UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

(Mark One)

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

For the quarterly period ended June 30, 2015

OR

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

For the transition period from_____ to_____

Commission File Number: 001-35966

bluebird bio, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**13-3680878**
(State or Other Jurisdiction of Incorporation or Organization)	**(IRS Employer Identification No.)**
150 Second Street Cambridge, Massachusetts	**02141**
(Address of Principal Executive Offices)	**(Zip Code)**

(339) 499-9300
(Registrant's Telephone Number, Including Area Code)

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

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

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐ (Do not check if a smaller reporting company)	Smaller reporting company	☐

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

As of July 31, 2015, there were 36,263,621 shares of the registrant's Common Stock, par value $0.01 per share, outstanding.

This Quarterly Report on Form 10-Q contains forward-looking statements that involve risks and uncertainties, as well as assumptions that, if they never materialize or prove incorrect, could cause our results to differ materially from those expressed or implied by such forward-looking statements. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. All statements other than statements of historical facts contained in this Quarterly Report on Form 10-Q are forward-looking statements. In some cases, you can identify forward-looking statements by words such as "anticipate," "believe," "contemplate," "continue," "could," "estimate," "expect," "intend," "may," "plan," "potential," "predict," "project," "seek," "should," "target," "will," "would," or the negative of these words or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- the initiation, timing, progress and results of our preclinical and clinical studies, and our research and development programs;
- our ability to advance product candidates into, and successfully complete, clinical studies;
- our ability to advance our viral vector manufacturing and transduction capabilities;
- the timing or likelihood of regulatory filings and approvals;
- the commercialization of our product candidates, if approved;
- the pricing and reimbursement of our product candidates, if approved;
- the implementation of our business model, strategic plans for our business, product candidates and technology;
- the scope of protection we are able to establish and maintain for intellectual property rights covering our product candidates and technology;
- estimates of our expenses, future revenues, capital requirements and our needs for additional financing;
- the potential benefits of strategic collaboration agreements and our ability to enter into strategic arrangements;
- our ability to maintain and establish collaborations or obtain additional grant funding;
- our financial performance;
- developments relating to our competitors and our industry; and
- other risks and uncertainties, including those listed under Part II, Item 1A. Risk Factors.

Any forward-looking statements in this Quarterly Report on Form 10-Q reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under Part II, Item 1A. Risk Factors and elsewhere in this Quarterly Report on Form 10-Q. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

This Quarterly Report on Form 10-Q also contains estimates, projections and other information concerning our industry, our business, and the markets for certain diseases, including data regarding the estimated size of those markets, and the incidence and prevalence of certain medical conditions. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources.

bluebird bio, Inc.
Form 10-Q
For the three and six months ended June 30, 2015

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PART I. FINANCIAL INFORMATION

Item 1. Financial Statements

bluebird bio, Inc.

Condensed Consolidated Balance Sheets
(unaudited)
(in thousands, except par value amounts)

	June 30, 2015	December 31, 2014
Assets		
Current assets:		
Cash and cash equivalents	$ 593,299	$ 347,845
Marketable securities	217,208	125,710
Deferred tax assets	399	1,913
Prepaid expenses and other current assets	4,546	4,521
Total current assets	815,452	479,989
Marketable securities	125,938	18,448
Property and equipment, net	16,803	15,740
Intangible assets, net	26,337	28,219
Goodwill	13,128	13,128
Restricted cash and other non-current assets	1,511	1,215
Total assets	$ 999,169	$ 556,739
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 2,339	$ 2,954
Accrued expenses and other current liabilities	20,024	14,649
Deferred revenue, current portion	5,670	25,375
Total current liabilities	28,033	42,978
Deferred rent, net of current portion	8,223	8,674
Deferred revenue, net of current portion	38,724	5,302
Contingent consideration, net of current portion	4,590	6,321
Deferred tax liabilities	399	1,913
Other non-current liabilities	234	294
Total liabilities	80,203	65,482
Commitments and contingencies *(Note 6)*		
Stockholders' equity:		
Preferred stock, $0.01 par value, 5,000 shares authorized; 0 shares issued and outstanding at June 30, 2015 and December 31, 2014	—	—
Common stock, $0.01 par value, 125,000 shares authorized; 35,958 and 32,340 shares issued and outstanding at June 30, 2015 and December 31, 2014, respectively	360	323
Additional paid-in capital	1,142,625	638,389
Accumulated other comprehensive loss	(53)	(71)
Accumulated deficit	(223,966)	(147,384)
Total stockholders' equity	918,966	491,257
Total liabilities and stockholders' equity	$ 999,169	$ 556,739

See accompanying notes to unaudited condensed consolidated financial statements.

bluebird bio, Inc.

Condensed Consolidated Statements of Operations and Comprehensive Loss
(unaudited)
(in thousands, except per share data)

	Three months ended June 30,		Six months ended June 30,	
	2015	2014	2015	2014
Revenue:				
Collaboration revenue	$ 4,940	$ 6,250	$ 11,284	$ 12,500
Research and license fees	—	85	—	170
Total revenue	4,940	6,335	11,284	12,670
Operating expenses:				
Research and development	44,266	13,931	67,985	25,394
General and administrative	10,724	5,738	18,060	11,277
Change in fair value of contingent consideration	1,973	—	2,188	—
Total operating expenses	56,963	19,669	88,233	36,671
Loss from operations	(52,023)	(13,334)	(76,949)	(24,001)
Other income, net	228	11	367	69
Loss before income taxes	(51,795)	(13,323)	(76,582)	(23,932)
Benefit from income taxes	—	11,797	—	11,797
Net loss	$ (51,795)	$ (1,526)	$ (76,582)	$ (12,135)
Other comprehensive loss:				
Unrealized gain on available-for-sale securities, net of tax	70	—	18	—
Comprehensive loss	$ (51,725)	$ (1,526)	$ (76,564)	$ (12,135)
Net loss per share - basic and diluted:	$ (1.57)	$ (0.06)	$ (2.34)	$ (0.50)
Weighted-average number of common shares used in computing net loss per share - basic and diluted:	32,955	24,474	32,757	24,312

See accompanying notes to unaudited condensed consolidated financial statements.

bluebird bio, Inc.

Condensed Consolidated Statements of Cash Flows
(unaudited)
(in thousands)

	Six months ended June 30,	
	2015	**2014**
Operating activities		
Net loss	$ (76,582)	$ (12,135)
Adjustments to reconcile net loss to net cash used in operating activities:		
Non-cash benefit on release of tax valuation allowance	—	(11,797)
Depreciation and amortization	3,509	1,017
Stock-based compensation expense	21,482	4,843
Change in fair value of contingent consideration	2,188	—
Other non-cash items	269	168
Changes in operating assets and liabilities:		
Prepaid expenses and other assets	(1,059)	854
Accounts payable	(418)	(2,702)
Accrued expenses and other liabilities	1,098	7,674
Deferred revenue	13,716	(12,670)
Deferred rent	(480)	1,490
Net cash used in operating activities	(36,277)	(23,258)
Investing activities		
Restricted cash	359	—
Purchase of property and equipment	(2,568)	(4,534)
Acquisition of business, net of cash acquired	—	(4,673)
Purchases of marketable securities	(261,440)	—
Proceeds from maturities of marketable securities	62,680	—
Net cash used in investing activities	(200,969)	(9,207)
Financing activities		
Proceeds from public offering of common stock, net of issuance costs	477,179	—
Proceeds from issuance of common stock	5,521	1,896
Net cash provided by financing activities	482,700	1,896
Increase (decrease) in cash and cash equivalents	245,454	(30,569)
Cash and cash equivalents at beginning of period	347,845	206,279
Cash and cash equivalents at end of period	$ 593,299	$ 175,710
Non-cash investing and financing activities:		
Assets acquired in acquisition	$ —	$ 43,759
Liabilities assumed in acquisition	$ —	$ 12,768
Equity issued in acquisition	$ —	$ 19,348
Purchases of property and equipment included in accounts payable and accrued expenses	$ 524	$ 344
Offering expenses included in accounts payable and accrued expenses	$ 115	$ 45
Stock option exercise proceeds receivable	$ 181	$ 75

See accompanying notes to unaudited condensed consolidated financial statements.

1. Description of the business

bluebird bio, Inc. (the "Company" or "bluebird") was incorporated in Delaware on April 16, 1992, and is headquartered in Cambridge, Massachusetts. The Company was formed to develop, manufacture and market therapies to safely and effectively deliver genes useful in the treatment of severe genetic and rare diseases and in the field of T cell-based immunotherapy. Since its inception, the Company has devoted substantially all of its resources to its research and development efforts relating to its product candidates, including activities to manufacture product candidates, conduct clinical studies of its product candidates, perform preclinical research to identify new product candidates and provide general and administrative support for these operations.

In June 2015, the Company sold 2,941,176 shares of common stock through an underwritten public offering at a price of $170.00 per share. The aggregate net proceeds received by the Company from the offering were $477.2 million, net of underwriting discounts and commissions and estimated offering expenses payable by the Company of approximately $22.8 million.

2. Summary of significant accounting policies and basis of presentation

Basis of presentation and principles of consolidation

The accompanying condensed consolidated financial statements are unaudited and have been prepared by the Company in accordance with accounting principles generally accepted in the United States ("GAAP") as found in the Accounting Standards Codification ("ASC") and Accounting Standards Update ("ASU") of the Financial Accounting Standards Board ("FASB"). Certain information and footnote disclosures normally included in the Company's annual financial statements have been condensed or omitted. These interim condensed consolidated financial statements, in the opinion of management, reflect all normal recurring adjustments necessary for a fair presentation of the Company's financial position and results of operations for the interim periods ended June 30, 2015 and 2014.

The results of operations for the interim periods are not necessarily indicative of the results of operations to be expected for the full year. These interim financial statements should be read in conjunction with the audited financial statements as of and for the year ended December 31, 2014, and the notes thereto, which are included in the Company's Annual Report on Form 10-K filed with the Securities and Exchange Commission (the "SEC") on February 25, 2015.

The accompanying condensed consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries: Precision Genome Engineering, Inc. ("Pregenen"), bluebird bio France – SARL, bluebird bio Australia Pty Ltd. and bluebird bio Securities Corporation. All intercompany balances and transactions have been eliminated in consolidation. Any reference in these notes to applicable guidance is meant to refer to GAAP. The Company views its operations and manages its business in one operating segment. All material long-lived assets of the Company reside in the United States.

Summary of accounting policies

The significant accounting policies and estimates used in preparation of the condensed consolidated financial statements are described in the Company's audited financial statements as of and for the year ended December 31, 2014, and the notes thereto, which are included in the Company's Annual Report on Form 10-K. There have been no material changes in the Company's significant accounting policies during the six months ended June 30, 2015.

Contingent consideration

Each reporting period, the Company revalues the contingent consideration obligations associated with business combinations to their fair value and records within operating expenses increases in their fair value as contingent consideration expense and decreases in the fair value as contingent consideration income. Changes in contingent consideration result from changes in the assumptions regarding probabilities of successful achievement of related milestones, the estimated timing in which the milestones are achieved and the discount rate used to estimate the fair value of the liability. Contingent consideration may change significantly as development of the Company's programs in certain indications progress and additional data are obtained, impacting the Company's assumptions. The assumptions used in estimating fair value require significant judgment. The use of different assumptions and judgments could result in a materially different estimate of fair value. See Note 4, "Fair value measurements," for additional information.

Net income (loss) per share

Basic net income (loss) per share is calculated by dividing net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding during the period. Diluted net income per share is calculated by dividing the net income attributable to common stockholders by the weighted-average number of common equivalent shares outstanding for the period, including any dilutive effect from outstanding stock options, unvested restricted stock, restricted stock units, employee stock purchase plan, warrants, and acquisition holdback shares using the treasury stock method.

Use of estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts in the financial statements and accompanying notes. Estimates are used in the following areas, among others: fair value estimates used to assess potential impairment of long-lived assets, contingent consideration, stock-based compensation expense, accrued expenses, revenue and income taxes. Actual results could materially differ from those estimates.

3. Marketable securities

The following table summarizes the available-for-sale securities held at June 30, 2015 and December 31, 2014 (in thousands):

Description	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
June 30, 2015				
U.S. government agency securities	$ 329,359	$ 29	$ (89)	$ 329,299
Certificates of deposit	13,840	8	(1)	13,847
Total	$ 343,199	$ 37	$ (90)	$ 343,146
December 31, 2014				
U.S. government agency securities	$ 131,589	$ 6	$ (59)	$ 131,536
Certificates of deposit	12,640	—	(18)	12,622
Total	$ 144,229	$ 6	$ (77)	$ 144,158

No available-for-sale securities held as of June 30, 2015 or December 31, 2014 had remaining maturities greater than two years.

4. Fair value measurements

The following table sets forth the Company's assets and liabilities that are measured at fair value on a recurring basis as of June 30, 2015 and December 31, 2014 (in thousands):

Description	Total	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
June 30, 2015				
Assets:				
Cash and cash equivalents	$ 593,299	$ 593,299	$ —	$ —
Marketable securities:				
U.S. government agency securities	329,299	—	329,299	—
Certificates of deposit	13,847	—	13,847	—
Total assets	$ 936,445	$ 593,299	$ 343,146	$ —
Liabilities:				
Contingent consideration	$ 7,984	$ —	$ —	$ 7,984
Total liabilities	$ 7,984	$ —	$ —	$ 7,984
December 31, 2014				
Assets:				
Cash and cash equivalents	$ 347,845	$ 347,845	$ —	$ —
Marketable securities:				
U.S. government agency securities	131,536	—	131,536	—
Certificates of deposit	12,622	—	12,622	—
Total assets	$ 492,003	$ 347,845	$ 144,158	$ —
Liabilities:				
Contingent consideration	$ 6,796	$ —	$ —	$ 6,796
Total liabilities	$ 6,796	$ —	$ —	$ 6,796

Cash and cash equivalents

The Company considers all highly liquid securities with original final maturities of three months or less from the date of purchase to be cash equivalents. As of June 30, 2015 and December 31, 2014, cash and cash equivalents comprise funds in cash and money market accounts.

Marketable securities

The amortized cost of available-for-sale securities is adjusted for amortization of premiums and accretion of discounts to maturity. At June 30, 2015 and December 31, 2014, the balance in the Company's accumulated other comprehensive loss was composed solely of activity related to the Company's available-for-sale marketable securities. There were no realized gains or losses recognized on the sale or maturity of available-for-sale securities during the six months ended June 30, 2015, and as a result, the Company did not reclassify any amounts out of accumulated other comprehensive income for the same period.

The aggregate fair value of securities held by the Company in an unrealized loss position for less than twelve months as of June 30, 2015 and December 31, 2014 was $181.3 million and $134.4 million, respectively. The Company has the intent and ability to hold such securities until recovery. The Company determined that there was no material change in the credit risk of the above investments. As a result, the Company determined it did not hold any investments with an other-than-temporary impairment as of June 30, 2015 and December 31, 2014.

Contingent consideration

In connection with the acquisition of Pregenen, the Company recorded contingent consideration pertaining to the amounts potentially payable to Pregenen's former equityholders pursuant to the Stock Purchase Agreement (the "Stock Purchase Agreement") by and among the Company, Pregenen and Pregenen's former equityholders. Contingent consideration is measured at fair value and is based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The valuation of contingent consideration uses assumptions the Company believes would be made by a market participant. The Company assesses these estimates on an on-going basis as additional data impacting the assumptions is obtained. Future changes in the fair value of contingent consideration related to updated assumptions and estimates are recognized within the condensed consolidated statements of operations and comprehensive loss.

Contingent consideration may change significantly as development progresses and additional data are obtained, impacting the Company's assumptions regarding probabilities of successful achievement of related milestones used to estimate the fair value of the liability and the timing in which they are expected to be achieved. In evaluating the fair value information, considerable judgment is required to interpret the market data used to develop the estimates. The estimates of fair value may not be indicative of the amounts that could be realized in a current market exchange. Accordingly, the use of different market assumptions and/or different valuation techniques could result in materially different fair value estimates.

The significant unobservable inputs used in the measurement of fair value of the Company's contingent consideration are probabilities of successful achievement of preclinical, clinical and commercial milestones, the period in which these milestones are expected to be achieved ranging from 2016 to 2026 and discount rates ranging from 10.5% to 14.7%. Significant increases or decreases in any of the probabilities of success would result in a significantly higher or lower fair value measurement, respectively. Significant increases or decreases in these other inputs would result in a significantly lower or higher fair value measurement, respectively.

The table below provides a roll-forward of fair value of the Company's contingent consideration obligations, which include Level 3 inputs (in thousands):

	Six Months Ended June 30, 2015
Beginning balance	$ 6,796
Additions	—
Changes in fair value	2,188
Reclassification to accrued expenses	(1,000)
Payments	—
Ending balance	$ 7,984

As of June 30, 2015, $3.4 million of the fair value of the Company's total contingent consideration obligations was reflected as a component of accrued expenses and other current liabilities within the condensed consolidated balance sheets, with the remaining balance of $4.5 million reflected as a non-current liability. During the second quarter of 2015, a $1.0 million milestone under the Stock Purchase Agreement was achieved and was recorded in accrued expenses and other current liabilities as of June 30, 2015. $1.0 million was paid to the former equityholders of Pregenen during the third quarter of 2015.

5. Accrued expenses and other current liabilities

Accrued expenses and other current liabilities consist of the following (in thousands):

	June 30, 2015	December 31, 2014
Employee compensation	$ 3,937	$ 4,943
Accrued good and services	10,303	7,358
Accrued professional fees	1,090	428
Deferred rent, current portion	885	914
Contingent consideration, current portion	3,394	475
Other	415	531
Total accrued expenses and other current liabilities	$ 20,024	$ 14,649

The change in fair value of contingent consideration was primarily related to an increase in the probability of successful achievement of milestones expected to be achieved within the next twelve months.

6. Commitments and contingencies

The Company is party to various agreements, principally relating to licensed technology, that require future payments relating to milestones not met at June 30, 2015 and December 31, 2014 or royalties on future sales of specified products.

The Company enters into standard indemnification agreements in the ordinary course of business. Pursuant to these agreements, the Company indemnifies, holds harmless, and agrees to reimburse the indemnified party for losses suffered or incurred by the indemnified party, generally the Company's business partners or customers, in connection with claims by any third party with respect to the Company's products or business activities. The term of these indemnification agreements is generally perpetual any time after execution of the agreement. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is unlimited. The Company has never incurred costs to defend lawsuits or settle claims related to these indemnification agreements.

The Company's wholly-owned subsidiary bluebird bio France – SARL participates in the French Crédit d'Impôt Recherche ("CIR") program, which allows companies to monetize up to 30% of eligible research expenses. The Company received aggregate reimbursement of €1.1 million related to years 2011 through 2013. The Company applied for €0.7 million related to 2014, which was classified in current assets within the condensed consolidated balance sheets as of June 30, 2015 and was received during the third quarter of 2015. The Company has not yet applied for €0.3 million related to the six months ended June 30, 2015, which is classified as non-current assets within the condensed consolidated balance sheets as of June 30, 2015. The years 2011 through 2015 are open and subject to examination.

On June 30, 2014, the Company acquired Pregenen. During the second quarter of 2015, a $1.0 million milestone under the Stock Purchase Agreement was achieved, which resulted in a $1.0 million payment to the former equityholders of Pregenen during the third quarter of 2015. The Company may be required to make up to an additional $134.0 million in future contingent cash payments to the former equityholders of Pregenen upon the achievement of certain preclinical, clinical and commercial milestones related to the Pregenen technology, of which $14.0 million relates to preclinical milestones, $20.1 million relates to clinical milestones and $99.9 million relates to commercial milestones. In accordance with accounting for business combinations guidance, contingent consideration liabilities are required to be recognized on the condensed consolidated balance sheets at fair value. Estimating the fair value of contingent consideration requires the use of significant assumptions primarily relating to probabilities of successful achievement of certain preclinical, clinical and commercial milestones, the expected timing in which these milestones will be achieved and discount rates. The use of different assumptions could result in materially different estimates of fair value. See Note 4, "Fair value measurements," for additional information.

On June 29, 2015, the Company entered into a lease agreement for additional office space located at 215 First Street, Cambridge, Massachusetts. Under the terms of the lease, the Company leased approximately 15,120 square feet starting on July 13, 2015 for $483,840 per year in base rent, which is subject to a 3% annual increase plus certain operating expenses and taxes. The lease will continue until the end of the sixtieth full calendar month following the date the landlord delivers the premises to the Company. Under

the terms of the lease, the Company will also lease an additional 8,075 square feet of office space in the same premises starting on January 1, 2016 for an additional $258,400 per year in base rent, which is subject to a 3% annual increase plus certain operating expenses and taxes.

7. Significant agreements

Celgene Corporation

Original Collaboration Agreement

On March 19, 2013, the Company entered into a Master Collaboration Agreement (the "Collaboration Agreement") with Celgene Corporation ("Celgene") to discover, develop and commercialize potentially disease-altering gene therapies in oncology. The collaboration is focused on applying gene therapy technology to genetically modify a patient's own T cells, known as chimeric antigen receptor, or CAR T cells, to target and destroy cancer cells. Additionally, on March 19, 2013, the Company entered into a Platform Technology Sublicense Agreement (the "Sublicense Agreement") with Celgene pursuant to which the Company obtained a sublicense to certain intellectual property from Celgene, originating under Celgene's license from Baylor College of Medicine, for use in the collaboration.

Under the terms of the Collaboration Agreement, the Company received a $75.0 million up-front, non-refundable cash payment. The Company is responsible for conducting discovery, research and development activities through completion of Phase I clinical studies, if any, during the initial term of the agreement, or three years. The collaboration is governed by a joint steering committee ("JSC") formed by an equal number of representatives from the Company and Celgene. The JSC, among other activities, review the collaboration program, review and evaluate product candidates and approve regulatory plans. In addition to the JSC, the Collaboration Agreement provides that the Company and Celgene each appoint representatives to a patent committee, which is responsible for managing the intellectual property developed and used during the collaboration.

Summary of the Amended Collaboration Agreement

On June 3, 2015, the Company and Celgene amended and restated the Collaboration Agreement (the "Amended Collaboration Agreement"). Under the Amended Collaboration Agreement, the parties will now focus the collaboration exclusively on anti- B-cell maturation antigen ("BCMA") product candidates for an additional three-year term. In connection with the Amended Collaboration Agreement, the Company received an upfront, one-time, non-refundable, non-creditable payment of $25.0 million to fund research and development under the collaboration. The collaboration will continue to be governed by the JSC.

Under the terms of the Amended Collaboration Agreement, for up to two product candidates selected for development under the collaboration, the Company is responsible for conducting and funding all research and development activities performed up through completion of the initial Phase I clinical study, if any, of such product candidate.

On a product candidate-by-product candidate basis, up through a specified period following enrollment of the first patient in an initial Phase I clinical study for such product candidate (the "Option Period"), the Company has granted Celgene an option to obtain an exclusive worldwide license to develop and commercialize such product candidate pursuant to a written agreement, the form of which the Company has already agreed upon, provided that, if Celgene does not exercise its option with respect to the first product candidate under the Amended Collaboration Agreement prior to the expiration of the applicable Option Period then it will not be permitted to exercise its option with respect to any future product candidates under the Amended Collaboration Agreement. In the event that Celgene exercises its option with respect to any product candidate, the Company may elect to co-develop and co-promote the product candidate in the United States, provided that, if the Company does not exercise its option co-develop and co-promote the first product candidate in-licensed by Celgene under the Amended Collaboration Agreement, then the Company will not be permitted to exercise its option to co-develop and co-promote any future product candidates under the Amended Collaboration Agreement.

If Celgene elects to exercise its option to exclusively in-license a product candidate, it must pay the Company an option fee in the amount of $10.0 million for the first product candidate and $15.0 million for any additional product candidates, plus an additional fee in the amount of $10.0 million in the event the Company does not exercise its option to co-develop and co-promote that product candidate in the United States. In addition to the applicable option fee, for each product candidate that is in-licensed by Celgene, and for which the Company does not exercise its option to co-develop and co-promote in the United States, the Company will be eligible to receive up to $10.0 million in clinical milestone payments, up to $117.0 million in regulatory milestone payments and up to $78.0 million in commercial milestone payments. The Company will also be eligible to receive a percentage of net sales as a royalty in a

range from the mid-single digits to low-teens. The royalties payable to the Company are subject to certain reductions, including for any royalty payments required to be made by Celgene to acquire patent rights, with an aggregate minimum floor. Celgene will assume certain development obligations and must report on its progress in achieving these milestones on a quarterly basis.

If the Company elects to co-develop and co-promote a product candidate licensed by Celgene, then the Company and Celgene would share equally in all costs incurred relating to the development, commercialization and manufacturing of the product candidate within the United States and share equally in the profits generated by such product candidate in the United States. Additionally, if the Company elects to co-develop and co-promote a product candidate, then the milestones and royalties would decrease compared to those described above. Under this scenario, the Company would receive, per product, up to $10.0 million in clinical milestone payments and, outside of the United States, up to $54.0 million in regulatory milestone payments and up to $36.0 million in commercial milestone payments. In addition, to the extent any of the product candidates licensed by Celgene and co-developed and co-promoted by the Company are commercialized, the Company would be entitled to receive tiered royalty payments ranging from the mid-single digits to low-teens based on a percentage of net sales from sales generated outside of the United States. The royalties payable to the Company are subject to certain reductions, including for any royalty payments required to be made by Celgene to acquire patent rights, with an aggregate minimum floor. The co-development and co-promotion agreement would be governed by a joint governance committee, or JGC, formed by representatives from the Company and Celgene. The JGC will, among other activities, supervise the overall performance of the development and commercialization of elected product candidates and licensed products for United States administration.

Celgene is solely responsible for the manufacture and supply of drug product for any optioned product candidate. Under the Amended Collaboration Agreement, subject to customary "back-up" supply rights granted to Celgene, the Company has the sole right to manufacture or have manufactured supplies of vectors and associated payloads manufactured for incorporation into the optioned product candidate. Celgene would reimburse the Company for its costs to manufacture and supply such vectors and associated payloads, plus a mid-single digit mark-up.

If Celgene does not exercise its option with respect to any product candidate prior to expiration of the applicable option period, then the Company has the right to develop that product candidate outside the scope of the Amended Collaboration Agreement.

Either party may terminate the Amended Collaboration Agreement upon written notice to the other party in the event of the other party's uncured material breach. Celgene may terminate the Amended Collaboration Agreement for any reason upon prior written notice to the Company. If the agreement is terminated, rights to product candidates in development at the time of such termination will be allocated to the parties through a mechanism included in the agreement. In addition, if Celgene terminates the agreement for the Company's breach, any then-existing co-development and co-promotion agreement will be automatically terminated and replaced with a license agreement for such product candidate and any amounts payable by Celgene under any then-existing product license agreements will be reduced.

Under the Amended Collaboration Agreement, the so-called "call option" under the prior collaboration agreement, pursuant to which Celgene had the option to terminate the collaboration agreement and obtain fully paid-up licenses to product candidates in the event of a change of control transaction involving the Company, has been eliminated.

Under the Sublicense Agreement, the Company will continue to have access to certain intellectual property rights in-licensed to Celgene pursuant to its collaboration agreement with the Baylor College of Medicine, which was first established in connection with the initiation of the original Collaboration Agreement between the Company and Celgene.

Accounting Analysis

The Company's Amended Collaboration Agreement with Celgene contains the following deliverables: (i) research and development services, (ii) participation on the JSC, (iii) participation on the patent committee, (iv) a license to the first product candidate, (v) manufacture of vectors and associated payload for incorporation into the first optioned product candidate under the license, and (vi) participation on the JGC under the co-development and co-promotion agreement for the first optioned product candidate under the license.

The license to the first product candidate is considered a deliverable at the inception of the arrangement and therefore the associated option fee is included in allocable arrangement consideration. The Company believes there is minimal risk with regard to whether Celgene will exercise the option based on the successful completion of preclinical activities and proximity of enrollment of

the first patient in an initial Phase I clinical study for this product candidate. Further, Celgene loses the right to option any other product candidates if it does not agree to license the first product candidate. The Company has determined that the obligation within the license to manufacture or have manufactured supplies of vectors and associated payloads for incorporation into the first optioned product candidate is a deliverable, consistent with the option to license the first product candidate.

However, the Company has determined that the options to license any additional product candidates are substantive options and therefore are not considered deliverables at execution of the Amended Collaboration Agreement. Celgene is not contractually obligated to exercise the options. Additionally, as a result of the uncertain outcome of the discovery, research and development activities, the Company is at risk with regard to whether Celgene will exercise the options to license additional product candidates. Moreover, the Company has determined that the options are not priced at a significant and incremental discount. Accordingly, the options to other product candidates are not considered deliverables at the inception of the arrangement and the associated option fees are not included in allocable arrangement consideration.

The Company concluded that each of the three delivered elements at the inception of the agreement (research and development services, participation on the JSC and participation on the patent committee) has standalone value from the other undelivered elements. Additionally, the Amended Collaboration Agreement does not include return rights related to the collaboration term. Accordingly, each deliverable qualifies as a separate unit of accounting.

The Company determined that each of the identified deliverables have the same period of performance (the three year term through projected initial Phase I study completion) and have the same pattern of revenue recognition, ratably over the period of performance as there is no other discernible pattern of recognition. The Company identified the allocable arrangement consideration as the $25.0 million up-front research and development funding payment, $10.0 million option fee for the first product candidate, $20.0 million related to remaining deferred revenue from the original Collaboration Agreement, and $54.1 million of contingent revenue related to the estimated amounts that will be received from Celgene for manufacturing services. The $109.0 million total allocable arrangement consideration was allocated based on the relative estimated selling price of the separate units of accounting at the inception of the amended agreement, resulting in $17.3 million allocated to the three delivered elements at the inception of the agreement, which will be recognized over an initial three year term. This initial term will be revisited as the development plan timing changes or other events that impact the period over which the Company's obligations relate.

The Company evaluated all of the milestones that may be received in connection with Celgene's option to license a product candidate resulting from the collaboration. In evaluating if a milestone is substantive, the Company assesses whether: (i) the consideration is commensurate with either the Company's performance to achieve the milestone or the enhancement of the value of the delivered item(s) as a result of a specific outcome resulting from the Company's performance to achieve the milestone, (ii) the consideration relates solely to past performance and (iii) the consideration is reasonable relative to all of the deliverables and payment terms within the arrangement. All clinical and regulatory milestones that may be received under the option to the license agreement are considered substantive on the basis of the contingent nature of the milestone, specifically reviewing factors such as the scientific, clinical, regulatory, commercial and other risks that must be overcome to achieve the milestone as well as the level of effort and investment required. Accordingly, such amounts will be recognized as revenue in full in the period in which the associated milestone is achieved, assuming all other revenue recognition criteria are met. All commercial milestones will be accounted for in the same manner as royalties and recorded as revenue upon achievement of the milestone, assuming all other revenue recognition criteria are met.

During each of the six months ended June 30, 2015 and 2014, the Company recognized $11.3 million and $12.5 million, respectively, of revenue associated with its collaboration with Celgene related to the recognition of discovery, research and development services. As of June 30, 2015 and December 31, 2014, there was $44.4 million and $30.7 million, respectively, of total deferred revenue related to the Company's collaboration with Celgene, which is classified as current or non-current in the condensed consolidated balance sheets, $16.9 million of which will be recognized over three years with the remaining amount deferred until a later date.

8. Stock-based compensation and warrants

In January 2015, the number of shares of common stock available for issuance under the 2013 Stock Option and Incentive Plan ("2013 Plan") was increased by approximately 1.3 million shares as a result of the automatic increase provision of the 2013 Plan. As

of June 30, 2015, the total number of shares of common stock available for issuance under the 2013 Plan was approximately 0.9 million.

Stock-based compensation expense

Stock-based compensation expense by award type was as follows (in thousands):

	Three months ended June 30,		Six months ended June 30,	
	2015	2014	2015	2014
Stock options	$ 15,310	$ 2,335	$ 20,065	$ 4,812
Restricted stock awards	—	16	—	31
Restricted stock units	668	—	1,285	—
Employee stock purchase plan	72	—	132	—
	$ 16,050	$ 2,351	$ 21,482	$ 4,843

As of June 30, 2015, the Company had $80.5 million of unrecognized stock-based compensation expense, net of estimated forfeitures, related to unvested stock options, restricted stock units, and the employee stock purchase plan that is expected to be recognized over a weighted-average period of 2.9 years.

On January 29, 2015, the Company entered into a Transitional Services and Separation Agreement with its Chief Scientific Officer, ending his employment with the Company effective July 6, 2015. Subsequent to this separation date, he is serving as a member of the Company's Scientific Advisory Board. Under the terms of the agreement, outstanding options held by the Chief Scientific Officer were modified. The incremental value of the modification was estimated to be $3.0 million using a Black-Scholes option valuation model, which is being recognized within research and development expense on a straight-line basis through the date of separation. As a result of the modification, the Company recognized $1.8 million and $2.8 million of stock-based compensation expense during the three and six months ended June 30, 2015, respectively.

On April 10, 2015, the Company modified the vesting conditions of a stock option award held by a non-employee founder, which resulted in $6.7 million of stock-based compensation expense recognized to research and development expense during the second quarter of 2015.

Restricted stock units

The following table summarizes the restricted stock unit activity under the Company's equity award plans (shares in thousands):

	Shares	Weighted-average grant date fair value
Unvested balance at December 31, 2014	179	$ 30.47
Granted	25	$ 179.30
Vested	—	—
Forfeited	(1)	$ 30.47
Unvested balance at June 30, 2015	203	$ 48.77

Stock options

The following table summarizes the stock option activity under the Company's equity award plans (shares in thousands):

	Shares	Weighted-average exercise price per share
Outstanding at December 31, 2014	3,652	$ 12.30
Granted	915	$ 106.87
Exercised	(671)	$ 7.97
Canceled or forfeited	(43)	$ 44.68
Outstanding at June 30, 2015	3,853	$ 35.15
Exercisable at June 30, 2015	1,325	$ 7.89
Vested and expected to vest at June 30, 2015	3,776	$ 35.61

Options exercisable for approximately 0.7 million shares of common stock were exercised during the six months ended June 30, 2015, resulting in total proceeds to the Company of $5.3 million. In accordance with the Company's stock option plans, the shares were issued from a pool of shares reserved for issuance under the stock option plans.

Employee stock purchase plan

The Company's 2013 Employee Stock Purchase Plan ("2013 ESPP") authorizes the initial issuance of up to a total of 238,000 shares of the Company's common stock to participating employees. The first offering period under the 2013 ESPP closed on January 31, 2015, resulting in the purchase of 6,780 common shares.

Warrants

As of June 30, 2015 and December 31, 2014, the Company had 0.2 million warrants outstanding to purchase common stock. During the six months ended June 30, 2015, there were no warrants exercised and no cancellations or expirations.

9. Income taxes

Deferred tax assets and deferred tax liabilities are recognized based on temporary differences between the financial reporting and tax basis of assets and liabilities using statutory rates. A valuation allowance is recorded against deferred tax assets if it is more likely than not that some or all of the deferred tax assets will not be realized. Due to the uncertainty surrounding the realization of the favorable tax attributes in future tax returns, the Company has recorded a full valuation allowance against the Company's otherwise recognizable net deferred tax assets. The Company has allocated its valuation allowance in accordance with the provisions of ASC 740, *Income Taxes*, which resulted in a current deferred tax asset of $0.4 million and a non-current deferred tax liability of $0.4 million as of June 30, 2015.

10. Net loss per share

The following common stock equivalents were excluded from the calculation of diluted net loss per share for the periods indicated because including them would have had an anti-dilutive effect (in thousands):

	Three and six months ended June 30,	
	2015	2014
Warrants	177	338
Outstanding stock options	3,853	4,112
Unvested restricted stock	—	27
Restricted stock units	203	—
ESPP shares	4	—
Acquisition holdback	94	94
	4,331	4,571

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

The following information should be read in conjunction with the unaudited financial information and the notes thereto included in this Quarterly Report on Form 10-Q and the audited financial information and the notes thereto included in our Annual Report on Form 10-K, which was filed with the Securities and Exchange Commission, or the SEC, on February 25, 2015.

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

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

The following information and any forward-looking statements should be considered in light of factors discussed elsewhere in this Quarterly Report on Form 10-Q, including those risks identified under Part II, Item 1A. Risk Factors.

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

Overview

We are a clinical-stage biotechnology company committed to developing potentially transformative gene therapies for severe genetic and rare diseases and in the field of T cell-based immunotherapy. With our lentiviral-based gene therapy and gene editing capabilities, we have built an integrated product platform with broad potential application in these areas. We believe that gene therapy for severe genetic diseases has the potential to change the way these patients are treated by correcting the underlying genetic defect that is the cause of their disease, rather than offering treatments that only address their symptoms. We and our scientific collaborators have generated what we believe is human proof-of-concept data for our gene therapy platform in three underserved diseases, each of which has been granted orphan drug status by U.S. and European regulatory authorities.

We are conducting a Phase II/III clinical study, called the Starbeam Study, of our most advanced product candidate, Lenti-D, to evaluate its safety and efficacy in subjects with childhood cerebral adrenoleukodystrophy, or CCALD, a rare, hereditary neurological disorder affecting young boys that is often fatal. In October 2013, we announced that the first subject had been treated in this study and in May 2015 we announced the achievement of enrollment of 18 subjects in this study. We are also conducting an observational study of subjects with CCALD treated by allogeneic hematopoietic stem-cell transplant referred to as the ALD-103 study.

We are also conducting two Phase I/II clinical studies in the United States, Australia, and Thailand and in France, called the Northstar (HGB-204) and HGB-205 studies, respectively, of our product candidate, LentiGlobin, to evaluate its safety and efficacy in subjects with beta-thalassemia major and sickle cell disease, or SCD, which are rare, hereditary blood disorders that often lead to severe anemia and shortened lifespans. We have initiated a Phase I clinical study in the United States, called the HGB-206 Study, to evaluate the safety and efficacy of LentiGlobin in subjects with severe SCD. In June 2015, we announced that the first patient with severe SCD had been infused in the HGB-206 Study.

We recently announced clinical data from our ongoing clinical studies of LentiGlobin in subjects with beta-thalassemia major and SCD. These data are summarized below.

- In December 2014, at the annual meeting of the American Society of Hematology (ASH), we announced data from the first eight subjects treated with LentiGlobin in these studies. As of December 2014, in the first four subjects, each of whom had at

least three months of follow-up, treatment with LentiGlobin resulted in sufficient hemoglobin production to reduce or eliminate the need for transfusion support among patients with beta-thalassemia major who would otherwise require chronic blood transfusions. These data included the first five subjects treated in the Northstar study and the first three subjects (two with beta-thalassemia major and one with severe SCD) from the HGB-205 study.

- In June 2015, at the 20th Congress of the European Hematology Association, we announced long-term follow up of two subjects with beta-thalassemia major and early safety and efficacy data in the first subject with severe SCD treated with LentiGlobin in the HGB-205 study. As of May 2015, the two patients with beta-thalassemia major remained transfusion-independent for 16 and 14 months, respectively, and neither experienced a LentiGlobin-related adverse event. As of May 2015, the proportion of anti-sickling hemoglobin being produced by the first-ever subject with severe SCD treated with gene therapy has risen steadily and accounted for 45% of all hemoglobin production at the patient's six-month visit post-drug product infusion; this is above the 30% threshold expected to potentially achieve a disease-modifying clinical effect. Further, as of May 2015, the patient with severe SCD had been free of transfusions for more than three months without complications or hospitalizations for SCD-related events post-transplant, and has demonstrated improvement in hemolysis markers.

We also plan to initiate two new clinical trials of LentiGlobin, called HGB-207, for adult and adolescent patients with beta-thalassemia major, and HGB-208, for pediatric patients with beta-thalassemia major. Each of these trials, once initiated, are expected to enroll approximately 15 patients to be evaluated for 24 months following treatment, and we expect that the primary endpoint of these trials will be 12 months of transfusion independence following treatment.

In May 2015, we announced that we believe we have reached general agreement with regulatory authorities in Europe and the United States regarding our development plans for LentiGlobin, which could potentially result in accelerated approvals in these jurisdictions. These discussions are summarized below.

- In Europe, we are participating in the Adaptive Pathways (formerly referred to as Adaptive Licensing) pilot program of the European Medicines Agency, or EMA. Based on our discussions with EMA, we believe it is possible to seek conditional approval of LentiGlobin for the treatment of adults and adolescents with beta-thalassemia major on the basis of the totality of clinical data, in particular reduction in transfusion need, from the ongoing Northstar study and supportive HGB-205 study. We believe that conversion to full approval will be subject to the successful completion of the HGB-207 and HGB-208 clinical trials, and collection of supportive long-term follow-up data and "real-life" post-approval data.
- In the United States, we believe we have reached general agreement with the U.S. Food and Drug Administration, or FDA, on the major elements of our planned HGB-207 and HGB-208 clinical trials. Based on our discussions with the FDA, we believe that the data from these trials, together with data from our ongoing beta-thalassemia major clinical studies (Northstar and HGB-205), could form the basis for a Biologics License Application, or BLA, submission for LentiGlobin for the treatment of beta-thalassemia major.

In June 2015, the National Institutes of Health (NIH) Recombinant DNA Advisory Committee's (RAC) recommended that we delay the initiation of the HGB-208 clinical trial for pediatric patients with beta-thalassemia major for an additional one to two years in order to obtain more safety and efficacy data in adults and adolescents to demonstrate a higher benefit with LentiGlobin as compared to alternative treatments. We believe this recommendation has no impact on our planned HGB-207 clinical trial for adult and adolescent patients with beta-thalassemia major. We still expect to initiate the HGB-208 clinical trial for pediatric patients in the United States and Europe after consultation with the appropriate regulatory agencies, institutional review boards and clinical trial sites.

In March 2013, we entered into a global strategic collaboration with Celgene Corporation, or Celgene, to discover, develop and commercialize chimeric antigen receptor-modified T cells, or CAR T cells, as potentially disease-altering therapies in oncology. This collaboration had an initial term of three years, and Celgene made a $75.0 million up-front, non-refundable cash payment to us as consideration for entering into the collaboration. In June 2015, we amended and restated the collaboration agreement, or the Amended Collaboration Agreement, to focus exclusively on anti-BCMA product candidates for an additional three-year term. B-cell maturation antigen, or BCMA, is a cell surface protein that is expressed in normal plasma cells and in most multiple myeloma cells, but is absent from other normal tissues. As consideration for the Amended Collaboration Agreement, we received an upfront, non-refundable cash payment of $25.0 million to fund research and development under the collaboration. During the three and six months ended June 30, 2015, we recognized $4.9 million and $11.3 million, respectively, of revenue associated with our collaboration with Celgene related to the research and development services performed. As of June 30, 2015, we have classified $44.4 million of deferred revenue related to our collaboration with Celgene in the accompanying balance sheets. We expect the first product candidate from this collaboration, bb2121, to enter clinical trials in early 2016.

In June 2014, we acquired Precision Genome Engineering, Inc., or Pregenen, a privately-held biotechnology company headquartered in Seattle, Washington. Through the acquisition, we obtained rights to Pregenen's gene editing and cell signaling technology. The agreement provided for up to $135.0 million in future contingent cash payments by us upon the achievement of

certain preclinical, clinical and commercial milestones related to the Pregenen technology, of which $15.0 million relates to preclinical milestones, $20.1 million relates to clinical milestones and $99.9 million relates to commercial milestones. During the second quarter of 2015, a $1.0 million milestone was achieved, which resulted in a $1.0 million payment to the former equityholders of Pregenen during the third quarter of 2015. We estimate future contingent cash payments have a fair value of $7.9 million as of June 30, 2015, $3.4 million of which is current.

As of June 30, 2015, we had cash, cash equivalents and marketable securities of approximately $936.4 million. We expect our cash, cash equivalents and marketable securities to fund operations through 2018.

Since our inception in 1992, we have devoted substantially all of our resources to our development efforts relating to our product candidates, including activities to manufacture product in compliance with good manufacturing practices, or GMP, to conduct clinical studies of our product candidates, to provide general and administrative support for these operations and to protect our intellectual property. We do not have any products approved for sale and have not generated any revenue from product sales. We have funded our operations primarily through the sale of common stock in our public offerings, private placements of preferred stock and warrants and through collaborations.

We have never been profitable and have incurred net losses in each year since inception. Our net losses were $76.6 million for the six months ended June 30, 2015 and our accumulated deficit was $224.0 million as of June 30, 2015. Substantially all our net losses resulted from costs incurred in connection with our research and development programs and from general and administrative costs associated with our operations. We expect to continue to incur significant expenses and increasing operating losses for at least the next several years. We expect our expenses will increase substantially in connection with our ongoing and planned activities, as we:

- conduct clinical studies for our Lenti-D and LentiGlobin product candidates;
- increase research and development-related activities for the discovery and development of oncology product candidates;
- continue our research and development efforts;
- manufacture clinical study materials and develop large-scale manufacturing capabilities;
- seek regulatory approval for our product candidates; and
- add personnel to support our product development and commercialization efforts.

We do not expect to generate revenue from product sales unless and until we successfully complete development and obtain regulatory approval for one or more of our product candidates, which we expect will take a number of years and is subject to significant uncertainty. We have no commercial-scale manufacturing facilities, and all of our manufacturing activities are contracted out to third parties. Additionally, we currently utilize third-party contract research organizations, or CROs, to carry out our clinical development activities; and we do not yet have a sales and marketing organization. If we obtain regulatory approval for any of our product candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing, and distribution. Accordingly, we will seek to fund our operations through public or private equity or debt financings, strategic collaborations, or other sources. However, we may be unable to raise additional funds or enter into such other arrangements when needed on favorable terms or at all. Our failure to raise capital or enter into such other arrangements as and when needed would have a negative impact on our financial condition and our ability to develop our products.

Because of the numerous risks and uncertainties associated with product development, we are unable to predict the timing or amount of increased expenses or when or if we will be able to achieve or maintain profitability. Even if we are able to generate revenues from the sale of our products, we may not become profitable. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce our operations.

Financial operations overview

Revenue

To date, we have not generated any revenues from the sale of products. Our revenues have been derived from collaboration arrangements, research fees, license fees and grant revenues.

Collaboration revenue is generated exclusively from our collaboration arrangement with Celgene. The terms of this arrangement contain multiple deliverables, which include: (i) research and development services, (ii) participation on the joint steering committee (iii) participation on the patent committee, (iv) a license to the first product candidate, (v) manufacture of vectors and associated payload for incorporation into the first optioned product candidate under the license, and (vi) participation on the joint governance

committee under the co-development and co-promotion agreement for the first optioned product candidate under the license. We recognize arrangement consideration allocated to each unit of accounting when all of the revenue recognition criteria in Financial Accounting Standards Board, or FASB, Accounting Standards Codification, or ASC, Topic 605, *Revenue Recognition*, or ASC 605, are satisfied for that particular unit of accounting. $17.3 million of revenue from the Celgene arrangement associated with research and development services, joint steering committee services and patent committee services will be recognized ratably over the associated period of performance, which is initially estimated to be three years.

Research and license fee revenue is primarily generated through license and research and development agreements with strategic partners and nonprofit organizations for the development and commercialization of our product candidates. There are no performance, cancellation, termination, or refund provisions in any of our arrangements that contain material financial consequences to us.

Nonrefundable license fees are recognized as revenue upon delivery provided there are no undelivered elements in the arrangement. Research fees are recognized as revenue over the period we perform the associated services or on a straight-line basis if the pattern of performance cannot be estimated.

Research and development expenses

Research and development expenses consist primarily of costs incurred for the development of our product candidates, which include:

- employee-related expenses, including salaries, benefits, travel and stock-based compensation expense;
- expenses incurred under agreements with CROs and clinical sites that conduct our clinical studies;
- costs of acquiring, developing, and manufacturing clinical study materials;
- facilities, depreciation, and other expenses, which include direct and allocated expenses for rent and maintenance of facilities, insurance, and other supplies;
- costs associated with our research platform and preclinical activities;
- costs associated with in-licensing other product candidates or technologies for use in preclinical and clinical activities;
- costs associated with our regulatory, quality assurance and quality control operations; and
- amortization of intangible assets.

Research and development costs are expensed as incurred. Costs for certain development activities are recognized based on an evaluation of the progress to completion of specific tasks using information and data provided to us by our vendors and our clinical sites. We cannot determine with certainty the duration and completion costs of the current or future clinical studies of our product candidates or if, when, or to what extent we will generate revenues from the commercialization and sale of any of our product candidates that obtain regulatory approval. We may never succeed in achieving regulatory approval for any of our product candidates. The duration, costs, and timing of clinical studies and development of our product candidates will depend on a variety of factors, including:

- the scope, rate of progress, and expense of our ongoing as well as any additional clinical studies and other research and development activities we undertake;
- future clinical study results;
- uncertainties in clinical study enrollment rates;
- changing standards for regulatory approval; and
- the timing and receipt of any regulatory approvals.

A change in the outcome of any of these variables with respect to the development of a product candidate could mean a significant change in the costs and timing associated with the development of that product candidate. For example, if the FDA, or another regulatory authority were to require us to conduct clinical studies beyond those that we currently anticipate will be required for the completion of clinical development of a product candidate or if we experience significant delays in enrollment in any of our clinical studies, we could be required to expend significant additional financial resources and time on the completion of clinical development for our product candidates.

We plan to increase our research and development expenses for the foreseeable future as we continue to advance the clinical development of our Lenti-D and LentiGlobin product candidates, conduct research and development activities in the field of oncology and continue the research and development of product candidates using our gene editing technology platform. Our research and development activities include the following:

- We are conducting a Phase II/III clinical study to examine the safety and efficacy of our Lenti-D product candidate in the treatment of CCALD. In October 2013, we announced that the first subject had been treated in this study and in May 2015 we announced the achievement of enrollment of 18 subjects in this study. We are also conducting an observational study of subjects with CCALD treated by allogeneic hematopoietic stem-cell transplant.
- We are conducting a Phase I/II clinical study in the United States, Australia and Thailand to study the safety and efficacy of our LentiGlobin product candidate in the treatment of subjects with beta-thalassemia major. In March 2014, we announced that the first subject had been treated in this study. We recently amended the protocol for this study to expand enrollment to include up to three adolescent patients.
- We are conducting a Phase I/II clinical study in France to study the safety and efficacy of our LentiGlobin product candidate in the treatment of subjects with beta-thalassemia major and severe SCD. In December 2013, we announced that the first subject beta-thalassemia major had been treated in this study and in October 2014, we announced that the first subject with SCD had been treated in this study.
- We have initiated a Phase I clinical study in the United States to study the safety and efficacy of our LentiGlobin product candidate in the treatment of subjects with severe SCD. In June 2015, we announced that the first patient with severe SCD had been infused in the HGB-206 Study.
- We are conducting research and development activities in the field of oncology and expect the first product candidate from our collaboration with Celgene, bb2121 to treat multiple myeloma, to enter clinical trials in early 2016.
- We are planning to initiate two new clinical trials of LentiGlobin, called HGB-207, for adult and adolescent patients with beta-thalassemia major, and HGB-208, for pediatric patients with beta-thalassemia major.
- We will continue to manufacture clinical study materials in support of our clinical studies.

Our direct research and development expenses consist principally of external costs, such as fees paid to investigators, consultants, central laboratories and CROs in connection with our clinical studies, costs to in-license product candidates and new technologies, and costs related to acquiring and manufacturing clinical study materials. We allocate salary and benefit costs directly related to specific programs. We do not allocate personnel-related discretionary bonus or stock-based compensation costs, costs associated with our general discovery platform improvements, depreciation or other indirect costs that are deployed across multiple projects under development and, as such, the costs are separately classified as personnel and other expenses in the table below:

	Three months ended June 30,		Six months ended June 30,	
	2015	2014	2015	2014
	(in thousands)		(in thousands)	
Lenti-D	$ 3,440	$ 2,232	$ 7,892	$ 5,042
LentiGlobin	7,042	6,273	14,133	10,138
Pre-clinical programs	5,266	1,160	7,916	2,257
Total direct research and development expense	15,748	9,665	29,941	17,437
Employee- and contractor-related expenses	2,993	1,295	5,461	2,233
Stock-based compensation expense	12,066	1,061	15,300	2,124
Platform-related expenses	11,885	250	14,062	516
Facility expenses	1,483	1,005	2,986	2,060
Other expenses	91	655	235	1,024
Unallocated personnel and other expenses	28,518	4,266	38,044	7,957
Total research and development expense	**$ 44,266**	**$ 13,931**	**$ 67,985**	**$ 25,394**

Refer to the "Results of Operations" section below for additional discussion on one-time, non-recurring charges included within unallocated personnel and other expenses.

General and administrative expenses

General and administrative expenses consist primarily of salaries and related costs for personnel, including stock-based compensation and travel expenses for our employees in executive, operational, finance, legal, business development, and human

resource functions. Other general and administrative expenses include facility-related costs, professional fees for accounting and legal services, directors' fees and expenses associated with obtaining and maintaining patents.

We anticipate that our general and administrative expenses will increase in the future as we increase our headcount to support our continued research and development and potential commercialization of our product candidates. Additionally, if and when we believe a regulatory approval of the first product candidate appears likely, we anticipate an increase in payroll and related expenses as a result of our preparation for commercial operations, especially as it relates to the sales and marketing of our product candidates.

Other income, net

Other income, net consists primarily of interest income earned on investments, foreign currency gain or loss and tax incentives from the Massachusetts Life Sciences Center.

Critical accounting policies and estimates

Our management's discussion and analysis of our financial condition and results of operations are based on our financial statements, which have been prepared in accordance with generally accepted accounting principles. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, and expenses and the disclosure of contingent assets and liabilities in our financial statements. On an ongoing basis, we evaluate our estimates and judgments, including those related to accrued research and development expenses, revenue, stock-based compensation, income taxes and contingent consideration. We base our estimates on historical experience, known trends and events and various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. In making estimates and judgments, management employs critical accounting policies. During the six months ended June 30, 2015, there were no material changes to our critical accounting policies as reported in our Annual Report on Form 10-K for the year ended December 31, 2014, which was filed with the SEC on February 25, 2015.

Results of Operations

Comparison of the three months ended June 30, 2015 and 2014:

	Three months ended June 30,		
	2015	2014	Change
	(in thousands)		
Revenue:			
Collaboration revenue	$ 4,940	$ 6,250	$ (1,310)
Research and license fees	—	85	(85)
Total revenue	4,940	6,335	(1,395)
Operating expenses:			
Research and development	44,266	13,931	30,335
General and administrative	10,724	5,738	4,986
Change in fair value of contingent consideration	1,973	—	1,973
Total operating expenses	56,963	19,669	37,294
Loss from operations	(52,023)	(13,334)	38,689
Other income, net	228	11	(217)
Loss before income taxes	(51,795)	(13,323)	38,472
Benefit from income taxes	—	11,797	11,797
Net loss	$ (51,795)	$ (1,526)	$ 50,269

Revenue. Total revenue was $4.9 million for the three months ended June 30, 2015 compared to $6.3 million for the three months ended June 30, 2014. The decrease of $1.4 million was primarily attributable to a reduction in collaboration revenue as a result of the amendment to our collaboration agreement with Celgene executed in the second quarter of 2015.

Research and development expenses. Research and development expenses were $44.3 million for the three months ended June 30, 2015, compared to $13.9 million for the three months ended June 30, 2014. The increase of $30.3 million was primarily attributable to the following:

- $11.0 million of increased stock-based compensation expense, $6.7 million of which related to the modification of a stock option award held by a non-employee founder and $1.8 million of which related to the modification of a stock option award held by our former Chief Scientific Officer, which are one-time charges.
- $10.7 million of non-recurring in-license milestones and fees, of which $5.4 million related to an upfront payment for amending and restating an existing patent sublicense agreement; $3.3 million (€3.0 million) related to an upfront payment for amending an existing license agreement with Institut Pasteur; and $1.5 million related to an upfront payment for a new license and collaboration agreement with Five Prime Therapeutics, Inc.
- $3.0 million of increased other employee compensation and benefit expense and $1.7 million of increased lab expenses necessary to support the advancement of our clinical and pre-clinical programs.
- $0.9 million of amortization expense related to intangible assets acquired in June 2014.

General and administrative expenses. General and administrative expenses were $10.7 million for the three months ended June 30, 2015, compared to $5.7 million for the three months ended June 30, 2014. The increase of $5.0 million was primarily attributable to $3.5 million of increased employee compensation and benefit expense to support our overall growth, of which $2.7 million was stock-based compensation expense.

Change in fair value of contingent consideration. The change in fair value of contingent consideration of $2.0 million was primarily related to an increase in the probability of successful achievement of milestones expected to be achieved within the next twelve months.

Comparison of the six months ended June 30, 2015 and 2014

	Six months ended June 30,		
	2015	2014	Change
	(in thousands)		
Revenue:			
Collaboration revenue	$ 11,284	$ 12,500	$ (1,216)
Research and license fees	—	170	(170)
Total revenue	11,284	12,670	(1,386)
Operating expenses:			
Research and development	67,985	25,394	42,591
General and administrative	18,060	11,277	6,783
Change in fair value of contingent consideration	2,188	—	2,188
Total operating expenses	88,233	36,671	51,562
Loss from operations	(76,949)	(24,001)	52,948
Other income (expense), net	367	69	(298)
Loss before income taxes	(76,582)	(23,932)	52,650
Benefit from income taxes	—	11,797	11,797
Net loss	$ (76,582)	$ (12,135)	$ 64,447

Revenue. Total revenue was $11.3 million for the six months ended June 30, 2015 compared to $12.7 million for the six months ended June 30, 2014. The decrease of $1.4 million was primarily attributable to a reduction in collaboration revenue as a result of the amendment to our collaboration agreement with Celgene executed in the second quarter of 2015. We expect collaboration revenue to be lower in the second half of 2015 as compared to the first half of 2015 as a result of this amendment.

Research and development expenses. Research and development expenses were $68.0 million for the six months ended June 30, 2015 compared to $25.4 million for the six months ended June 30, 2014. The increase of $42.6 million was primarily attributable to the following:

- $13.2 million of increased stock-based compensation expense, $6.7 million of which related to the modification of a stock option award held by a non-employee founder and $2.8 million of which related to the modification of a stock option award held by our former Chief Scientific Officer, which are one-time charges.
- $10.8 million of non-recurring in-license milestones and fees, of which $5.4 million related to an upfront payment for amending and restating an existing patent sublicense agreement; $3.3 million (€3.0 million) related to an upfront payment for

amending an existing license agreement with Institut Pasteur; and $1.5 million related to an upfront payment for a new license and collaboration agreement with Five Prime Therapeutics, Inc.

- $5.3 million of increased other employee compensation and benefit expense, $3.0 million of increased manufacturing related costs, $2.9 million of increased clinical trial related costs, and $2.2 million of increased lab expenses necessary to support the advancement of our clinical and pre-clinical programs.
- $1.9 million of amortization expense related to intangible assets acquired in June 2014.

General and administrative expenses. General and administrative expenses were $18.1 million for the six months ended June 30, 2015 compared to $11.3 million for the six months ended June 30, 2014. The increase of $6.8 million was primarily attributable to $4.6 million of increased employee and contractor related costs to support our overall growth, of which $3.4 million was stock-based compensation expense, $0.5 million of increased professional services costs and $0.5 million of consulting costs.

Change in fair value of contingent consideration. The change in fair value of contingent consideration of $2.2 million was primarily related to an increase in the probability of successful achievement of milestones expected to be achieved within the next twelve months.

Liquidity and Capital Resources

As of June 30, 2015, we had cash, cash equivalents and marketable securities of approximately $936.4 million. We expect cash, cash equivalents and marketable securities to fund operations through 2018. Cash in excess of immediate requirements is invested in accordance with our investment policy, primarily with a view to liquidity and capital preservation. As of June 30, 2015, our funds are held in U.S. government agency securities, federally insured certificates of deposit and money market mutual funds invested in U.S. Treasuries or U.S. government agency securities.

We have incurred losses and cumulative negative cash flows from operations since our inception in April 1992, and as of June 30, 2015 we had an accumulated deficit of $224.0 million. We anticipate that we will continue to incur losses for at least the next several years. We expect that our research and development and general and administrative expenses will continue to increase and, as a result, we will need additional capital to fund our operations, which we may raise through public or private equity or debt financings, strategic collaborations, or other sources.

We have funded our operations principally from the sale of common stock, preferred stock and through the Celgene collaboration. On June 24, 2013, we completed our initial public offering, or IPO, whereby we sold 6,832,352 shares of common stock at a price of $17.00 per share for aggregate net proceeds received by us of $104.9 million. On July 14, 2014, we sold 3,450,000 shares of common stock (inclusive of 450,000 shares of common stock sold by us pursuant to the full exercise of an overallotment option granted to the underwriters in connection with the offering) through an underwritten public offering at a price of $34.00 per share for aggregate net proceeds to us of $109.8 million. On December 19, 2014, we sold 3,047,500 shares of common stock (inclusive of 397,500 shares of common stock sold by us pursuant to the full exercise of an overallotment option granted to the underwriters in connection with the offering) through an underwritten public offering at a price of $85.00 per share for aggregate net proceeds to us of $243.3 million. On June 29, 2015, we sold 2,941,176 shares of common stock through an underwritten public offering at a price of $170.00 per share for aggregate net proceeds to us of $477.2 million.

Sources of Liquidity

Cash Flows

The following table sets forth the primary sources and uses of cash for each of the periods below:

	Six months ended June 30,	
	2015	2014
	(in thousands)	
Net cash provided by (used in):		
Operating activities	$ (36,277)	$ (23,258)
Investing activities	(200,969)	(9,207)
Financing activities	482,700	1,896
Net decrease in cash and cash equivalents	$ 245,454	$ (30,569)

Cash Flows from Operating Activities. The $13.0 million increase in cash used in operating activities for the six months ended June 30, 2015, compared to the six months ended June 30, 2014, was primarily due to the increase in net loss during this period which

was primarily attributable to increased stock-based compensation expense, in-license milestones and fees, and spending on our clinical and pre-clinical stage programs, partially offset by cash received in connection with the Amended Collaboration Agreement with Celgene Corporation. Net loss was $76.6 million for the six months ended June 30, 2015 compared to $12.1 million for the six months ended June 30, 2014, an increase of $64.5 million.

Cash Flows from Investing Activities. The net cash used in investing activities was $201.0 million for the six months ended June 30, 2015 and was primarily due to our purchase of $261.4 million of marketable securities partially offset by proceeds by maturities of marketable securities of $62.7 million.

Cash Flows from Financing Activities: The net cash provided by financing activities was $482.7 million for the six months ended June 30, 2015 and was due to $477.2 million net proceeds from an offering of our common stock and $5.5 million of proceeds from the exercise of stock options and ESPP contributions.

Contractual Obligations and Commitments

There have been no material changes to our contractual obligations and commitments as included in our Annual Report on Form 10-K, which was filed with the SEC on February 25, 2015, except as noted below:

- On April 1, 2015, we amended an existing license agreement with Institut Pasteur, which resulted in a payment of $3.3 million (€3.0 million) that was paid during the second quarter of 2015.
- On April 6, 2015, we amended and restated an existing patent sublicense agreement, which resulted in a license fee payment of $5.4 million that was paid during the second quarter of 2015. As a result of this amendment, aggregate payments of $1.3 million that were previously included in our contractual obligations and commitments table in our Annual Report on Form 10-K filed with the SEC on February 25, 2015 are no longer due.
- On June 29, 2015, we entered into a lease agreement for additional office space located at 215 First Street, Cambridge, Massachusetts. Under the terms of the lease, we leased approximately 15,120 square feet starting on July 13, 2015 for $483,840 per year in base rent, which is subject to a 3% annual increase plus certain operating expenses and taxes. The lease will continue until the end of the sixtieth full calendar month following the date the landlord delivers the premises to us. Under the terms of the lease, we will also lease an additional 8,075 square feet of office space in the same premises starting on January 1, 2016 for an additional $258,400 per year in base rent, which is subject to a 3% annual increase plus certain operating expenses and taxes.

Off-Balance Sheet Arrangements

As of June 30, 2015, we did not have any off-balance sheet arrangements as defined in the rules and regulations of the SEC.

Item 3. Quantitative and Qualitative Disclosures about Market Risks

We are exposed to market risk related to changes in interest rates. As of June 30, 2015 and December 31, 2014, we had cash, cash equivalents and marketable securities of $936.4 million and $492.0 million, respectively, primarily invested in U.S. government agency securities, federally insured certificates of deposit and money market mutual funds invested in U.S. Treasuries or U.S. government agency securities. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates, particularly because our investments are in short-term securities. Our available for sale securities are subject to interest rate risk and will fall in value if market interest rates increase. If market interest rates were to increase immediately and uniformly by 100 basis points, or one percentage point, from levels at June 30, 2015, the net fair value of our interest-sensitive marketable securities would have resulted in a hypothetical decline of approximately $3.0 million.

Item 4. Controls and Procedures

Management's Evaluation of our Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in the reports that we file or submit under the Securities and Exchange Act of 1934 is (1) recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms and (2) accumulated and communicated to our management, including our principal executive officer and principal financial officer, to allow timely decisions regarding required disclosure.

As of June 30, 2015, our management, with the participation of our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities

and Exchange Act of 1934). Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Our principal executive officer and principal financial officer have concluded based upon the evaluation described above that, as of June 30, 2015, our disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

During the quarter ended June 30, 2015, there have been no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15(d)-15(f) promulgated under the Securities Exchange Act of 1934, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

In the ordinary course of business, we are from time to time involved in lawsuits, claims, investigations, proceedings, and threats of litigation relating to intellectual property, commercial arrangements, employment and other matters. While the outcome of these proceedings and claims cannot be predicted with certainty, as of June 30, 2015, we were not party to any legal or arbitration proceedings that may have, or have had in the recent past, significant effects on our financial position. No governmental proceedings are pending or, to our knowledge, contemplated against us. We are not a party to any material proceedings in which any director, member of executive management or affiliate of ours is either a party adverse to us or our subsidiaries or has a material interest adverse to us or our subsidiaries.

Item 1A. Risk Factors

An investment in shares of our common stock involves a high degree of risk. You should carefully consider the following information about these risks, together with the other information appearing elsewhere in this Quarterly Report on Form 10-Q, including our financial statements and related notes hereto, before deciding to invest in our common stock. The occurrence of any of the following risks could have a material adverse effect on our business, financial condition, results of operations and future growth prospects. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Those risk factors below denoted with a "" are newly added or have been materially updated from our Annual Report on 10-K filed with the Securities and Exchange Commission, or the SEC, on February 25, 2015.*

Risks related to the discovery and development of our product candidates

Our gene therapy product candidates are based on a novel technology, which makes it difficult to predict the time and cost of product candidate development and subsequently obtaining regulatory approval. At the moment, no gene therapy products have been approved in the United States and only one product has been approved in the European Union, or EU.

We have concentrated our therapeutic product research and development efforts on our gene therapy platform, and our future success depends on the successful development of this therapeutic approach. There can be no assurance that any development problems we experience in the future related to our gene therapy platform will not cause significant delays or unanticipated costs, or that such development problems can be solved. We may also experience delays in developing a sustainable, reproducible and commercial-scale manufacturing process or transferring that process to commercial partners, which may prevent us from completing our clinical studies or commercializing our products on a timely or profitable basis, if at all.

In addition, the clinical study requirements of the U.S. Food and Drug Administration, or FDA, the European Medicines Agency, or EMA, and other regulatory agencies and the criteria these regulators use to determine the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty and intended use and market of the potential products. The regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied pharmaceutical or other product candidates. At the moment, only one gene therapy product, UniQure's Glybera, which received marketing authorization in the EU in 2012, has been approved in the Western world, which makes it difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our product candidates in the United States, the EU or other jurisdictions. Approvals by the EMA and the European Commission may not be indicative of what the FDA may require for approval.

Regulatory requirements governing gene and cell therapy products have evolved and may continue to change in the future. For example, the FDA has established the Office of Cellular, Tissue and Gene Therapies within its Center for Biologics Evaluation and Research, or CBER, to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. Gene therapy clinical studies conducted at institutions that receive funding for recombinant DNA research from the U.S. National Institutes of Health, or the NIH, are also subject to review by the NIH Office of Biotechnology Activities' Recombinant DNA Advisory Committee, or the RAC. Although the FDA decides whether individual gene therapy protocols may proceed, the RAC review process can impede the initiation of a clinical study, even if the FDA has reviewed the study and approved its initiation. For example, although in May 2015 we believe we reached general agreement with the FDA on the design of our planned HGB-208 pediatric study protocol for our LentiGlobin product candidate, in June 2015, the RAC completed its public review and recommended a delay of initiation of the HGB-208 study in the United States for an additional one to two years. We cannot predict if this recommendation may delay enrollment of the HGB-208 study. Clinical trial sites in the United States that receive NIH funding for research involving recombinant or synthetic nucleic acid molecules are required to follow RAC

recommendations, or risk losing NIH funding for such research or needing NIH pre-approval before conducting such research. In addition, the FDA can put an investigational new drug application, or IND, on clinical hold if the information in an IND is not sufficient to assess the risks in pediatric patients. Before a clinical study can begin at any institution, that institution's institutional review board, or IRB, and its Institutional Biosafety Committee will have to review the proposed clinical study to assess the safety of the study. Moreover, serious adverse events or developments in clinical trials of gene therapy product candidates conducted by others may cause the FDA or other regulatory bodies to initiate a clinical hold on our clinical trials or otherwise change the requirements for approval of any of our product candidates.

These regulatory review agencies, committees and advisory groups and the new requirements and guidelines they promulgate may lengthen the regulatory review process, require us to perform additional studies, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of these treatment candidates or lead to significant post-approval limitations or restrictions. As we advance our product candidates, we will be required to consult with these regulatory and advisory groups and comply with applicable requirements and guidelines. If we fail to do so, we may be required to delay or discontinue development of our product candidates. Delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring a potential product to market could decrease our ability to generate sufficient product revenue to maintain our business.

We may find it difficult to enroll patients in our clinical studies, which could delay or prevent clinical studies of our product candidates.

Identifying and qualifying patients to participate in clinical studies of our product candidates is critical to our success. The timing of our clinical studies depends on the speed at which we can recruit patients to participate in testing our product candidates. We have experienced delays in some of our clinical studies, and we may experience similar delays in the future. If patients are unwilling to participate in our gene therapy studies because of negative publicity from adverse events in the biotechnology or gene therapy industries or for other reasons, including competitive clinical studies for similar patient populations, the timeline for recruiting patients, conducting studies and obtaining regulatory approval of potential products may be delayed. These delays could result in increased costs, delays in advancing our product development, delays in testing the effectiveness of our technology or termination of the clinical studies altogether.

We may not be able to identify, recruit and enroll a sufficient number of patients, or those with required or desired characteristics to achieve diversity in a study, to complete our clinical studies in a timely manner. Patient enrollment is affected by factors including:

- severity of the disease under investigation;
- design of the study protocol;
- size of the patient population;
- eligibility criteria for the study in question;
- perceived risks and benefits of the product candidate under study;
- proximity and availability of clinical study sites for prospective patients;
- availability of competing therapies and clinical studies;
- efforts to facilitate timely enrollment in clinical studies;
- patient referral practices of physicians; and
- ability to monitor patients adequately during and after treatment.

In particular, each of the conditions for which we plan to evaluate our current product candidates are rare genetic disorders with limited patient pools from which to draw for clinical studies. It has been estimated that about 1.5% (80 to 90 million people) of the global population are carriers of beta-thalassemia, with about 60,000 symptomatic individuals born annually, the great majority in the developing world. According to Thalassemia International Federation, about 288,000 patients with beta-thalassemia major are alive and registered as receiving regular treatment around the world, of which we estimate that about 10,000-15,000 live in the United States and Europe. The global incidence of SCD is estimated to be 250,000-300,000 births annually with a global prevalence estimated to be about 20-25 million. The worldwide incidence rate for adrenoleukodystrophy, or ALD, the superset of CCALD, is approximately one in 20,000 newborn males. CCALD accounts for about 30-40% of patients diagnosed with ALD. Further, because newborn screening for CCALD is not widely adopted, and it can be difficult to diagnose CCALD in the absence of a genetic screen, we may have difficulty finding patients who are eligible to participate in our study. The eligibility criteria of our clinical studies will further limit the pool of available study participants. Additionally, the process of finding and diagnosing patients may prove costly.

Finally, our treatment process requires that the procurement of autologous cells from subjects be conducted where the cells can be shipped to a transduction facility within the required timelines, as the hematopoietic stem cells, or HSCs, have limited viability following harvest.

Our current product candidates are being developed to treat rare conditions and certain cancers. We plan to seek initial marketing approval in the United States and the European Union. We may not be able to initiate or continue clinical studies if we cannot enroll a sufficient number of eligible patients to participate in the clinical studies required by the FDA or the EMA or other regulatory agencies. Our ability to successfully initiate, enroll and complete a clinical study in any foreign country is subject to numerous risks unique to conducting business in foreign countries, including:

- difficulty in establishing or managing relationships with contract research organizations, or CROs, and physicians;
- different standards for the conduct of clinical studies;
- our inability to locate qualified local consultants, physicians and partners; and
- the potential burden of complying with a variety of foreign laws, medical standards and regulatory requirements, including the regulation of pharmaceutical and biotechnology products and treatment.

If we have difficulty enrolling a sufficient number of patients to conduct our clinical studies as planned, we may need to delay, limit or terminate ongoing or planned clinical studies, any of which would have an adverse effect on our business.

We may encounter substantial delays in our clinical studies or we may fail to demonstrate safety and efficacy to the satisfaction of applicable regulatory authorities.

Before obtaining marketing approval from regulatory authorities for the sale of our product candidates, we must conduct extensive clinical studies to demonstrate the safety, purity and potency, or efficacy, of the product candidates in humans. Clinical testing is expensive, time-consuming and uncertain as to outcome. We cannot guarantee that any clinical studies will be conducted as planned or completed on schedule, if at all. A failure of one or more clinical studies can occur at any stage of testing. Events that may prevent successful or timely completion of clinical development include:

- delays in reaching a consensus with regulatory agencies on study design;
- delays in obtaining required Institutional Review Board, or IRB, or Institutional Ethics Committee approval at each clinical study site;
- delays in recruiting suitable patients to participate in our clinical studies;
- imposition of a clinical hold by regulatory agencies, after an inspection of our clinical study operations or study sites or due to unforeseen safety issues;
- failure by our CROs, other third parties or us to adhere to clinical study requirements;
- failure to perform in accordance with the FDA's good clinical practices, or GCP, or applicable regulatory requirements in other countries;
- delays in the testing, validation, manufacturing and delivery of our product candidates to the clinical sites;
- failure to obtain sufficient cells from patients to manufacture enough drug product or achieve target cell doses;
- delays in having patients complete participation in a study or return for post-treatment follow-up;
- clinical study sites or patients dropping out of a study;
- occurrence of serious adverse events associated with the product candidate that are viewed to outweigh its potential benefits; or
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols.

Any inability to successfully complete preclinical and clinical development could result in additional costs to us or impair our ability to generate revenues from product sales, regulatory and commercialization milestones and royalties. In addition, if we make manufacturing or formulation changes to our product candidates, we may need to conduct additional studies to demonstrate comparability of our modified product candidates to earlier versions. Clinical study delays could also shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market

before we do, which could impair our ability to successfully commercialize our product candidates and may harm our business and results of operations.

If the results of our clinical studies are inconclusive or if there are safety concerns or adverse events associated with our product candidates, we may:

- be delayed in obtaining regulatory approval for our product candidates, if at all;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or safety warnings;
- be required to perform additional clinical studies or clinical studies of longer duration to support approval or be subject to additional post-marketing testing requirements;
- have regulatory authorities withdraw their approval of the product or impose restrictions on its use;
- be subject to the addition of labeling statements, such as warnings or contraindications;
- be sued; or
- experience damage to our reputation.

Treatment with our gene therapy product candidates involves chemotherapy and myeloablative treatments, which can cause side effects or adverse events that are unrelated to our product candidate, but may still impact the success of our clinical studies. Additionally, our product candidates could potentially cause other adverse events that have not yet been predicted. The inclusion of critically ill patients in our clinical studies may result in deaths or other adverse medical events due to other therapies or medications that such patients may be using. As described above, any of these events could prevent us from achieving or maintaining market acceptance of our product candidates and impair our ability to commercialize our products.

We have not completed any clinical studies of our current viral vectors or product candidates derived from these viral vectors. Success in early clinical studies may not be indicative of results obtained in later studies.

Our current viral vectors and our product candidates first initiated evaluation in human clinical studies in 2013, and we may experience unexpected results in the future. Earlier gene therapy clinical studies, which we believe serve as proof-of-concept for our product candidates, utilized lentiviral vectors similar to ours. However, these studies should not be relied upon as evidence that our future clinical studies will succeed. Study designs and results from previous studies are not necessarily predictive of our future clinical study designs or results, and initial results may not be confirmed upon full analysis of the complete study data. Our product candidates may also fail to show the desired safety and efficacy in later stages of clinical development despite having successfully advanced through initial clinical studies.

There is a high failure rate for drugs and biologics proceeding through clinical studies. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in later stage clinical studies even after achieving promising results in earlier stage clinical studies. Data obtained from preclinical and clinical activities are subject to varying interpretations, which may delay, limit or prevent regulatory approval. In addition, regulatory delays or rejections may be encountered as a result of many factors, including changes in regulatory policy during the period of product development.

****Initial success in our ongoing clinical studies may not be indicative of results obtained when these studies are completed.***

In December 2014, at the Annual Meeting of the American Society of Hematology (ASH), we announced data from the first eight subjects treated with our LentiGlobin BB305 product candidate. In June 2015, at the 20th Congress of the European Hematology Association, we announced long-term follow up of two patients with beta-thalassemia major and early safety and efficacy data in the first patient with severe SCD treated with our LentiGlobin BB305 product candidate in the HGB 205 Study. Although the initial clinical data on these subjects are encouraging, the data are preliminary in nature, based on limited periods of time since patient infusion, and the Northstar and HGB-205 Studies are not complete. There is limited data concerning long-term safety and efficacy following treatment with LentiGlobin drug product. These data, or other positive data, may not continue or occur for these subjects or for any future subjects in this study, and may not be repeated or observed in ongoing or future studies involving our LentiGlobin product candidate, including the HGB-205 Study, the Northstar Study or the HGB-206 Study in severe SCD. There can be no assurance that subjects for whom periodic transfusion support has been reduced or temporarily eliminated will not receive transfusion support in the future. Furthermore, there can be no assurance that any of these studies will ultimately be successful or support further clinical advancement of this product candidate. There is a high failure rate for drugs and biologics proceeding through clinical studies. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in clinical development

even after achieving promising results in earlier studies, and any such setbacks in our clinical development could have a material adverse effect on our business and operating results.

The results from our Starbeam Study may not be sufficiently robust to support the submission of marketing approval for our Lenti-D product candidate. Before we submit Lenti-D for marketing approval, the FDA and the EMA may require us to enroll additional subjects, conduct additional clinical studies, or evaluate subjects for an additional follow-up period.

The FDA has advised us that our Starbeam Study, which is a single-arm, open-label study to evaluate the safety and efficacy of our Lenti-D product candidate to halt the progression of CCALD, may not be deemed to be a pivotal study or may not provide sufficient support for a Biologics License Application, or BLA, submission. The FDA normally requires two pivotal clinical studies to approve a drug or biologic product, and thus the FDA may require that we conduct additional clinical studies of Lenti-D prior to a BLA submission. The FDA typically does not consider a single clinical study to be adequate to serve as a pivotal study unless it is, among other things, well-controlled and demonstrates a clinically meaningful effect on mortality, irreversible morbidity, or prevention of a disease with potentially serious outcome, and a confirmatory study would be practically or ethically impossible. Due to the nature of CCALD and the limited number of patients with this condition, a placebo-controlled and blinded study is not practicable for ethical and other reasons. However, it is still possible that, even if we achieve favorable results in the Starbeam Study, the FDA may require us to enroll additional subjects or conduct additional clinical studies, possibly involving a larger sample size or a different clinical study design, particularly if the FDA does not find the results from the Starbeam Study to be sufficiently persuasive to support a BLA submission. The FDA may also require that we conduct a longer follow-up period of subjects treated with our Lenti-D product candidate prior to accepting our BLA submission.

In addition, the Starbeam Study was not designed to achieve a statistically significant efficacy determination. Rather, we anticipate that Lenti-D safety and efficacy will be evaluated in light of the data collected in our retrospective ALD-101 Study and potentially our observational ALD-103 study. However, due to the retrospective nature of the ALD-101 study, and the limited number of patients with this condition, the FDA has advised us that the ALD-101 Study is not sufficiently robust to serve as a conventional historical control group and as a basis of comparison against the results of the Starbeam Study. Thus, we expect that the FDA will assess the totality of the safety and efficacy data from our CCALD clinical studies in reviewing any future BLA submission for our Lenti-D product candidate. Based on this assessment, the FDA may require that we conduct additional preclinical or clinical studies prior to submitting or approving a BLA for this indication.

It is possible that the FDA or the EMA may not consider the results of this study to be sufficient for approval of Lenti-D for this indication. If the FDA or the EMA requires additional studies, we would incur increased costs and delays in the marketing approval process, which may require us to expend more resources than we have available. In addition, it is possible that the FDA and the EMA may have divergent opinions on the elements necessary for a successful BLA and Marketing Authorization Application, or MAA, respectively, which may cause us to alter our development, regulatory and/or commercialization strategies.

****We cannot be certain that our planned HGB-207 and HGB-208 clinical trials of LentiGlobin BB305, together with data from our ongoing beta-thalassemia major clinical studies (Northstar and HGB-205), will be sufficient to form the basis for a Biologics License Application, or BLA, submission for LentiGlobin BB305.***

In general, the FDA requires the successful completion of two pivotal trials to support approval of a BLA, but in certain circumstances, will approve a BLA based on only one pivotal trial. If successful, we believe the results from our planned clinical trials, called HGB-207, for adult and adolescent patients with beta-thalassemia major, and HGB-208, for pediatric patients with beta-thalassemia major, together with data from our ongoing beta-thalassemia major clinical studies (Northstar and HGB-205), could be sufficient to form the basis for a BLA submission for LentiGlobin BB305 to treat patients with beta-thalassemia major. However, it should be noted that our ability to submit and obtain approval of a BLA is ultimately an FDA review decision, which will be dependent upon the data available at such time, and the available data may not be sufficiently robust from a safety and/or efficacy perspective to support the submission or approval of a BLA. Depending on the outcome of these planned and ongoing clinical trials, the FDA may require that we conduct additional or larger pivotal trials before we can submit or obtain approval for a BLA for LentiGlobin BB305.

In June 2015, the RAC recommended that we delay the initiation of the HGB-208 trial for pediatric patients with beta-thalassemia major for one to two years. Any delay in the initiation or completion of the HGB-208 clinical trial could similarly delay our ability to submit a BLA for LentiGlobin BB305 or obtain full approval in Europe.

In addition, while we believe we and the FDA are in general agreement on the design and key elements of our planned HGB-207 and HGB-208 clinical trials of LentiGlobin BB305, before beginning these trials, the FDA must review the final protocols for the trials, along with additional information supporting the respective proposed trial designs. Concurrent with starting the trial, the FDA will review certain updated chemistry, manufacturing and controls, or CMC, information that we are required to submit. If the FDA does not approve the protocols for the planned trials in the forms in which we submit them, or if the FDA is not satisfied with the additional CMC information we plan to provide, the start or continuation of these clinical trials may be delayed or the design of the trials may change.

There can be no assurance that we will ultimately receive conditional marketing approval of LentiGlobin in the European Union, or the nature of the conditions that would be imposed on us if conditionally approved.

The EMA Adaptive Pathways program in which we are participating is intended to facilitate either an initial approval in a well-defined patient subgroup with a high medical need and subsequent widening of the indication to a larger patient population, or an early regulatory approval (e.g. conditional approval), which is prospectively planned, and where uncertainty is reduced through the collection of post-approval data on a drug's use in patients. Based on our discussions with the EMA, we believe our LentiGlobin BB305 product candidate may be eligible for conditional approval under this program for the treatment of patients with beta-thalassemia major on the basis of the totality of clinical data, in particular reduction in transfusion need, from the ongoing Northstar study and supportive HGB-205 study.

However, it should be noted that the EMA Adaptive Pathways program is a pilot program, and as such there is limited information and precedent regarding the potential outcomes for sponsors that participate in this program. Whether our LentiGlobin BB305 product candidate is eligible for conditional approval will ultimately be determined at the discretion of the EMA and will be dependent upon the data available at such time, and the available data may not be sufficiently robust from a safety and/or efficacy perspective to support conditional approval. Depending on the outcome of our planned and ongoing clinical trials, the EMA may require that we conduct additional or larger clinical trials before LentiGlobin BB305 is eligible for conditional approval. Even if conditional approval is obtained, the conditions to be imposed on us under this program are unknown and will be imposed at the time of any such conditional approval.

In previous clinical studies involving viral vectors for gene therapy, some subjects experienced serious adverse events, including the development of leukemia due to vector-related insertional oncogenesis. If our vectors demonstrate a similar effect, we may be required to halt or delay further clinical development of our product candidates.

A significant risk in any gene therapy product based on viral vectors is that the vector will insert in or near cancer-causing oncogenes leading to uncontrolled clonal proliferation of mature cancer cells in the patient. For example, in 2003, 20 subjects treated for X-linked severe combined immunodeficiency in two gene therapy studies using a murine, or mouse-derived, gamma-retroviral vector showed correction of the disease, but the studies were terminated after five subjects developed leukemia (four of whom were subsequently cured). The cause of these adverse events was shown to be insertional oncogenesis, which is the process whereby the corrected gene inserts in or near a gene that is important in a critical cellular process like growth or division, and this insertion results in the development of a cancer (often leukemia). Using molecular diagnostic techniques, it was determined that clones from these subjects showed retrovirus insertion in proximity to the promoter of the LMO2 proto-oncogene. Earlier generation retroviruses like the one used in these two studies have been shown to preferentially integrate in regulatory regions of genes that control cell growth.

These well-publicized adverse events led to the development of new viral vectors, such as lentiviral vectors, with improved safety profiles and also the requirement of enhanced safety monitoring in gene therapy clinical trials, including periodic analyses of the therapy's genetic insertion sites. In published studies, lentiviral vectors have demonstrated an improved safety profile over gamma-retroviral vectors, with no disclosed events of gene therapy-related adverse events, which we believe is due to a number of factors including the tendency of these vectors to integrate within genes rather than in areas that control gene expression, as well as their lack of strong viral enhancers. However, it should be noted that in our Phase I/II study (the LG001 Study) of autologous HSCs transduced *ex vivo* using an earlier generation of our LentiGlobin vector, called HPV569, we initially observed in one subject that a disproportionate number of the cells expressing our functional gene had the same insertion site. Tests showed that this partial clonal dominance contained an insertion of the functional gene in the HMGA2 gene that persisted for a period of two to three years. Although there was some initial concern that the observed clonal dominance might represent a pre-leukemic event, there have been no adverse clinical consequences of this event, or any signs of cancer, in over seven years since the observation was made. The presence of the HMGA2 clone has steadily declined in this subject over time to the point that it is no longer the most common clone observed in this subject.

Notwithstanding the historical data regarding the potential safety improvements of lentiviral vectors, the risk of insertional oncogenesis remains a significant concern for gene therapy and we cannot assure that it will not occur in any of our ongoing or planned clinical studies. There is also the potential risk of delayed adverse events following exposure to gene therapy products due to

persistent biological activity of the genetic material or other components of products used to carry the genetic material. The FDA has stated that lentiviral vectors possess characteristics that may pose high risks of delayed adverse events. If any such adverse events occur, further advancement of our clinical studies could be halted or delayed, which would have a material adverse effect on our business and operations.

Even if we complete the necessary preclinical and clinical studies, we cannot predict when or if we will obtain regulatory approval to commercialize a product candidate or the approval may be for a more narrow indication than we expect.

We cannot commercialize a product until the appropriate regulatory authorities have reviewed and approved the product candidate. Even if our product candidates demonstrate safety and efficacy in clinical studies, the regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee or other regulatory advisory group or authority recommends non-approval or restrictions on approval. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory agency policy during the period of product development, clinical studies and the review process. Regulatory agencies also may approve a treatment candidate for fewer or more limited indications than requested or may grant approval subject to the performance of post-marketing studies. In addition, regulatory agencies may not approve the labeling claims that are necessary or desirable for the successful commercialization of our treatment candidates. For example, the development of our product candidates for pediatric use is an important part of our current business strategy, and if we are unable to obtain regulatory approval for the desired age ranges, our business may suffer.

Even if we obtain regulatory approval for a product candidate, our products will remain subject to regulatory scrutiny.

Even if we obtain regulatory approval in a jurisdiction, the regulatory authority may still impose significant restrictions on the indicated uses or marketing of our product candidates, or impose ongoing requirements for potentially costly post-approval studies or post-market surveillance. For example, the FDA typically advises that patients treated with gene therapy undergo follow-up observations for potential adverse events for a 15-year period. Additionally, the holder of an approved BLA is obligated to monitor and report adverse events and any failure of a product to meet the specifications in the BLA. The holder of an approved BLA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws.

In addition, product manufacturers and their facilities are subject to payment of user fees and continual review and periodic inspections by the FDA and other regulatory authorities for compliance with good manufacturing practices, or GMP, and adherence to commitments made in the BLA. If we or a regulatory agency discovers previously unknown problems with a product such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory agency may impose restrictions relative to that product or the manufacturing facility, including requiring recall or withdrawal of the product from the market or suspension of manufacturing.

If we fail to comply with applicable regulatory requirements following approval of any of our product candidates, a regulatory agency may:

- issue a warning letter asserting that we are in violation of the law;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical studies;
- refuse to approve a pending marketing application, such as a BLA or supplements to a BLA submitted by us;
- seize product; or
- refuse to allow us to enter into supply contracts, including government contracts.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may inhibit our ability to commercialize our product candidates and generate revenues.

Risks related to our reliance on third parties

We expect to rely on third parties to conduct some or all aspects of our vector production, drug product manufacturing, research and preclinical and clinical testing, and these third parties may not perform satisfactorily.

We do not expect to independently conduct all aspects of our vector production, product manufacturing, research and preclinical and clinical testing. We currently rely, and expect to continue to rely, on third parties with respect to these items. In some cases these third parties are academic, research or similar institutions that may not apply the same quality control protocols utilized in certain commercial settings.

Our reliance on these third parties for research and development activities will reduce our control over these activities but will not relieve us of our responsibility to ensure compliance with all required regulations and study protocols. For example, for product candidates that we develop and commercialize on our own, we will remain responsible for ensuring that each of our IND-enabling studies and clinical studies are conducted in accordance with the study plan and protocols.

If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our studies in accordance with regulatory requirements or our stated study plans and protocols, we will not be able to complete, or may be delayed in completing, the preclinical and clinical studies required to support future IND and BLA submissions and approval of our product candidates.

Any of these third parties may terminate their engagements with us at any time. If we need to enter into alternative arrangements, it could delay our product development activities.

Reliance on third-party manufacturers entails risks to which we would not be subject if we manufactured the product candidates ourselves, including:

- the inability to negotiate manufacturing agreements with third parties under commercially reasonable terms;
- reduced control as a result of using third-party manufacturers for all aspects of manufacturing activities;
- the risk that these activities are not conducted in accordance with our study plans and protocols;
- termination or nonrenewal of manufacturing agreements with third parties in a manner or at a time that is costly or damaging to us; and
- disruptions to the operations of our third-party manufacturers or suppliers caused by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or supplier.

Any of these events could lead to clinical study delays or failure to obtain regulatory approval, or impact our ability to successfully commercialize future products. Some of these events could be the basis for FDA action, including injunction, recall, seizure or total or partial suspension of production.

We and our contract manufacturers are subject to significant regulation with respect to manufacturing our products. The manufacturing facilities on which we rely may not continue to meet regulatory requirements and have limited capacity.

We currently have relationships with a limited number of suppliers for the manufacturing of our viral vectors and product candidates. Each supplier may require licenses to manufacture such components if such processes are not owned by the supplier or in the public domain and we may be unable to transfer or sublicense the intellectual property rights we may have with respect to such activities.

All entities involved in the preparation of therapeutics for clinical studies or commercial sale, including our existing contract manufacturers for our product candidates, are subject to extensive regulation. Some components of a finished therapeutic product approved for commercial sale or used in late-stage clinical studies must be manufactured in accordance with GMP. These regulations govern manufacturing processes and procedures (including record keeping) and the implementation and operation of quality systems to control and assure the quality of investigational products and products approved for sale. Poor control of production processes can lead to the introduction of adventitious agents or other contaminants, or to inadvertent changes in the properties or stability of our product candidates that may not be detectable in final product testing. We or our contract manufacturers must supply all necessary documentation in support of a BLA or MAA on a timely basis and where required, must adhere to the FDA's or other regulator's good laboratory practices, or GLP, and GMP regulations enforced by the FDA or other regulator through facilities inspection programs. Some of our contract manufacturers have not produced a commercially-approved product and therefore have not obtained the requisite FDA or other regulatory approvals to do so. Our facilities and quality systems and the facilities and quality systems of some or all of our third-party contractors must pass a pre-approval inspection for compliance with the applicable regulations as a condition of regulatory approval of our product candidates or any of our other potential products. In addition, the regulatory authorities may, at any

time, audit or inspect a manufacturing facility involved with the preparation of our product candidates or our other potential products or the associated quality systems for compliance with the regulations applicable to the activities being conducted. If these facilities do not pass a pre-approval plant inspection, FDA or other regulatory approval of the products will not be granted.

The regulatory authorities also may, at any time following approval of a product for sale, audit the manufacturing facilities of our third-party contractors. If any such inspection or audit identifies a failure to comply with applicable regulations or if a violation of our product specifications or applicable regulations occurs independent of such an inspection or audit, we or the relevant regulatory authority may require remedial measures that may be costly and/or time-consuming for us or a third party to implement and that may include the temporary or permanent suspension of a clinical study or commercial sales or the temporary or permanent closure of a facility. Any such remedial measures imposed upon us or third parties with whom we contract could materially harm our business.

If we or any of our third-party manufacturers fail to maintain regulatory compliance, the FDA or other regulators can impose regulatory sanctions including, among other things, refusal to approve a pending application for a biologic product, or revocation of a pre-existing approval. As a result, our business, financial condition and results of operations may be materially harmed.

Additionally, if supply from one approved manufacturer is interrupted, there could be a significant disruption in commercial supply. The number of manufacturers with the necessary manufacturing capabilities is limited. In addition, an alternative manufacturer would need to be qualified through a BLA supplement or similar regulatory submission which could result in further delay. The regulatory agencies may also require additional studies if a new manufacturer is relied upon for commercial production. Switching manufacturers may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

These factors could cause the delay of clinical studies, regulatory submissions, required approvals or commercialization of our product candidates, cause us to incur higher costs and prevent us from commercializing our products successfully. Furthermore, if our suppliers fail to meet contractual requirements, and we are unable to secure one or more replacement suppliers capable of production at a substantially equivalent cost, our clinical studies may be delayed or we could lose potential revenue.

We expect to rely on third parties to conduct, supervise and monitor our clinical studies, and if these third parties perform in an unsatisfactory manner, it may harm our business.

We expect to rely on CROs and clinical study sites to ensure our clinical studies are conducted properly and on time. While we will have agreements governing their activities, we will have limited influence over their actual performance. We will control only certain aspects of our CROs' activities. Nevertheless, we will be responsible for ensuring that each of our clinical studies is conducted in accordance with the applicable protocol, legal, regulatory and scientific standards, and our reliance on the CROs does not relieve us of our regulatory responsibilities.

We and our CROs are required to comply with the FDA's GCPs for conducting, recording and reporting the results of clinical studies to assure that the data and reported results are credible and accurate and that the rights, integrity and confidentiality of clinical study participants are protected. The FDA enforces these GCPs through periodic inspections of study sponsors, principal investigators and clinical study sites. If we or our CROs fail to comply with applicable GCPs, the clinical data generated in our future clinical studies may be deemed unreliable and the FDA may require us to perform additional clinical studies before approving any marketing applications. Upon inspection, the FDA may determine that our clinical studies did not comply with GCPs. In addition, our future clinical studies will require a sufficient number of test subjects to evaluate the safety and efficacy of our product candidates. Accordingly, if our CROs fail to comply with these regulations or fail to recruit a sufficient number of patients, we may be required to repeat such clinical studies, which would delay the regulatory approval process.

Employees of our CROs are not our employees, and we are therefore unable to directly monitor whether or not they devote sufficient time and resources to our clinical and nonclinical programs, which must be conducted in accordance with GCPs and GLPs, respectively. These CROs may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical studies or other drug development activities that could harm our competitive position. If our CROs do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements, or for any other reasons, our clinical studies may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for, or successfully commercialize our product candidates. As a result, our financial results and the commercial prospects for our product candidates would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

We also expect to rely on other third parties to store and distribute our vectors and products for any clinical studies that we may conduct. Any performance failure on the part of our distributors could delay clinical development or marketing approval of our

product candidates or commercialization of our products, if approved, producing additional losses and depriving us of potential product revenue.

Our reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Because we rely on third parties to manufacture our vectors and our product candidates, and because we collaborate with various organizations and academic institutions on the advancement of our gene therapy platform, we must, at times, share trade secrets with them. We seek to protect our proprietary technology in part by entering into confidentiality agreements and, if applicable, material transfer agreements, collaborative research agreements, consulting agreements or other similar agreements with our collaborators, advisors, employees and consultants prior to beginning research or disclosing proprietary information. These agreements typically limit the rights of the third parties to use or disclose our confidential information, such as trade secrets. Despite the contractual provisions employed when working with third parties, the need to share trade secrets and other confidential information increases the risk that such trade secrets become known by our competitors, are inadvertently incorporated into the technology of others, or are disclosed or used in violation of these agreements. Given that our proprietary position is based, in part, on our know-how and trade secrets, a competitor's discovery of our trade secrets or other unauthorized use or disclosure would impair our competitive position and may have a material adverse effect on our business.

In addition, these agreements typically restrict the ability of our collaborators, advisors, employees and consultants to publish data potentially relating to our trade secrets. Our academic collaborators typically have rights to publish data, provided that we are notified in advance and may delay publication for a specified time in order to secure our intellectual property rights arising from the collaboration. In other cases, publication rights are controlled exclusively by us, although in some cases we may share these rights with other parties. We also conduct joint research and development programs that may require us to share trade secrets under the terms of our research and development partnerships or similar agreements. Despite our efforts to protect our trade secrets, our competitors may discover our trade secrets, either through breach of these agreements, independent development or publication of information including our trade secrets in cases where we do not have proprietary or otherwise protected rights at the time of publication. A competitor's discovery of our trade secrets would impair our competitive position and have an adverse impact on our business.

Risks related to our financial condition and capital requirements

**** We have incurred significant losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future.***

We are a clinical-stage biotechnology company, and we have not yet generated significant revenues. We have incurred net losses in each year since our inception in 1992, including net losses of $48.7 million and $25.3 million for the years ended December 31, 2014 and 2013, respectively. As of June 30, 2015, we had an accumulated deficit of $224.0 million.

We have devoted most of our financial resources to research and development, including our clinical and preclinical development activities. To date, we have financed our operations primarily through the sale of equity securities and, to a lesser extent, through collaboration agreements and grants from governmental agencies and charitable foundations. The amount of our future net losses will depend, in part, on the rate of our future expenditures and our ability to obtain funding through equity or debt financings, strategic collaborations or additional grants. We have not completed pivotal clinical studies for any product candidate and it will be several years, if ever, before we have a product candidate ready for commercialization. Even if we obtain regulatory approval to market a product candidate, our future revenues will depend upon the size of any markets in which our product candidates have received approval, and our ability to achieve sufficient market acceptance, reimbursement from third-party payors and adequate market share for our product candidates in those markets.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. We anticipate that our expenses will increase substantially if and as we:

- continue our research and preclinical and clinical development of our product candidates;
- expand the scope of our current clinical studies for our product candidates;
- initiate additional preclinical, clinical or other studies for our oncology product candidates;
- further develop the manufacturing process for our vectors or our product candidates;
- change or add additional manufacturers or suppliers;
- seek regulatory and marketing approvals for our product candidates that successfully complete clinical studies;

- seek to identify and validate additional product candidates;
- acquire or in-license other product candidates and technologies;
- make milestone or other payments under any license agreements or our stock purchase agreement with the former equityholders of Pregenen;
- maintain, protect and expand our intellectual property portfolio;
- establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval;
- attract and retain skilled personnel;
- build additional infrastructure to support our operations as a public company and our product development and planned future commercialization efforts; and
- experience any delays or encounter issues with any of the above.

The net losses we incur may fluctuate significantly from quarter to quarter and year to year, such that a period-to-period comparison of our results of operations may not be a good indication of our future performance. In any particular quarter or quarters, our operating results could be below the expectations of securities analysts or investors, which could cause our stock price to decline.

We have never generated any revenue from product sales and may never be profitable.

Our ability to generate revenue and achieve profitability depends on our ability, alone or with strategic collaboration partners, to successfully complete the development of, and obtain the regulatory, pricing and reimbursement approvals necessary to commercialize our product candidates. We do not anticipate generating revenues from product sales for the foreseeable future, if ever. Our ability to generate future revenues from product sales depends heavily on our success in:

- completing research and preclinical and clinical development of our product candidates;
- seeking and obtaining regulatory and marketing approvals for product candidates for which we complete clinical studies;
- developing a sustainable, commercial-scale, reproducible, and transferable manufacturing process for our vectors and product candidates;
- establishing and maintaining supply and manufacturing relationships with third parties that can provide adequate (in amount and quality) products and services to support clinical development and the market demand for our product candidates, if approved;
- launching and commercializing product candidates for which we obtain regulatory and marketing approval, either by collaborating with a partner or, if launched independently, by establishing a sales force, marketing and distribution infrastructure;
- obtaining sufficient pricing and reimbursement for our product candidates from third-party and governmental payors;
- obtaining market acceptance of our product candidates and gene therapy as a viable treatment option;
- addressing any competing technological and market developments;
- identifying and validating new gene therapy product candidates;
- negotiating favorable terms in any collaboration, licensing or other arrangements into which we may enter; and
- maintaining, protecting and expanding our portfolio of intellectual property rights, including patents, trade secrets and know-how.

Even if one or more of the product candidates that we develop is approved for commercial sale, we anticipate incurring significant costs associated with commercializing any approved product candidate. Our expenses could increase beyond expectations if we are required by the U.S. Food and Drug Administration, or the FDA, the European Medicines Agency, or the EMA, or other regulatory agencies, domestic or foreign, to perform clinical and other studies in addition to those that we currently anticipate. Even if we are able to generate revenues from the sale of any approved products, we may not become profitable and may need to obtain additional funding to continue operations.

From time to time, we will need to raise additional funding, which may not be available on acceptable terms, or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations.

We are currently advancing our Lenti-D and LentiGlobin product candidates through clinical development and other product candidates through preclinical development. Developing gene therapy products is expensive, and we expect our research and development expenses to increase substantially in connection with our ongoing activities, particularly as we advance our product candidates in clinical studies.

As of June 30, 2015, our cash, cash equivalents and marketable securities were $936.4 million. We expect that our existing cash and cash equivalents will be sufficient to fund our current operations through 2018. However, our operating plan may change as a result of many factors currently unknown to us, and we may need to seek additional funds sooner than planned, through public or private equity or debt financings, government or other third-party funding, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements or a combination of these approaches. In any event, we will require additional capital to obtain regulatory approval for, and to commercialize, our product candidates. Even if we believe we have sufficient funds for our current or future operating plans, we may seek additional capital if market conditions are favorable or if we have specific strategic objectives.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. In addition, we cannot guarantee that future financing will be available in sufficient amounts or on terms acceptable to us, if at all. Moreover, the terms of any financing may adversely affect the holdings or the rights of our stockholders and the issuance of additional securities, whether equity or debt, by us, or the possibility of such issuance, may cause the market price of our shares to decline. The sale of additional equity or convertible securities would dilute all of our stockholders. The incurrence of indebtedness would result in increased fixed payment obligations and we may be required to agree to certain restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire, sell or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. We could also be required to seek funds through arrangements with collaborative partners or otherwise at an earlier stage than otherwise would be desirable and we may be required to relinquish rights to some of our technologies or product candidates or otherwise agree to terms unfavorable to us, any of which may have a material adverse effect on our business, operating results and prospects.

If we are unable to obtain funding on a timely basis, we may be required to significantly curtail, delay or discontinue one or more of our research or development programs or the commercialization of any product candidates or be unable to expand our operations or otherwise capitalize on our business opportunities, as desired, which could materially affect our business, financial condition and results of operations.

Risks related to commercialization of our product candidates

We intend to rely on third-party manufacturers to produce our vector, product candidates and other key materials, but we have not entered into binding agreements with any such manufacturers to support commercialization. Additionally, these manufacturers do not have experience producing our vectors and product candidates at commercial levels and may not achieve the necessary regulatory approvals or produce our vectors and products at the quality, quantities, locations and timing needed to support commercialization.

We have not yet secured manufacturing capabilities for commercial quantities of our viral vectors or established transduction facilities in the desired commercialization regions to support commercialization of our products. Although we intend to rely on third-party manufacturers for commercialization, we have only entered into agreements with such manufacturers to support our clinical studies. We may be unable to negotiate binding agreements with the manufacturers to support our commercialization activities at commercially reasonable terms.

No manufacturer currently has the experience or ability to produce our vectors and product candidates at commercial levels. We are currently developing a commercial-scale manufacturing process for LentiGlobin and Lenti-D, which we are beginning to transfer to one or more contract manufacturers. We may run into technical or scientific issues related to manufacturing or development that we may be unable to resolve in a timely manner or with available funds. Although we have been able to produce our Lenti-D vector at commercial scale, we have not completed the characterization and validation activities necessary for commercial and regulatory approvals. If our manufacturing partners do not obtain such regulatory approvals, our commercialization efforts will be harmed.

Additionally, since the HSCs have a limited window of stability following procurement from the subject, we must set up transduction facilities in the regions where we wish to commercialize our product. Currently, we rely on third-party contract manufacturers in the United States and Europe to produce our product candidates for our clinical studies. Since a portion of our target patient populations will be outside the United States and Europe, we will need to set up additional transduction facilities that can

replicate our transduction process. Establishment of such facilities may be financially impractical or impeded by technical, quality, or regulatory issues related to these new sites and we may also run into technical or scientific issues related to transfer of our transduction process or other developmental issues that we may be unable to resolve in a timely manner or with available funds.

Even if we timely develop a manufacturing process and successfully transfer it to the third-party vector and product manufacturers, if such third-party manufacturers are unable to produce the necessary quantities of viral vectors and our product candidates, or in compliance with GMP or other pertinent regulatory requirements, and within our planned time frame and cost parameters, the development and sales of our products, if approved, may be materially harmed.

In addition, any significant disruption in our supplier relationships could harm our business. We source key materials from third parties, either directly through agreements with suppliers or indirectly through our manufacturers who have agreements with suppliers. There are a small number of suppliers for certain key materials that are used to manufacture our product candidates. Such suppliers may not sell these key materials to our manufacturers at the times we need them or on commercially reasonable terms. We do not have any control over the process or timing of the acquisition of these key materials by our manufacturers. Moreover, we currently do not have any agreements for the commercial production of these key materials.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may be unable to generate any revenues.

We have no experience selling and marketing our product candidates. To successfully commercialize any products that may result from our development programs, we will need to develop these capabilities, either on our own or with others. We may enter into collaborations with other entities to utilize their mature marketing and distribution capabilities, but we may be unable to enter into marketing agreements on favorable terms, if at all. If our future collaborative partners do not commit sufficient resources to commercialize our future products, if any, and we are unable to develop the necessary marketing capabilities on our own, we will be unable to generate sufficient product revenue to sustain our business. We will be competing with many companies that currently have extensive and well-funded marketing and sales operations. Without an internal team or the support of a third party to perform marketing and sales functions, we may be unable to compete successfully against these more established companies.

We face intense competition and rapid technological change and the possibility that our competitors may develop therapies that are more advanced or effective than ours, which may adversely affect our financial condition and our ability to successfully commercialize our product candidates.

We are engaged in gene therapy and in the field of CAR T cells in oncology, both of which are competitive and rapidly changing fields. We have competitors both in the United States and internationally, including major multinational pharmaceutical companies, biotechnology companies and universities and other research institutions. Some of the pharmaceutical and biotechnology companies we expect to compete with include GlaxoSmithKline plc through their collaboration with TIGET/MolMed, Sangamo BioSciences Inc. through their collaboration with Biogen Idec, Merck & Co., Inc., Novartis AG through their collaboration with the University of Pennsylvania, GlycoMimetics Inc., Acceleron Pharma, Inc., Kite Pharma, Inc., Pfizer Inc. through their collaboration with Cellectis SA, Adaptimmune Inc. and Juno Therapeutics, Inc. through their collaboration with Celgene Corporation. In addition, many universities and private and public research institutes are active in our target disease areas.

Many of our competitors have substantially greater financial, technical and other resources, such as larger research and development staff and experienced marketing and manufacturing organizations. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries. Our competitors may succeed in developing, acquiring or licensing on an exclusive basis, products that are more effective or less costly than any product candidate that we may develop, or achieve earlier patent protection, regulatory approval, product commercialization and market penetration than us. Additionally, technologies developed by our competitors may render our potential product candidates uneconomical or obsolete, and we may not be successful in marketing our product candidates against competitors.

Even if we are successful in achieving regulatory approval to commercialize a product candidate faster than our competitors, we may face competition from biosimilars due to the changing regulatory environment. In the United States, the Biologics Price Competition and Innovation Act of 2009 created an abbreviated approval pathway for biological products that are demonstrated to be “highly similar,” or biosimilar, to or “interchangeable” with an FDA-approved biological product. This new pathway could allow competitors to reference data from biological products already approved after 12 years from the time of approval. In his proposed budget for fiscal year 2014, President Obama proposed to cut this 12-year period of exclusivity down to seven years. He also proposed to prohibit additional periods of exclusivity due to minor changes in product formulations, a practice often referred to as “evergreening.” In Europe, the European Commission has granted marketing authorizations for several biosimilars pursuant to a set of general and product class-specific guidelines for biosimilar approvals issued over the past few years. In Europe, a competitor may reference data from biological products already approved, but will not be able to get on the market until 10 years after the time of

approval. This 10-year period will be extended to 11 years if, during the first eight of those 10 years, the marketing authorization holder obtains an approval for one or more new therapeutic indications that bring significant clinical benefits compared with existing therapies. In addition, companies may be developing biosimilars in other countries that could compete with our products. If competitors are able to obtain marketing approval for biosimilars referencing our products, our products may become subject to competition from such biosimilars, with the attendant competitive pressure and consequences. Expiration or successful challenge of our applicable patent rights could also trigger competition from other products, assuming any relevant exclusivity period has expired.

In addition, although our product candidates have been granted orphan drug status by the FDA and EMA, there are limitations to the exclusivity. In the United States, the exclusivity period for orphan drugs is seven years, while pediatric exclusivity adds six months to any existing patents or exclusivity periods. In Europe, orphan drugs may be able to obtain 10 years of marketing exclusivity and up to an additional two years on the basis of qualifying pediatric studies. However, orphan exclusivity may be reduced to six years if the drug no longer satisfies the original designation criteria. Additionally, a marketing authorization holder may lose its orphan exclusivity if it consents to a second orphan drug application or cannot supply enough drug. Orphan drug exclusivity also can be lost when a second applicant demonstrates its drug is "clinically superior" to the original orphan drug.

Finally, as a result of the expiration or successful challenge of our patent rights, we could face more litigation with respect to the validity and/or scope of patents relating to our competitors' products. The availability of our competitors' products could limit the demand, and the price we are able to charge, for any products that we may develop and commercialize.

The commercial success of any current or future product candidate will depend upon the degree of market acceptance by physicians, patients, third-party payors and others in the medical community.

Ethical, social and legal concerns about gene therapy and genetic research could result in additional regulations restricting or prohibiting the products and processes we may use. Even with the requisite approvals, the commercial success of our product candidates will depend in part on the medical community, patients, and third-party or governmental payors accepting gene therapy products in general, and our product candidates in particular, as medically useful, cost-effective, and safe. Any product that we bring to the market may not gain market acceptance by physicians, patients, third-party payors and others in the medical community. If these products do not achieve an adequate level of acceptance, we may not generate significant product revenue and may not become profitable. The degree of market acceptance of these product candidates, if approved for commercial sale, will depend on a number of factors, including:

- the potential efficacy and potential advantages over alternative treatments;
- the prevalence and severity of any side effects, including any limitations or warnings contained in a product's approved labeling;
- the prevalence and severity of any side effects resulting from the chemotherapy and myeloablative treatments associated with the procedure by which our product candidates are administered;
- relative convenience and ease of administration;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support and timing of market introduction of competitive products;
- the pricing of our products;
- publicity concerning our products or competing products and treatments; and
- sufficient third-party insurance coverage or reimbursement.

Even if a potential product displays a favorable efficacy and safety profile in preclinical and clinical studies, market acceptance of the product will not be known until after it is launched. Our efforts to educate the medical community and third-party payors on the benefits of the product candidates may require significant resources and may never be successful. Such efforts to educate the marketplace may require more resources than are required by the conventional technologies marketed by our competitors.

If we obtain approval to commercialize our product candidates outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If any of our product candidates are approved for commercialization, we may enter into agreements with third parties to market them on a worldwide basis or in more limited geographical regions. We expect that we will be subject to additional risks related to entering into international business relationships, including:

- different regulatory requirements for approval of drugs and biologics in foreign countries;
- reduced protection for intellectual property rights;
- economic weakness, including inflation, or political instability in particular foreign economies and markets; and
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenues, and other obligations incident to doing business in another country.

The insurance coverage and reimbursement status of newly-approved products is uncertain. Failure to obtain or maintain adequate coverage and reimbursement for new or current products could limit our ability to market those products and decrease our ability to generate revenue.

The availability and extent of reimbursement by governmental and private payors is essential for most patients to be able to afford expensive treatments, such as stem cell transplants or gene therapy. Sales of our product candidates will depend substantially, both domestically and abroad, on the extent to which the costs of our product candidates will be paid by health maintenance, managed care, pharmacy benefit and similar healthcare management organizations, or reimbursed by government health administration authorities, private health coverage insurers and other third-party payors. If reimbursement is not available, or is available only to limited levels, we may not be able to successfully commercialize our product candidates. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us to establish or maintain pricing sufficient to realize a sufficient return on our investment.

There is significant uncertainty related to the insurance coverage and reimbursement of newly approved products, including gene therapies. In the United States, the principal decisions about reimbursement for new medicines are typically made by the Centers for Medicare & Medicaid Services, or CMS, an agency within the U.S. Department of Health and Human Services, as CMS decides whether and to what extent a new medicine will be covered and reimbursed under Medicare. Private payors tend to follow CMS to a substantial degree. It is difficult to predict what CMS will decide with respect to reimbursement for fundamentally novel products such as ours, as there is no body of established practices and precedents for these new products. Reimbursement agencies in Europe may be more conservative than CMS. For example, a number of cancer drugs have been approved for reimbursement in the United States and have not been approved for reimbursement in certain European countries. In addition, costs or difficulties associated with the reimbursement of Glybera could create an adverse environment for reimbursement of other gene therapies.

Outside the United States, international operations are generally subject to extensive governmental price controls and other market regulations, and we believe the increasing emphasis on cost-containment initiatives in Europe, Canada, and other countries has and will continue to put pressure on the pricing and usage of our product candidates. In many countries, the prices of medical products are subject to varying price control mechanisms as part of national health systems. In general, the prices of medicines under such systems are substantially lower than in the United States. Other countries allow companies to fix their own prices for medicines, but monitor and control company profits. Additional foreign price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our product candidates. Accordingly, in markets outside the United States, the reimbursement for our products may be reduced compared with the United States and may be insufficient to generate commercially reasonable revenues and profits.

Moreover, increasing efforts by governmental and third-party payors, in the United States and abroad, to cap or reduce healthcare costs may cause such organizations to limit both coverage and level of reimbursement for new products approved and, as a result, they may not cover or provide adequate payment for our product candidates. We expect to experience pricing pressures in connection with the sale of any of our product candidates, due to the trend toward managed healthcare, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription drugs and surgical procedures and other treatments, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products.

Due to the novel nature of our technology and the potential for our product candidates to offer therapeutic benefit in a single administration, we face uncertainty related to pricing and reimbursement for these product candidates.

Our target patient populations are relatively small, as a result, the pricing and reimbursement of our product candidates, if approved, must be adequate to support commercial infrastructure. If we are unable to obtain adequate levels of reimbursement, our

ability to successfully market and sell our product candidates will be adversely affected. The manner and level at which reimbursement is provided for services related to our product candidates (e.g., for administration of our product to patients) is also important. Inadequate reimbursement for such services may lead to physician resistance and adversely affect our ability to market or sell our products.

If the market opportunities for our product candidates are smaller than we believe they are, our revenues may be adversely affected and our business may suffer. Because the target patient populations of our product candidates are small, we must be able to successfully identify patients and achieve a significant market share to maintain profitability and growth.

We focus our research and product development on treatments for severe genetic and rare diseases. Our projections of both the number of people who have these diseases, as well as the subset of people with these diseases who have the potential to benefit from treatment with our product candidates, are based on estimates. These estimates may prove to be incorrect and new studies may change the estimated incidence or prevalence of these diseases. The number of patients in the United States, Europe and elsewhere may turn out to be lower than expected, may not be otherwise amenable to treatment with our products, or new patients may become increasingly difficult to identify or gain access to, all of which would adversely affect our results of operations and our business.

Risks related to our business operations

If we undertake business combinations, collaborations or similar strategic transactions, they may disrupt our business, divert management's attention, dilute stockholder value or be difficult to integrate.

On a regular basis, we consider various business combination transactions, collaborations, license agreements and strategic transactions with third parties, including transactions which may result in us acquiring, or being acquired by, a third party. The consummation or performance of any future business combination, collaboration or strategic transaction may involve risks, such as:

- diversion of managerial resources from day-to-day operations;
- challenges associated with integrating acquired technologies and operations of acquired companies;
- exposure to unforeseen liabilities;
- difficulties in the assimilation of different cultures and practices, as well as in the assimilation and retention of broad and geographically dispersed personnel and operations;
- misjudgment with respect to value, return on investment or strategic fit;
- higher than expected transaction costs; and
- additional dilution to our existing stockholders if we issue equity securities as consideration for any acquisitions.

As a result of these risks, we may not be able to achieve the expected benefits of any such transaction. If we are unsuccessful in completing or integrating any acquisition, we may be required to reevaluate that component of our strategy only after we have incurred substantial expenses and devoted significant management time and resources in seeking to complete and integrate the acquisition.

Future business combinations could involve the acquisition of significant intangible assets. We may need to record write-downs from future impairments of identified intangible assets and goodwill. These accounting charges would increase a reported loss or reduce any future reported earnings. In addition, we could use substantial portions of our available cash to pay the purchase price for company or product candidate acquisitions. Subject to the limitations under our existing indebtedness, it is possible that we could incur additional debt or issue additional equity securities as consideration for these acquisitions, which could cause our stockholders to suffer significant dilution.

The failure to successfully integrate Precision Genome Engineering, Inc.'s business and operations or fully realize the benefits of this acquisition may adversely affect our future results.

On June 30, 2014, we acquired all of the outstanding capital stock of Precision Genome Engineering, Inc., or Pregenen. Based in Seattle, Washington, Pregenen is focused on the development of gene editing and cell signaling technologies. The success of our acquisition of Pregenen will depend, in part, on our ability to successfully integrate Pregenen's business and operations and fully realize the anticipated benefits and synergies from combining our business with Pregenen's business, in particular our ability to advance Pregenen's gene editing and cell signaling technologies to the stage where they can be incorporated into our existing or new product candidates. However, to realize these anticipated benefits, we must successfully combine these businesses and continue the research and development activities previously undertaken by Pregenen as a stand-alone company. If we are unable to achieve these

objectives, the anticipated benefits of our acquisition of Pregenen may not be realized fully or at all or may take longer to realize than expected. Any failure to timely realize these anticipated benefits could have a material adverse effect on our development programs, expenses and operating results.

Negative public opinion and increased regulatory scrutiny of gene therapy and genetic research may damage public perception of our product candidates or adversely affect our ability to conduct our business or obtain regulatory approvals for our product candidates.

Public perception may be influenced by claims that gene therapy is unsafe, and gene therapy may not gain the acceptance of the public or the medical community. In particular, our success will depend upon physicians specializing in the treatment of those diseases that our product candidates target prescribing treatments that involve the use of our product candidates in lieu of, or in addition to, existing treatments they are already familiar with and for which greater clinical data may be available. More restrictive government regulations or negative public opinion would have a negative effect on our business or financial condition and may delay or impair the development and commercialization of our product candidates or demand for any products we may develop. For example, in 2003, 20 subjects treated for X-linked severe combined immunodeficiency in two gene therapy studies using a murine gamma-retroviral vector showed correction of the disease, but the studies were terminated after five subjects developed leukemia (four of whom were subsequently cured). Although none of our current product candidates utilize these gamma-retroviruses, our product candidates use a viral delivery system. Adverse events in our clinical studies, even if not ultimately attributable to our product candidates (such as the many adverse events that typically arise from the transplant process) and the resulting publicity could result in increased governmental regulation, unfavorable public perception, potential regulatory delays in the testing or approval of our potential product candidates, stricter labeling requirements for those product candidates that are approved and a decrease in demand for any such product candidates.

Our future success depends on our ability to retain key employees, consultants and advisors and to attract, retain and motivate qualified personnel.

We are highly dependent on principal members of our executive team and key employees, the loss of whose services may adversely impact the achievement of our objectives. While we have entered into employment agreements with each of our executive officers, any of them could leave our employment at any time, as all of our employees are "at will" employees. Recruiting and retaining other qualified employees, consultants and advisors for our business, including scientific and technical personnel, will also be critical to our success. There is currently a shortage of skilled executives in our industry, which is likely to continue. As a result, competition for skilled personnel is intense and the turnover rate can be high. We may not be able to attract and retain personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for individuals with similar skill sets. In addition, failure to succeed in preclinical or clinical studies may make it more challenging to recruit and retain qualified personnel. The inability to recruit or loss of the services of any executive, key employee, consultant or advisor may impede the progress of our research, development and commercialization objectives.

****We will need to expand our organization and we may experience difficulties in managing this growth, which could disrupt our operations.***

As of June 30, 2015, we had 184 full-time employees. As our business, research and development activities expand, we expect to expand our full-time employee base and to hire more consultants and contractors. Our management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. We may not be able to effectively manage the expansion of our operations, which may result in weaknesses in our infrastructure, operational mistakes, loss of business opportunities, loss of employees and reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of additional product candidates. If our management is unable to effectively manage our growth, our expenses may increase more than expected, our ability to generate and/or grow revenues could be reduced, and we may not be able to implement our business strategy.

Our employees, principal investigators, consultants and commercial partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants and commercial partners. Misconduct by these parties could include intentional failures to comply with the regulations of the FDA and non-U.S. regulators, provide accurate information to the FDA and non-U.S. regulators, comply with healthcare fraud and abuse laws and regulations in the United States and abroad, report financial information or data accurately or disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a

wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Such misconduct could also involve the improper use of information obtained in the course of clinical studies, which could result in regulatory sanctions and cause serious harm to our reputation or could cause regulatory agencies not to approve our product candidates. We have adopted a code of conduct applicable to all of our employees, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of significant fines or other sanctions.

We face potential product liability, and, if successful claims are brought against us, we may incur substantial liability and costs. If the use of our product candidates harms patients, or is perceived to harm patients even when such harm is unrelated to our product candidates, our regulatory approvals could be revoked or otherwise negatively impacted and we could be subject to costly and damaging product liability claims.

The use of our product candidates in clinical studies and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by subjects participating in clinical trials, consumers, healthcare providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. There is a risk that our product candidates may induce adverse events. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation;
- withdrawal of clinical study participants;
- costs due to related litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- the inability to commercialize our product candidates; and
- decreased demand for our product candidates, if approved for commercial sale.

We carry product liability insurance and we believe our product liability insurance coverage is sufficient in light of our current clinical programs; however, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If and when we obtain marketing approval for product candidates, we intend to expand our insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. On occasion, large judgments have been awarded in class action lawsuits based on drugs or medical treatments that had unanticipated adverse effects. A successful product liability claim or series of claims brought against us could cause our stock price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business.

Patients with the diseases targeted by our product candidates are often already in severe and advanced stages of disease and have both known and unknown significant pre-existing and potentially life-threatening health risks. During the course of treatment, patients may suffer adverse events, including death, for reasons that may be related to our product candidates. Such events could subject us to costly litigation, require us to pay substantial amounts of money to injured patients, delay, negatively impact or end our opportunity to receive or maintain regulatory approval to market our products, or require us to suspend or abandon our commercialization efforts. Even in a circumstance in which we do not believe that an adverse event is related to our products, the investigation into the circumstance may be time-consuming or inconclusive. These investigations may interrupt our sales efforts, delay our regulatory approval process in other countries, or impact and limit the type of regulatory approvals our product candidates receive or maintain. As a result of these factors, a product liability claim, even if successfully defended, could have a material adverse effect on our business, financial condition or results of operations.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste

products. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials or other work-related injuries, this insurance may not provide adequate coverage against potential liabilities. In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

We may not be successful in our efforts to identify or discover additional product candidates.

The success of our business depends primarily upon our ability to identify, develop and commercialize products based on our gene therapy and gene editing platforms. Although our Lenti-D and LentiGlobin product candidates are currently in clinical development, our research programs, including our oncology research programs, may fail to identify other potential product candidates for clinical development for a number of reasons. Our research methodology may be unsuccessful in identifying potential product candidates or our potential product candidates may be shown to have harmful side effects or may have other characteristics that may make the products unmarketable or unlikely to receive marketing approval.

If any of these events occur, we may be forced to abandon our development efforts for a program or programs, which would have a material adverse effect on our business and could potentially cause us to cease operations. Research programs to identify new product candidates require substantial technical, financial and human resources. We may focus our efforts and resources on potential programs or product candidates that ultimately prove to be unsuccessful.

We may use our financial and human resources to pursue a particular research program or product candidate and fail to capitalize on programs or product candidates that may be more profitable or for which there is a greater likelihood of success.

Because we have limited resources, we may forego or delay pursuit of opportunities with certain programs or product candidates or for indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs for product candidates may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate, or we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

We incur significant increased costs as a result of operating as a public company, and our management devotes substantial time to new compliance initiatives.

As a public company, we have incurred and will continue to incur significant legal, accounting and other expenses. In addition, the Sarbanes-Oxley Act, as well as rules subsequently implemented by the SEC, and The NASDAQ Global Select Market have imposed various requirements on public companies. In July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted, resulting in significant corporate governance and executive compensation-related regulations. Stockholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways we cannot currently anticipate. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain our current levels of such coverage.

Risks related to our intellectual property

If we are unable to obtain or protect intellectual property rights related to our product candidates, we may not be able to compete effectively in our markets.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our product candidates. The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our product candidates in the United States or in other foreign countries. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found, which can invalidate a patent or prevent a patent from issuing from a pending patent application. Even if patents do successfully issue and even if such patents cover our product candidates, third parties may challenge their validity, enforceability or scope, which may result in such patents being narrowed or invalidated. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property, provide exclusivity for our product candidates or prevent others from designing around our claims. Any of these outcomes could impair our ability to prevent competition from third parties, which may have an adverse impact on our business.

If the patent applications we hold or have in-licensed with respect to our programs or product candidates fail to issue, if their breadth or strength of protection is threatened, or if they fail to provide meaningful exclusivity for our product candidates, it could dissuade companies from collaborating with us to develop product candidates, and threaten our ability to commercialize, future products. Several patent applications covering our product candidates have been filed recently. We cannot offer any assurances about which, if any, patents will issue, the breadth of any such patent or whether any issued patents will be found invalid and unenforceable or will be threatened by third parties. Any successful opposition to these patents or any other patents owned by or licensed to us could deprive us of rights necessary for the successful commercialization of any product candidates that we may develop. Further, if we encounter delays in regulatory approvals, the period of time during which we could market a product candidate under patent protection could be reduced. Since patent applications in the United States and most other countries are confidential for a period of time after filing, and some remain so until issued, we cannot be certain that we were the first to file any patent application related to a product candidate. Furthermore, if third parties have filed such patent applications, an interference proceeding in the United States can be initiated by a third party to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available however the life of a patent, and the protection it affords, is limited. Even if patents covering our product candidates are obtained, once the patent life has expired for a product, we may be open to competition from generic medications.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable or that we elect not to patent, processes for which patents are difficult to enforce and any other elements of our product candidate discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. However, trade secrets can be difficult to protect. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our employees, consultants, scientific advisors and contractors. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors.

Although we expect all of our employees and consultants to assign their inventions to us, and all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed or that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Misappropriation or unauthorized disclosure of our trade secrets could impair our competitive position and may have a material adverse effect on our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret. In addition, others may independently discover our trade secrets and proprietary information. For example, the FDA, as part of its Transparency Initiative, is currently considering whether to make additional information publicly available on a routine basis, including information that we may consider to be trade secrets or other proprietary information, and it is not clear at the present time how the FDA's disclosure policies may change in the future, if at all.

Further, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent material disclosure of the non-patented intellectual property related to our technologies to third parties, and there is no guarantee that we will have any such enforceable trade secret protection, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, results of operations and financial condition.

Third-party claims of intellectual property infringement may prevent or delay our development and commercialization efforts.

Our commercial success depends in part on our avoiding infringement of the patents and proprietary rights of third parties. There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits, interferences, oppositions and *inter partes* reexamination proceedings before the U.S. Patent and Trademark Office, or U.S. PTO, and corresponding foreign patent offices. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are pursuing development candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the patent rights of third parties.

Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our product candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process of any of our product candidates, any molecules formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize such product candidate unless we obtained a license under the applicable patents, or until such patents expire. Similarly, if any third-party patents were held by a court of competent jurisdiction to cover aspects of our formulations, processes for manufacture or methods of use, including combination therapy, the holders of any such patents may be able to block our ability to develop and commercialize the applicable product candidate unless we obtained a license or until such patent expires. In either case, such a license may not be available on commercially reasonable terms or at all.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize one or more of our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, pay royalties, redesign our infringing products or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure.

We may not be successful in obtaining or maintaining necessary rights to gene therapy product components and processes for our development pipeline through acquisitions and in-licenses.

Presently we have rights to the intellectual property, through licenses from third parties and under patents that we own, to develop our gene therapy product candidates. Because our programs may involve additional product candidates that may require the use of proprietary rights held by third parties, the growth of our business will likely depend in part on our ability to acquire, in-license or use these proprietary rights. In addition, our product candidates may require specific formulations to work effectively and efficiently and these rights may be held by others. We may be unable to acquire or in-license any compositions, methods of use, processes or other third-party intellectual property rights from third parties that we identify. The licensing and acquisition of third-party intellectual property rights is a competitive area, and a number of more established companies are also pursuing strategies to license or acquire third-party intellectual property rights that we may consider attractive. These established companies may have a competitive advantage over us due to their size, cash resources and greater clinical development and commercialization capabilities.

For example, we sometimes collaborate with U.S. and foreign academic institutions to accelerate our preclinical research or development under written agreements with these institutions. Typically, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the collaboration. Regardless of such right of first negotiation for intellectual property, we may be unable to negotiate a license within the specified time frame or under terms that are acceptable to us. If we are unable to do so, the institution may offer the intellectual property rights to other parties, potentially blocking our ability to pursue our program.

In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire third-party intellectual property rights on terms that would allow us to make an appropriate return on our

investment. If we are unable to successfully obtain rights to required third-party intellectual property rights, our business, financial condition and prospects for growth could suffer.

If we fail to comply with our obligations in the agreements under which we license intellectual property rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

We are a party to a number of intellectual property license agreements that are important to our business and expect to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that future license agreements will impose, various diligence, milestone payment, royalty and other obligations on us. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, the licensor may have the right to terminate the license, in which event we would not be able to market products covered by the license.

We may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we have done so from time to time. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates, which could harm our business significantly. We cannot provide any assurances that third-party patents do not exist which might be enforced against our current product candidates or future products, resulting in either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties.

In many cases, patent prosecution of our licensed technology is controlled solely by the licensor. If our licensors fail to obtain and maintain patent or other protection for the proprietary intellectual property we license from them, we could lose our rights to the intellectual property or our exclusivity with respect to those rights, and our competitors could market competing products using the intellectual property. In certain cases, we control the prosecution of patents resulting from licensed technology. In the event we breach any of our obligations related to such prosecution, we may incur significant liability to our licensing partners. Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues and is complicated by the rapid pace of scientific discovery in our industry. Disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights under our collaborative development relationships;
- our diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners; and
- the priority of invention of patented technology.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates.

We may be involved in lawsuits to protect or enforce our patents or the patents of our licensors, which could be expensive, time-consuming and unsuccessful.

Competitors may infringe our patents or the patents of our licensors. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours or our licensors is not valid, is unenforceable and/or is not infringed, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing.

Interference proceedings provoked by third parties or brought by us may be necessary to determine the priority of inventions with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms. Our defense of litigation or interference proceedings may fail and, even

if successful, may result in substantial costs and distract our management and other employees. We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

Recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law, including provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. The U.S. PTO is currently developing regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, were enacted March 16, 2013. However, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business and financial condition.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties or that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

We employ individuals who were previously employed at universities or other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and independent contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information, of any of our employee's former employer or other third parties. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel, which could adversely impact our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We may also be subject to claims that former employees, collaborators or other third parties have an ownership interest in our patents or other intellectual property. We have had in the past, and we may also have to in the future, ownership disputes arising, for example, from conflicting obligations of consultants or others who are involved in developing our product candidates. Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

Obtaining and maintaining our patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the U.S. PTO and various governmental patent agencies outside of the United States in several stages over the lifetime of the patents and/or applications. We have systems in place to remind us to pay these fees, and we employ an outside firm and rely on our outside counsel to pay these fees due to non-U.S. patent agencies. The U.S. PTO and various non-U.S. governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. We employ reputable law firms and other professionals to help us comply, and in many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market and this circumstance would have a material adverse effect on our business.

Issued patents covering our product candidates could be found invalid or unenforceable if challenged in court.

If we or one of our licensing partners initiated legal proceedings against a third party to enforce a patent covering one of our product candidates, the defendant could counterclaim that the patent covering our product candidate is invalid and/or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the U.S. PTO, or made a misleading statement, during prosecution. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post grant review, and equivalent proceedings in foreign jurisdictions (e.g., opposition proceedings). Such proceedings could result in revocation or amendment to our patents in such a way that they no longer cover our product candidates. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we and the patent examiner were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates. Such a loss of patent protection would have a material adverse impact on our business.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other biotechnology companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biotechnology industry involve both technological and legal complexity, and is therefore obtaining and enforcing biotechnology patents is costly, time-consuming and inherently uncertain. In addition, the United States has recently enacted and is currently implementing wide-ranging patent reform legislation. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts, and the U.S. PTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on product candidates in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets and other intellectual property protection, particularly those relating to biotechnology products, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Risks related to ownership of our common stock

The market price of our common stock may be highly volatile, and you may not be able to resell your shares at or above the price at which you purchase them.

Companies trading in the stock market in general, and The NASDAQ Global Select Market in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these

companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance.

The market price of our common stock may be volatile. Our stock price could be subject to wide fluctuations in response to a variety of factors, including the following:

- adverse results or delays in preclinical or clinical studies;
- reports of adverse events in other gene therapy products or clinical studies of such products;
- inability to obtain additional funding;
- any delay in filing an IND or BLA for any of our product candidates and any adverse development or perceived adverse development with respect to the FDA's review of that IND or BLA;
- failure to develop successfully and commercialize our product candidates;
- failure to maintain our existing strategic collaborations or enter into new collaborations;
- failure by us or our licensors and strategic collaboration partners to prosecute, maintain or enforce our intellectual property rights;
- changes in laws or regulations applicable to future products;
- inability to obtain adequate product supply for our product candidates or the inability to do so at acceptable prices;
- adverse regulatory decisions;
- introduction of new products, services or technologies by our competitors;
- failure to meet or exceed financial projections we may provide to the public;
- failure to meet or exceed the financial projections of the investment community;
- the perception of the pharmaceutical industry by the public, legislatures, regulators and the investment community;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us, our strategic collaboration partner or our competitors;
- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
- additions or departures of key scientific or management personnel;
- significant lawsuits, including patent or stockholder litigation;
- changes in the market valuations of similar companies;
- sales of our common stock by us or our stockholders in the future; and
- trading volume of our common stock.

Actual or potential sales of our common stock by our employees, including our executive officers, pursuant to pre-arranged stock trading plans could cause our stock price to fall or prevent it from increasing for numerous reasons, and actual or potential sales by such persons could be viewed negatively by other investors.

In accordance with the guidelines specified under Rule 10b5-1 of the Securities Exchange Act of 1934, as amended, and our policies regarding stock transactions, a number of our employees, including executive officers, have adopted and may continue to adopt stock trading plans pursuant to which they have arranged to sell shares of our common stock from time to time in the future. Generally, sales under such plans by our executive officers and directors require public filings. Actual or potential sales of our common stock by such persons could cause the price of our common stock to fall or prevent it from increasing for numerous reasons. For example, a substantial number of shares of our common stock becoming available (or being perceived to become available) for sale in the public market could cause the market price of our common stock to fall or prevent it from increasing. Also, actual or potential sales by such persons could be viewed negatively by other investors.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

Additional capital will be needed in the future to continue our planned operations. To the extent we raise additional capital by issuing equity securities, our stockholders may experience substantial dilution. We may sell common stock, convertible securities or other equity securities in one or more transactions at prices and in a manner we determine from time to time. If we sell common stock, convertible securities or other equity securities in more than one transaction, investors may be materially diluted by subsequent sales. These sales may also result in material dilution to our existing stockholders, and new investors could gain rights superior to our existing stockholders.

Pursuant to our 2013 Stock Option and Incentive Plan, or the 2013 Plan, our management is authorized to grant stock options and other equity-based awards to our employees, directors and consultants. The number of shares available for future grant under the 2013 Plan automatically increases each year by up to 4% of all shares of our capital stock outstanding as of December 31 of the prior calendar year, subject to the ability of our board of directors or compensation committee to take action to reduce the size of the increase in any given year. Currently, we plan to register the increased number of shares available for issuance under the 2013 Plan each year. If our board of directors or compensation committee elects to increase the number of shares available for future grant by the maximum amount each year, our stockholders may experience additional dilution, which could cause our stock price to fall. We also have an Employee Stock Purchase Plan and any shares of common stock purchased pursuant to that plan will also cause dilution.

We could be subject to securities class action litigation.

In the past, securities class action litigation has often been brought against a company following a decline in the market price of its securities. This risk is especially relevant for us because pharmaceutical companies have experienced significant stock price volatility in recent years. If we face such litigation, it could result in substantial costs and a diversion of management's attention and resources, which could harm our business.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

Under Section 382 of the Internal Revenue Code of 1986, as amended, if a corporation undergoes an "ownership change," generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation's ability to use its pre-change net operating loss carryforwards, or NOLs, and other pre-change tax attributes (such as research tax credits) to offset its post-change income may be limited. We have completed several financings since our inception which we believe have resulted in a change in control as defined by IRC Section 382. We may also experience ownership changes in the future as a result of subsequent shifts in our stock ownership. As a result, if we earn net taxable income, our ability to use our pre-change net operating loss carryforwards to offset U.S. federal taxable income may be subject to limitations, which could potentially result in increased future tax liability to us. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed.

We do not intend to pay dividends on our common stock so any returns will be limited to the value of our stock.

We have never declared or paid any cash dividends on our common stock. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Any return to stockholders will therefore be limited to the appreciation of their stock.

Provisions in our amended and restated certificate of incorporation and by-laws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us or increase the cost of acquiring us, even if doing so would benefit our stockholders or remove our current management.

Our amended and restated certificate of incorporation, amended and restated by-laws and Delaware law contain provisions that may have the effect of delaying or preventing a change in control of us or changes in our management. Our amended and restated certificate of incorporation and by-laws, include provisions that:

- authorize "blank check" preferred stock, which could be issued by our board of directors without stockholder approval and may contain voting, liquidation, dividend and other rights superior to our common stock;
- create a classified board of directors whose members serve staggered three-year terms;
- specify that special meetings of our stockholders can be called only by our board of directors, the chairperson of our board of directors, our chief executive officer or our president;
- prohibit stockholder action by written consent;

- establish an advance notice procedure for stockholder approvals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to our board of directors;
- provide that our directors may be removed only for cause;
- provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum;
- specify that no stockholder is permitted to cumulate votes at any election of directors;
- expressly authorize our board of directors to modify, alter or repeal our amended and restated by-laws; and
- require supermajority votes of the holders of our common stock to amend specified provisions of our amended and restated certificate of incorporation and amended and restated by-laws.

These provisions, alone or together, could delay or prevent hostile takeovers and changes in control or changes in our management.

In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us.

Any provision of our amended and restated certificate of incorporation or amended and restated by-laws or Delaware law that has the effect of delaying or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

Item 5. Other Information

Our policy governing transactions in our securities by our directors, officers, and employees permits our officers, directors and certain other persons to enter into trading plans complying with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. We have been advised that certain of our officers (including Nick Leschly, Chief Executive Officer, Jeffrey Walsh, Chief Operating Officer, David Davidson, Chief Medical Officer, Jason Cole, Senior Vice President and General Counsel and Eric Sullivan, Senior Director, Finance and Principal Accounting Officer) and certain of our directors (including Daniel Lynch and James Mandell) have entered into trading plans covering periods after the date of this quarterly report on Form 10-Q in accordance with Rule 10b5-1 and our policy governing transactions in our securities. Generally, under these trading plans, the individual relinquishes control over the transactions once the trading plan is put into place. Accordingly, sales under these plans may occur at any time, including possibly before, simultaneously with, or immediately after significant events involving our company. We do not undertake to report Rule 10b5-1 trading plans that may be adopted by any officers or directors in the future, or to report any modifications or termination of any publicly announced trading plan, except to the extent required by law.

Item 6. Exhibits

The exhibits filed as part of this Quarterly Report on Form 10-Q are set forth on the Exhibit Index, which is incorporated herein by reference.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

bluebird bio, Inc.

Date: August 6, 2015

By: /s/ Nick Leschly
Nick Leschly
President, Chief Executive Officer and Director (Principal Executive Officer and Duly Authorized Officer)

Date: August 6, 2015

By: /s/ James M. DeTore
James M. DeTore
Chief Financial Officer and Treasurer (Principal Financial Officer and Duly Authorized Officer)

Exhibit Index

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File no.	Exhibit	Filing Date
2.1	Stock Purchase Agreement by and between the Registrant and Precision Genome Engineering, Inc.	8-K	001-35966	2.1	June 30, 2014
3.1	Amended and Restated Certificate of Incorporation of the Registrant	8-K	001-35966	3.1	June 24, 2013
3.2	Amended and Restated By-laws of the Registrant	8-K	001-35966	3.2	June 24, 2013
4.1	Specimen Common Stock Certificate	S-1/A	333-188605	4.1	June 4, 2013
4.2	Form of Series A-1 Preferred Stock Warrant	S-1/A	333-188605	4.3	May 14, 2013
4.3	Form of Series B Preferred Stock Warrant	S-1/A	333-188605	4.4	May 14, 2013
4.4	Amended and Restated Investors' Rights Agreement, dated as of July 23, 2012, by and among the Registrant and the Investors listed therein.	S-1/A	333-188605	4.5	May 14, 2013
4.5	Amendment to Amended and Restated Investors' Rights Agreement, dated as of July 8, 2014, by and among the Registrant and the Investors listed therein.	10-Q	001-35966	4.6	August 12, 2014
10.1	Second Amended and Restated 2002 Employee, Director and Consultant Plan, as amended, and forms of award agreement thereunder	S-1/A	333-188605	10.1	May 14, 2013
10.2	2010 Stock Option and Grant Plan, as amended, and forms of award agreement thereunder	S-1/A	333-188605	10.2	May 14, 2013
10.3	2013 Stock Option and Incentive Plan and forms of award agreement thereunder	S-1/A	333-188605	10.3	June 4, 2013
10.4	Form of Indemnification Agreement between the Registrant and each of its Executive Officers and Directors	S-1/A	333-188605	10.4	May 14, 2013
10.5	Amended and Restated Lease Agreement, dated May 18, 2007, by and between the Registrant and Rivertech Associates II, LLC, as amended	10-Q	001-35966	10.1	November 14, 2013
10.6†	Patent License Agreement, dated December 11, 1996, by and between the Registrant (formerly known as Genetix Pharmaceuticals Inc., successor-in-interest to Innogene Pharmaceuticals Inc.) and Massachusetts Institute of Technology, as amended	S-1/A	333-188605	10.6	May 14, 2013
10.7†	Patent and Know-How License Agreement No. 07554F30, dated May 14, 2009, by and between the Registrant (formerly known as Genetix Pharmaceuticals Inc.) and INSERM-TRANSFERT, as amended	S-1/A	333-188605	10.7	May 14, 2013
10.8†	License Agreement, dated September 13, 2011, by and between the Registrant and Institut Pasteur, as amended	S-1/A	333-188605	10.8	May 14, 2013
10.9†	Amendment No. 3 to License Agreement, dated September 10, 2013, by and between the Registrant and Institut Pasteur	10-Q	001-35966	10.2	November 14, 2013
10.10†	Amendment No. 4 to License Agreement, dated April 1, 2015, by and between the Registrant and Institut Pasteur	10-Q	001-35966	10.10	May 5, 2015
10.11†	License Agreement, dated December 7, 2011, by and between the Registrant and Research Development Foundation	S-1/A	333-188605	10.9	May 14, 2013
10.12†	Novation Agreement, dated April 2, 2012, by and between the Registrant and The Board of Trustees of the Leland Stanford Junior University	S-1/A	333-188605	10.10	May 14, 2013

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File no.	Exhibit	Filing Date
10.13†	Master Collaboration Agreement by and between the Registrant and Celgene Corporation, dated March 19, 2013	S-1/A	333-188605	10.11	May 14, 2013
10.14†	Amended and Restated Master Collaboration Agreement by and between the Registrant and Celgene Corporation, dated June 3, 2015	—	—	—	Filed herewith
10.15	Amended and Restated Employment Agreement by and between the Registrant and Nick Leschly	S-1/A	333-188605	10.12	June 4, 2013
10.16	Amended and Restated Employment Agreement by and between the Registrant and Jeffrey T. Walsh	S-1/A	333-188605	10.13	June 4, 2013
10.17	Amended and Restated Employment Agreement by and between the Registrant and Mitch Finer	S-1/A	333-188605	10.14	June 4, 2013
10.18	Transitional Services and Separation Agreement by and between the Registrant and Mitch Finer	10-Q	001-35966	10.17	May 6, 2015
10.19	Amended and Restated Employment Agreement by and between the Registrant and David M. Davidson, M.D.	S-1/A	333-188605	10.15	June 4, 2013
10.20	Employment Agreement, dated October 20, 2014, by and between the Registrant and James DeTore	8-K	001-35966	10.1	November 10, 2014
10.21	Employment Agreement, dated May 30, 2015, by and between the Registrant and Philip D. Gregory	—	—	—	Filed herewith
10.22	Employment Agreement, dated February 3, 2014, by and between the Registrant and Jason F. Cole	10-Q	001-35966	10.19	May 13, 2014
10.23	Offer Letter, dated October 14, 2013, by and between the Registrant and Eric Sullivan	10-Q	001-35966	10.20	May 13, 2014
10.24	2013 Employee Stock Purchase Plan	S-1/A	333-188605	10.17	June 4, 2013
10.25	Executive Cash Incentive Bonus Plan	S-1/A	333-188605	10.18	May 14, 2013
10.26	Lease, dated June 3, 2013, by and between the Registrant and 150 Second Street, LLC, as amended	S-1/A	333-188605	10.19	June 4, 2013
10.27	Lease Amendment, dated November 15, 2013, by and between the Registrant and 150 Second Street, LLC, as amended	10-K	001-35966	10.19	March 5, 2014
10.28	Lease Amendment, dated June 9, 2014, by and between the Registrant and 150 Second Street, LLC, as amended	10-Q	011-35966	10.24	August 12, 2014
10.29	Lease, dated June 29, 2015, by and between the Registrant and ARE-MA Region No. 38, LLC	—	—	—	Filed herewith
21.1	Subsidiaries of the Registrant	10-Q	011-35966	21.1	August 12, 2014
31.1	Certification of Principal Executive Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	—	—	—	Filed herewith
31.2	Certification of Principal Financial Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	—	—	—	Filed herewith
32.1	Certification of Principal Executive Officer and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	—	—	—	Filed herewith

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File no.	Exhibit	Filing Date
101	The following materials from the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2015, formatted in XBRL (eXtensible Business Reporting Language): (i) Condensed Consolidated Balance Sheets as of June 30, 2015 and December 31, 2014, (ii) Condensed Consolidated Statements of Operations and Comprehensive Loss for the three and six months ended June 30, 2015 and 2014, (iii) Condensed Consolidated Statements of Cash Flows for the six months ended June 30, 2015 and 2014 and (iv) Notes to Unaudited Condensed Consolidated Financial Statements.	—	—	—	Filed herewith

† Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment and this exhibit has been submitted separately to the SEC.

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Exhibit 10.14

Amended and Restated Master Collaboration Agreement

by and between

bluebird bio, Inc.,

and

Celgene Corporation

and

Celgene European Investment Company LLC

June 3, 2015

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CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

List of Exhibits

Amended and Restated Master Collaboration Agreement

This Amended and Restated Master Collaboration Agreement (this "Agreement"), dated as of June 3, 2015 (the "Amendment Date"), is made by and between bluebird bio, Inc., a Delaware corporation ("Bluebird"), and Celgene Corporation, a Delaware corporation ("Celgene Corp."), with respect to all rights and obligations under this Agreement in the United States (subject to Section 11.19), and Celgene European Investment Company LLC ("Celgene Europe"), a Delaware limited liability company, with respect to all rights and obligations under this Agreement outside of the United States (subject to Section 11.19) ("Celgene Europe" and Celgene Corp., together, "Celgene"). Each of Bluebird and Celgene may be referred to herein as a "Party" or together as the "Parties."

WHEREAS, Bluebird has developed and owns or has rights to certain Patents and technology relating to developing innovative gene therapies for genetic disorders;

WHEREAS, Celgene is a biopharmaceutical company focused on acquiring, Developing and Commercializing innovative anti-cancer agents;

WHEREAS, the Bluebird and Celgene Corp. entered into that certain Master Collaboration Agreement, dated as of March 19, 2013 (the "Original Agreement Date"), pursuant to which such Parties entered into a global strategic collaboration to research, develop and commercialize therapeutic products in the Field (the "Original Agreement"); and

WHEREAS, the Parties wish to amend and restate the Original Agreement as set forth herein in order to continue the research and development of Product Candidates, pursuant to the terms set forth therein.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the amount and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Definitions.

The following terms and their correlatives will have the following meanings:

1.1 "Affiliate" of a Person means any other Person which (directly or indirectly) is controlled by, controls or is under common control with such Person. A Person will be deemed to "control" another Person if it: (a) with respect to such other Person that is a corporation, owns, directly or indirectly, beneficially or legally, at least fifty percent (50%) of the outstanding voting securities or capital stock (or such lesser percentage which is the maximum allowed to be owned by such Person in a particular jurisdiction) of such other Person, or, with respect to such other Person that is not a corporation, has other comparable ownership interest; or (b) has the power, whether pursuant to contract, ownership of securities or otherwise, to direct the management and policies of such other Person.

1.2 "Baylor" means Baylor College of Medicine.

1.3 "Baylor Agreements" means (a) the Research and Collaboration Agreement (dated as of March 19, 2013) by and between Baylor and Celgene Corp. ("Baylor Research Agreement"), (b) the Platform Technology License Agreement (dated as of March 19, 2013) by and between

Baylor and Celgene ("Baylor Platform License"), and (c) any Product License Agreement ("Baylor Product License"), in each case ((a) – (c)) as may be amended or restated.

1.4 "Biologics License Application" or "BLA" means, with respect to a country or extra-national territory, a request for permission to introduce, distribute, sell or market a biologic product in such country or some or all of such extra-national territory, including pursuant to 21 CFR 601.2 in the U.S.

1.5 "Bluebird In-Licensed IP" means all Patents, Materials and Know-How in-licensed by Bluebird or its Affiliates during the Collaboration Program Term pursuant to Bluebird In-Licenses that are necessary or useful to perform the Collaboration Program.

1.6 "Bluebird In-Licenses" means Pre-Existing In-Licenses and Bluebird Collaboration In-Licenses.

1.7 "Bluebird IP" means (a) Collaboration IP solely owned by Bluebird pursuant to Section 2.1(f), (b) Bluebird In-Licensed IP and (c) all Patents, Materials and Know-How Controlled by Bluebird or its Affiliates (other than Bluebird In-Licensed IP), in each case that is necessary or useful to perform the Collaboration Program. For avoidance of doubt, Collaboration IP jointly owned by the Parties pursuant to Section 2.1(f) will not be deemed Bluebird IP. [***]

1.8 "Bluebird New In-License" means a New In-License between Bluebird or any of its Affiliates and a Third Party.

1.9 "Business Combination" means with respect to a Party, any of the following events: (a) any Third Party (or group of Third Parties acting in concert as a "group" within the meaning of Section 13(d) of the Exchange Act) acquires (including by way of a tender or exchange offer or issuance by such Party), directly or indirectly, beneficial ownership or a right to acquire beneficial ownership of shares of such Party representing fifty percent (50%) or more of the voting shares (where voting refers to being entitled to vote for the election of directors) then outstanding of such Party, but excluding for such purposes any transaction or series of transactions with Financial Investors made for bona fide equity financing purposes in which cash is received by Bluebird or indebtedness of Bluebird is cancelled or converted or a combination thereof; (b) such Party consolidates with or merges into another corporation or entity which is a Third Party, or any corporation or entity which is a Third Party consolidates with or merges into such Party, in either event pursuant to a transaction in which more than fifty percent (50%) of the voting shares of the acquiring or resulting entity outstanding immediately after such consolidation or merger is not held by the holders of the outstanding voting shares of such Party immediately preceding such consolidation or merger; or (c) such Party sells, transfers, leases or otherwise disposes of all or substantially all of its assets to a Third Party. "Financial Investor" means any investor or series of Affiliated investors whose primary business is the investment of capital for financial gain (including venture capital funds, private equity funds, pension funds and so-called "angel investors"), but in all cases excluding so-called "strategic investors" such as biotechnology companies, specialty pharmaceutical companies, pharmaceutical companies, generic pharmaceutical companies, and medical device companies and their Affiliates such as strategic venture arms.

1.10 "CAR" means chimeric antigen receptor.

1.11 "Celgene In-Licensed IP" means all Patents, Materials and Know-How in-licensed by Celgene or its Affiliates during the Collaboration Program Term pursuant to Applicable Celgene In-Licenses that are necessary or useful for the research, Development or Manufacture of Product Candidates in the Field.

1.12 "Celgene In-Licenses" means the (a) Celgene Pre-Existing In-Licenses and (b) Celgene New In-Licenses. For clarity, the Baylor Agreements will not be considered a Celgene In-License hereunder.

1.13 "Celgene IP" means, collectively:

(a) "Celgene Know-How," which means Know-How and Materials that (i) are Controlled by Celgene or any of its Affiliates (other than pursuant to a Celgene In-License) as of the Original Agreement Date or thereafter during the Term, (ii) arise outside of the Collaboration Program, (iii) are provided by Celgene to the Collaboration Program pursuant to Section 2.1(i) for the Parties' research, Development or Manufacture of Product Candidates in the Field and (iv) are necessary or useful for the research, Development or Manufacture of Product Candidates in the Field; and

(b) "Celgene Patents," which means Patents Controlled by Celgene or any of its Affiliates (other than pursuant to a Celgene In-License) as of the Original Agreement Date or thereafter during the Term that Cover Celgene Know-How that are provided by Celgene to the Collaboration Program pursuant to Section 2.1(i);

(c) Any Celgene In-Licensed IP; and

(d) Any Collaboration IP solely owned by Celgene pursuant to Section 2.1(f).

For avoidance of doubt, Collaboration IP jointly owned by the Parties pursuant to Section 2.1(f) will not be deemed Celgene IP.

1.14 "Celgene New In-License" means a New In-License between Celgene or any of its Affiliates and a Third Party.

1.15 "Celgene Pre-Existing In-Licenses" means any agreement between Celgene or any of its Affiliates and a Third Party executed prior to the Original Agreement Date pursuant to which Celgene or any of its Affiliates in-licenses any Know-How, Materials or Patents that is necessary or useful for the research, Development, Manufacture or commercialization of Product Candidates in the Field. For clarity, the Baylor Agreements and Celgene New In-Licenses will not be considered Celgene Pre-Existing In-Licenses hereunder.

1.16 "cGMP" means all applicable standards relating to manufacturing practices for pharmaceutical products, including (a) all applicable requirements detailed in the FDA's current Good Manufacturing Practices regulations, 21 CFR Parts 210 and 211 and The Rules Governing Medicinal Products in the European Community, Volume IV, Good Manufacturing Practice for Medicinal Products, as each may be amended from time to time, and (b) all applicable Laws promulgated by any governmental authority having jurisdiction over the Manufacture of a Product Candidate, Licensed Candidate or Licensed Product, as applicable.

1.17 "Clinical Study" means any human clinical trial of a Product Candidate.

1.18 "Collaboration IP" means all Collaboration Know-How and Patents arising therefrom that Cover the Collaboration Know-How.

1.19 "Collaboration Know-How" means all Know-How and Materials discovered, created, conceived, developed or reduced to practice in the course of performing activities under the Collaboration Program (whether solely by one Party or jointly by the Parties, in each case with their Affiliates or any Third Parties or any employees, consultants or agents of any of the foregoing which perform activities under the Collaboration Program).

1.20 "Collaboration Program" means the program of research and Development in the Field that is engaged in by or on behalf of the Parties under this Agreement during the Collaboration Program Term.

1.21 "Commercially Reasonable Efforts" means, with respect to the research and Development of Product Candidates, that level of efforts and resources that such Party would normally devote to the research or Development, as the case may be, of a product owned by it or to which it has rights of the type it has hereunder, which is of a similar commercial potential at a similar stage in its lifecycle, in each case taking into account issues of safety and efficacy, product profile, the proprietary position, the then current competitive environment for such product and the likely timing of such product's entry into the market, the pricing and launching strategy for the respective product, the regulatory environment and status of such product, and other relevant scientific, technical and commercial factors.

1.22 "Control" or "Controlled" means, with respect to any Know-How, Material, Patent, Regulatory Data, Regulatory Filings or Regulatory Approvals, the possession (whether by ownership or license or sublicense) by a Party of the ability to use or practice such Know-How, Material, Patent, Regulatory Data, Regulatory Filings or Regulatory Approvals to perform the Collaboration Program or otherwise to grant to the other Party a license or access as provided herein to such item, without violating the terms of any agreement or other arrangement with any Third Party or, other than under the Bluebird In-Licenses, being obligated to pay any royalties or other consideration therefor ("Additional Payments"). For clarity, Bluebird New In-Licenses are not "Controlled" for purposes of this Agreement, unless and only after such Bluebird New In-License is converted into a Bluebird Collaboration In-License pursuant to Sections 4.1(b) or 4.1(d) and all required payments thereunder have been made by Celgene to Bluebird. For clarity, Celgene In-Licenses are not "Controlled" for purposes of this Agreement, unless and only after the Parties mutually agree to include such Celgene In-License in the Collaboration Program pursuant to Section 4.1(c). Notwithstanding the foregoing, if on or after the Original Agreement Date and for such time as the other Party agrees to pay and does in fact pay all Additional Payments with respect to such Party's access or license to such Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals (other than that in-licensed by Bluebird pursuant to a Bluebird In-License), such Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals will be deemed to be included in the definition of "Control".

1.23 "Covers", with reference to (a) a Patent, means that the making, using, selling, offering for sale or importing of a product or practice of a method would infringe a valid claim of such Patent in the country in which such activity occurs, and (b) Materials or Know-How, means that

the Manufacture, Development or commercialization of a product incorporates, embodies or otherwise makes use of such Know-How.

1.24 "Development" means preclinical and clinical drug development activities, including: test method development and stability testing, toxicology, formulation, process development, qualification and validation, Manufacture scale-up, development-stage Manufacturing, quality assurance/quality control, clinical studies, statistical analysis and report writing, the preparation and submission of BLAs and MAAs, regulatory affairs with respect to the foregoing and all other activities necessary or useful or otherwise requested or required by a Regulatory Authority as a condition or in support of obtaining or maintaining a Regulatory Approval.

1.25 "Development & Commercialization Agreements" means the Amended and Restated License Agreement attached hereto as Exhibit A (the "License Agreement") and the Amended and Restated Co-Development, Co-Promote and Profit Share Agreement attached hereto as Exhibit B (the "Co-Development, Co-Promote and Profit Share Agreement").

1.26 "EMA" means the Regulatory Authority known as either the European Medicines Agency or the European Agency for the Evaluation of Medicinal Products and any successor agency thereto.

1.27 "FDA" means the United States Food and Drug Administration and any successor agency thereto.

1.28 "Field" means the targeting of the Target Antigen by the use of (a) T-cells expressing a CAR (with or without other engineering to enhance functionality and/or safety), including virus specific genetically modified T-cells expressing a synthetic CAR, and (b) T-cells expressing native antigen receptors or engineered antigen receptors in which the T-cells are genetically modified to enhance their performance, persistence or safety, in each case under (a) and (b) for the treatment, modulation, palliation or prevention of cancer in humans.

1.29 "Gene Editing" means homing endonuclease (HE) and megaTAL gene editing technologies, including HE/megaTAL-mediated homology directed recombination and Bluebird's proprietary DARIC cell signaling technology.

1.30 "IND" means an investigational new drug application filed with the FDA for authorization to commence clinical studies, and its equivalent in a foreign country.

1.31 "Know-How" means all commercial, technical, scientific and other know-how and information, trade secrets, knowledge, technology, methods, processes, practices, formulae, instructions, skills, techniques, procedures, experiences, ideas, technical assistance, designs, drawings, assembly procedures, computer programs, specifications, data and results (including biological, chemical, pharmacological, toxicological, pharmaceutical, physical and analytical, preclinical, clinical, safety, manufacturing and quality control data and know-how, including Regulatory Data, study designs and protocols), in all cases, whether or not confidential, proprietary, patented or patentable, in written, electronic or any other form now known or hereafter developed.

1.32 "Knowledge" means the actual knowledge or good faith understanding of the vice presidents, senior vice presidents, president or chief executive officer of a Party of the facts and information then in their possession.

1.33 "Law" or "Laws" means all laws, statutes, rules, regulations, orders, judgments, or ordinances having the effect of law of any federal, national, multinational, state, provincial, county, city or other political subdivision.

1.34 "Lead Product Candidate" means the Product Candidate identified on Exhibit D.

1.35 "license" means license or sublicense, as applicable.

1.36 "Manufacturing" means the production, manufacture, processing, filling, finishing, packaging, labeling, shipping and holding of product or any intermediate thereof, including process development, process qualification and validation, scale-up, commercial manufacture and analytic development, product characterization, stability testing, quality assurance and quality control. With reference to any Product Candidate, Manufacturing includes Vector and associated Payload supply.

1.37 "Materials" means any tangible chemical or biological material, including any compounds, DNA, RNA, clones, Vectors, Payloads, cells, and any expression product, progeny, derivative or other improvement thereto, along with any tangible chemical or biological material embodying any Know-How.

1.38 "MAA" means an application for the authorization to market a product in any country or group of countries outside the United States, as defined in the applicable Laws and filed with the Regulatory Authority of a given country or group of countries.

1.39 "Next Generation Product Candidate" means the Product Candidate identified on Exhibit D.

1.40 [***]

1.41 "Option Fees" means the Initial Option Fee and the Additional Option Fee.

1.42 "Optioned Candidate" means a Product Candidate for which Celgene has exercised its option pursuant to Sections 5.1 or 5.6.

1.43 "Other In-Licenses" means Bluebird Collaboration In-Licenses that Celgene does not elect to include within the definition of Applicable New In-Licenses in an applicable Development & Commercialization Agreement in accordance with Section 5.7.

1.44 "Patent" means a patent or a patent application, including any additions, divisions, continuations, continuations-in-part, invention certificates, substitutions, reissues, reexaminations, extensions, registrations, supplementary protection certificates and renewals, including all U.S. and foreign counterparts thereof, but not including any rights that give rise to regulatory exclusivity periods (other than supplementary protection certificates, which will be treated as "Patents" hereunder).

1.45 "Patent Costs" means the out-of-pocket costs and expenses paid to outside legal counsel and other Third Parties (including to any licensor pursuant to any in-license), and filing and maintenance expenses, incurred in Prosecuting and Maintaining Patents and enforcing and defending them.

1.46 "Payload" means [***].

1.47 "Person" means any individual, partnership, joint venture, limited liability company, corporation, firm, trust, association, unincorporated organization, governmental authority or agency, or any other entity not specifically listed herein.

1.48 "Phase 1 Study" means a clinical trial of a product, the principal purpose of which is preliminary determination of safety in healthy individuals or patients as described under 21 C.F.R. §312.21(a) (as amended or any replacement thereof), or a similar clinical study prescribed by the Regulatory Authorities in a foreign country. For purposes of this Agreement, "completion of Phase 1 Study" means the date on which a final and complete clinical study report for the Phase 1 Study, based on an Initial Primary Analysis, is provided to Celgene. "Initial Primary Analysis" means, with respect to a Phase 1 Study, an analysis performed on the complete and cleaned dataset from such Phase 1 Study, which dataset includes a minimum of three (3) months follow-up of all patients in such Phase 1 Study.

1.49 "Phase 2/3 Study" means a clinical trial of a product that is (a) initiated to determine the safety and efficacy in the target patient population, as described in 21 C.F.R. 312.21(b) (as amended or any replacement thereof), or a similar clinical study prescribed by the Regulatory Authorities in a foreign country and (b) converted to a Phase 3 Study following an interim analysis of safety and efficacy data generated from the initial patents enrolled in such clinical trial.

1.50 "Phase 3 Study" means a clinical trial of a product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support Regulatory Approval of such product, as described in 21 C.F.R. 312.21(c) (as amended or any replacement thereof), or a similar clinical study prescribed by the Regulatory Authorities in a foreign country. For purposes of this Agreement and the Development & Commercialization Agreements, (a) "commencement of Phase 3 Study" for a product means (I) the first dosing of such product in a human patient in a Phase 3 Study, or (ii) the date on which the sponsor elects to continue enrollment of patients in a Phase 2/3 Study following an interim analysis of safety and efficacy data generated from the initial patents enrolled in such Phase 2/3 Study, and (b) "completion of Phase 3 Study" means the final dosing of the last patient to be dosed in such Phase 3 Study.

1.51 "Pre-Existing In-Licenses" means the agreements listed in Exhibit C.

1.52 "Product Candidate(s)" means any therapeutic candidate designed, discovered or developed as part of the Collaboration Program that comprises a T-Cell transduced with recombinant viral agent(s) encoding CAR(s) with targeting domain(s) that specifically targets the Target Antigen and optionally encoding additional protein(s) that may modulate the efficacy and safety of such therapeutic candidate. As of the Amendment Date, the Product Candidates include the Lead Product Candidate and the Next Generation Product Candidate.

1.53 "Prosecution and Maintenance" means, with regard to a particular Patent, the preparation, filing, prosecution and maintenance of such Patent, as well as re-examinations, reissues and the like with respect to that Patent, together with the conduct of interferences, the defense of oppositions and other similar proceedings with respect to that Patent.

1.54 "Regulatory Approval" means, with respect to a country or extra-national territory, any and all approvals (including BLAs and MAAs), licenses, registrations or authorizations of any Regulatory Authority necessary in order to commercially distribute, sell or market a product in such country or some or all of such extra-national territory, excluding any pricing or reimbursement approvals.

1.55 "Regulatory Authority" means any national (*e.g.*, the FDA), supra-national (*e.g.*, the EMA), regional, state or local regulatory agency, department, bureau, commission, council or other governmental authority, in any jurisdiction in the world, involved in the granting of Regulatory Approval.

1.56 "Regulatory Data" means all information with respect to a product made, collected or otherwise generated under or in connection with clinical studies and such other tests and studies in patients that are (a) required by applicable Law, or otherwise recommended by Regulatory Authorities, to obtain or maintain Regulatory Approvals, or (b) conducted solely in support of pricing or reimbursement for such product or are not otherwise strictly required in order to obtain or maintain Regulatory Approval for such product (including epidemiological studies, modeling and pharmacoeconomic studies, post-marketing surveillance studies, investigator sponsored studies and health economics studies).

1.57 "Regulatory Filings" means any submission to a Regulatory Authority of any appropriate regulatory application together with any related correspondence and documentation, and will include any submission to a regulatory advisory board, marketing authorization application, and any supplement or amendment thereto. For the avoidance of doubt, Regulatory Filings will include any IND, BLA, MAA or the corresponding application in any other country or group of countries.

1.58 "Target Antigen" means the antigen designated as B-cell maturation antigen (BCMA) as further set forth on Exhibit D, and naturally occurring variants thereof.

1.59 "T-Cell" means any of the lymphocytes that mature in the thymus and have the ability to recognize specific peptide antigens presented by major histocompatibility complex antigens through the receptors on their cell surface.

1.60 "Third Party" means any Person other than Bluebird, Celgene and their respective Affiliates.

1.61 [***]

1.62 [***]

1.63 "United States" or "U.S." means the United States of America, including its territories and possessions, the District of Columbia and Puerto Rico.

1.64 "Vector" means [***].

Definitions for each of the following terms are found in the body of this Agreement as indicated below:

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Defined Term	*Location*
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Term	Section 10.1
Third Party	Section 1.60
Third Party Claims	Section 9.6(a)
[***]	
[***]	
United States (U.S.)	Section 1.63
Vector	Section 1.64

2. Collaboration Program.

2.1 Collaboration Program.

(a) *General.* During the Collaboration Program Term, the Parties will conduct the Collaboration Program on the terms and conditions set forth in this Agreement to identify, research and Develop Product Candidates. [***] Under the Collaboration Program, Bluebird will be responsible for all research and Development activities performed through completion of the initial Phase 1 Study with respect to each Product Candidate, and Celgene will be a critical advisor for oncology drug development, ex vivo human cell processing, assay development and release testing. Bluebird will keep Celgene reasonably informed of Bluebird's research and Development activities and will reasonably consult with Celgene and reasonably consider Celgene's comments and advice with respect to all material decisions relating to such activities. Research and Development activities of the Parties with respect to the Collaboration Program will be described in a "Collaboration Plan," an initial version of which is attached hereto as Exhibit E. Any modifications or amendments to the Collaboration Plan that are proposed by either Party will be subject to review by the JSC pursuant to and in accordance with the terms of Section 3.2(d) and to the prior written approval of both Parties. The selection of Product Candidates for additional work under the Collaboration Program will be subject to the oversight and supervision of the JSC, provided that if the JSC is unable to unanimously agree with respect to the selection of a Product Candidate for additional work under the Collaboration Program, either Party may, by written notice to the other Party, have such dispute referred to the Bluebird CEO and the Celgene CEO or in either case his or her designee (who will be a senior executive), who will attempt in good faith to resolve such dispute by negotiation and consultation [***], and if not so resolved, Bluebird will have the tie-breaking vote, provided that if a Business Combination has occurred with respect to Bluebird, Celgene will have the tie-breaking vote.

(b) *Obligations Under the Collaboration Plan.* Each Party will use Commercially Reasonable Efforts to perform (itself or through its Affiliates or by permitted subcontracting pursuant to Section 2.4) its respective obligations under the Collaboration Plan, and will cooperate with and provide reasonable support to the other Party in such other Party's performance of its responsibilities under the Collaboration Plan. The Collaboration Plan will not assign to Celgene, and Bluebird will not request that Celgene perform, any research or Development activity that would require a sublicense under any Bluebird In-License. If, notwithstanding the foregoing, the

Collaboration Plan assigns to Celgene, or Bluebird requests that Celgene perform, any such research or Development activity, Bluebird will be responsible for any and all obligations to its licensors under any Bluebird In-License that arise out of such research or Development. [***] The Parties acknowledge and agree, however, that no outcome or success is or can be assured and that failure to achieve desired results will not in and of itself constitute a breach or default of any obligation in this Agreement (notwithstanding the focus of the Collaboration Program described above).

(c) *Manufacturing*.

(i) The Parties mutually agree that, subject to mutual agreement on a work order under that certain Manufacturing and Clinical Supply Agreement, dated as of December 15, 2014 (as the same may be amended, restated or otherwise modified from time to time), as a part of the Collaboration Program, Celgene will use and operate an existing cGMP suite, for the processing of the Lead Product Candidate which incorporates Vectors and associated Payloads supplied by Bluebird [***]. The Parties will use commercially reasonable efforts to enter into such additional agreements as may be necessary for Celgene to do so, including a Vector and Payload supply agreement. The Parties will determine which Party will have responsibility for (A) the processing of the Lead Product Candidate which incorporates Vectors and associated Payloads supplied by Bluebird for use in any Clinical Studies [***], and (B) the processing of any other Product Candidates which incorporates Vectors and associated Payloads supplied by Bluebird for any Clinical Studies of such other Product Candidates [***].

(ii) Prior to or during initial proof of concept studies, Celgene and Bluebird will mutually assess the capability for sole supply manufacture of Vector supply, and agree to provisions to ensure the Manufacture and distribution, of Vector Supplies, in adequate quantities, of adequate quality, and in acceptable timeframes so as to not delay clinical Development and commercialization of Product Candidates. Multiple sites may be required to supply and store inventories of Vector supplies.

(d) *Collaboration Program Term*. Unless terminated or extended pursuant to the terms hereof, the term of the Collaboration Program will commence on the Original Agreement Date and continue until the third (3rd) anniversary of the Amendment Date the "Collaboration Program Term"). The Collaboration Program Term may be extended only upon the mutual written agreement of the Parties.

(e) **Exclusivity.** [***]

(f) *Collaboration Know-How and IP*.

(i) Each Party will promptly (and at least on a calendar quarterly basis) disclose to the other Party any Collaboration Know-How discovered, created, conceived, developed or reduced to practice by or on behalf of such Party, and will provide the other Party such documentation regarding the same as the other Party may reasonably request.

(ii) Except as set forth in this Section 2.1(f)(ii) and in Section 2.1(f) (iv) below, each Party will solely own all right, title and interest in and to all Collaboration IP that is discovered, created, conceived, developed or reduced to practice solely by or on behalf of such Party, and all right, title and interest in and to all Collaboration IP will automatically vest solely in

such Party. The Parties acknowledge and agree that (A) subject to Section 2.1(f)(iv) with respect to improvements to, or modifications or derivative works of, Bluebird IP that is directed to Vectors, the Parties will jointly own all right, title and interest in and to all Know-How and Materials, and Patents arising therefrom, that are discovered, created, conceived, developed or reduced to practice by or on behalf of the Parties (whether solely by or on behalf of a Party or jointly by or on behalf of both Parties) in the course of performing activities as a part of the "Project Research" (as defined in the Baylor Research Agreement), (B) as between Celgene and Bluebird, Know-How and Materials, and Patents arising therefrom, discovered, created, conceived, developed or reduced to practice by Dr. Malcolm K. Brenner during the Term in connection with his participation on the Collaboration Program Advisory Committee that relate to "Project Research" will be subject to the terms of the Baylor Agreements and (C) as between Celgene and Bluebird, Know-How and Materials, and Patents arising therefrom, that are discovered, created, conceived, developed or reduced to practice by Dr. Malcolm K. Brenner during the Term in connection with his participation on the Collaboration Program Advisory Committee that do not relate to "Project Research" and (I) are within the Baylor Field will be jointly owned by the Parties and (II) are outside the Baylor Field will be solely owned by the Party with which Dr. Malcolm K. Brenner discovered, created, conceived, developed or reduced to practice the subject Know-How and Materials, or will be jointly owned by the Parties if Dr. Malcolm K. Brenner discovered, created, conceived, developed or reduced to practice the subject Know-How and Materials with both Parties, subject, in each case of clauses (C)(I) and (C)(II) above, to Section (iv) with respect to improvements to, or modifications or derivative works of, Bluebird IP that is directed to Vectors. Each Party agrees to execute such written assignments and confirmations as are necessary to effect the allocation of ownership of Patents, Know-How and Materials as provided in the immediately preceding sentence, and any Patents, Know-How and Materials addressed by the immediately preceding sentence (other than clause (C)(II)) shall be considered Collaboration IP. [***]

(iii) Except as set forth in Section 2.1(f)(iv) below, the Parties will jointly own any and all Collaboration IP that is discovered, created, conceived, developed or reduced to practice jointly by or on behalf of the Parties. Each Party will have an undivided one-half interest in and to such jointly-owned Collaboration IP. Each Party will exercise its ownership rights in and to such jointly-owned Collaboration IP, including the right to license and sublicense or otherwise to exploit, transfer or encumber its ownership interest, without an accounting or obligation to, or consent required from, the other Party, but subject to the licenses hereunder and the other terms and conditions of this Agreement, including Section 2.1(e). At the reasonable written request of a Party, the other Party will in writing grant such consents and confirm that no such accounting is required to effect the foregoing regarding jointly-owned Collaboration IP. Each Party, for itself and on behalf of its Affiliates, licensees and sublicensees, and employees, subcontractors (subject to Section 2.4), consultants and agents of any of the foregoing, hereby assigns (and to the extent such assignment can only be made in the future hereby agrees to assign), to the other Party a joint and undivided interest in and to all jointly-owned Collaboration IP.

(iv) Notwithstanding the first sentence of Section 2.1(f)(ii) and notwithstanding Section 2.1(f)(iii), but subject to the second sentence of Section 2.1(f)(ii), (A) Celgene will solely own any Collaboration IP that is an improvement to, or modification or derivative work of, any Celgene IP, and Bluebird, for itself and on behalf of its Affiliates, licensees and sublicensees, and employees, subcontractors (subject to Section 2.4), consultants and agents of any of the foregoing,

hereby assigns (and to the extent such assignment can only be made in the future hereby agrees to assign), all of its rights, title and interest in such Collaboration IP to Celgene, and (B) Bluebird will solely own any Collaboration IP that is an improvement to, or modification or derivative work of, any Bluebird IP, and Celgene, for itself and on behalf of its Affiliates, licensees and sublicensees, and employees, subcontractors (subject to Section 2.4), consultants and agents of any of the foregoing, hereby assigns (and to the extent such assignment can only be made in the future hereby agrees to assign), all of its rights, title and interest in such Collaboration IP to Bluebird. To the extent that a particular item of Collaboration IP constitutes an improvement to, or modification or derivative work of, both Celgene IP and Bluebird IP, the Parties will jointly own such particular item of Collaboration IP pursuant to Section 2.1(f)(iii).

(v) The Parties acknowledge and agree that all Collaboration Know-How (as defined under the Original Agreement) existing as of the Amendment Date and Patents arising therefrom that Cover such Collaboration Know-How are and shall continue to be owned by the Parties pursuant to the terms of the Original Agreement, and shall be considered Collaboration IP for purposes of this Agreement. As of the Amendment Date, (A) all Patents within such Collaboration IP that are solely owned by Bluebird are set forth on Exhibit I-1, (B) all Patents within such Collaboration IP that are solely owned by Celgene are set forth on Exhibit I-2, and (C) all Patents within such Collaboration IP that are jointly owned by Bluebird and Celgene are set forth on Exhibit I-3.

(vi) Inventorship determination for all Patents worldwide arising from any Know-How or Material discovered, created, conceived, developed or reduced to practice by or on behalf of the Parties under or in connection with this Agreement and thus the ownership thereof will be made in accordance with applicable United States patent laws.

(g) *Regulatory*. Bluebird will exclusively own the INDs for the Development of Product Candidates and will, after reasonable consultation with Celgene under the oversight of the JSC: (i) determine the regulatory plans and strategies for Product Candidates, (ii) prepare and file all Regulatory Filings with respect to Product Candidates, and (iii) be responsible for conducting all meetings with Regulatory Authorities in connection with the Development of Product Candidates, in each case unless and until such time that such Product Candidate becomes an Optioned Candidate. Bluebird will provide Celgene with reasonable prior notice of all such meetings with Regulatory Authorities, and Celgene will have the right to participate in such meetings.

(h) *Licenses*.

(i) During the Term, Bluebird hereby grants to Celgene the co-exclusive (with Bluebird and its Affiliates), worldwide, royalty-free right and license in the Field, without the right to grant sublicenses (other than to permitted subcontractors under Section 2.4), under Collaboration IP solely owned by Bluebird pursuant to Section 2.1(f) and Bluebird's interest in jointly owned Collaboration IP, in each case solely to conduct research and Development under the Collaboration Plan as part of the Collaboration Program in accordance with the terms of this Agreement. Except as may be permitted under an applicable Development & Commercialization Agreement, Celgene will not practice or otherwise use any Collaboration IP solely owned by

Bluebird pursuant to Section 2.1(f) other than in accordance with the license granted in this Section 2.1(h)(i).

(ii) Subject to the terms and conditions of this Agreement, during the Term and thereafter, Celgene hereby grants to Bluebird a worldwide, fully paid-up, non-exclusive license, with the right to sublicense through multiple tiers, under (A) Collaboration IP solely owned by Celgene pursuant to Section 2.1(f), (B) all improvements to, or modifications or derivative works of, any Bluebird IP that are discovered, created, conceived, developed or reduced to practice by or on behalf of Celgene or its Affiliates during the Collaboration Program Term in the course of Developing an Optioned Candidate, Elected Candidate or Licensed Product under a Development & Commercialization Agreement, and (C) [***], in each case of (A) through (C), that are related to the Manufacture of Vectors, solely to research, Develop, Manufacture and commercialize Vectors, provided that (I) the foregoing license does not include any Patents and Know-How for Manufacturing (other than Manufacturing of Vectors), (II) [***], (III) during the Term and the term of any applicable Development & Commercialization Agreement, the foregoing license does not include the right to research, Develop, Manufacture or commercialize any Vectors that are used in connection with Optioned Candidates, Elected Candidates or Licensed Products under such Development & Commercialization Agreement, other than with and for Celgene, and (IV) [***]. Further, the Parties acknowledge and agree that, upon written notice to Celgene, Bluebird may decline the taking of or terminate such sublicense from Celgene with respect to any Patents, Know-How or Materials that are in-licensed by Celgene pursuant to a Celgene New In-License that is an Applicable Celgene In-License. If any royalty, milestone or other payment, [***] becomes due under any Celgene New In-License that is attributable to Bluebird as a sublicensee thereunder with respect to such research, Development, Manufacture or commercialization of Vectors, Celgene will pay same, provided that Bluebird will reimburse Celgene for any such payment within thirty (30) days of Bluebird's receipt of Celgene's written invoice therefor, and Bluebird's failure to pay such reimbursement within such time period will entitle Celgene to terminate Bluebird's sublicense under the applicable Celgene New In-License upon thirty (30) days written notice. Upon Bluebird's request, Celgene agrees to provide Bluebird with a copy of any Celgene New In-License that is an Applicable Celgene In-License under which Bluebird is granted a sublicense under this Section 2.1(h)(ii), which Celgene may reasonably redact (other than with respect to provisions applicable to the determination of Bluebird's reimbursement obligations under this Section 2.1(h)(ii)).

(iii) [***]

(i) *Celgene IP*. If either Party desires that Celgene make available any Patents, Know-How or Material Controlled by Celgene or its Affiliates (other than pursuant to a Celgene In-License, which is governed by Section 4.1(c), and other than Collaboration IP) for use in the Collaboration Program, such Party will notify the JSC and the JSC will discuss whether or not such Patents, Know-How or Materials would be useful for the Collaboration Program. If the JSC concludes that such Patents, Know-How or Materials would be useful for the Collaboration Program, the JSC will invite Celgene to make such intellectual property available to the Collaboration Program. Celgene will have sole discretion whether or not to make such intellectual property available to the Collaboration Program, and if Celgene so elects it will make such intellectual property available by providing the JSC with written notice specifying the Patents,

Know-How and/or Materials that will be made available to the Collaboration Program as "Celgene IP". Except by such written notice provided to the JSC, no Patents, Know-How or Materials Controlled by Celgene or its Affiliates (other than pursuant to a Celgene In-License, which is governed by Section 4.1(c) and other than Collaboration IP) will be made available for, or used in, the Collaboration Program, and no such Patents, Know-How or Materials shall be considered "Celgene IP".

2.2 Collaboration Program Expenses. Except for any amounts that may be payable by Celgene under a Vector and associated Payload supply agreement described in Section 2.1(c), each of Bluebird and Celgene is and will remain solely responsible for all of its internal costs and expenses that are incurred by or on its behalf in connection with the performance of the Collaboration Plan. Subject to Sections 4.1, 4.2, 6.4 and 7.2, and except for any amounts that may be payable by Celgene under a Vector and associated Payload supply agreement described in Section 2.1(c) or a Celgene In-License, Bluebird will be responsible for all out-of-pocket costs and expenses payable to Third Parties in connection with the performance of the Collaboration Plan.

2.3 Collaboration Program Records, Reports and Materials.

(a) *Records*. Each Party will maintain, or cause to be maintained, records of its activities under the Collaboration Program in sufficient detail and in good scientific manner appropriate for scientific, Patent and regulatory purposes, that will properly reflect all work included in the Collaboration Program, for a period of at least ten (10) years after the creation of such records, but in no event less than required by applicable Laws. Each Party will have the right to request and receive a copy of any such records.

(b) *Collaboration Program Reports*. Each Party will furnish to the JSC a high-level summary written report within thirty (30) days after each June 30th and December 31st occurring during the Collaboration Program Term, describing its progress under the Collaboration Plan as part of the Collaboration Program during the previous six (6) month period. Each Party agrees that it will promptly respond to the other Party's reasonable questions regarding any of such Party's reports.

(c) *Materials*.

(i) Each Party will, during the Collaboration Program Term, as a matter of course as described in the Collaboration Plan or upon the other Party's reasonable written request, furnish to each other samples of Materials that are in such Party's Control and are necessary for the other Party to carry out its responsibilities under the Collaboration Plan, provided that, prior to Celgene providing any Materials to Bluebird, Celgene will notify Bluebird of the cost of such Materials and Bluebird may elect whether or not to receive such Materials from Celgene. Subject to the foregoing, after Celgene has provided Materials costing more than [***], Bluebird will reimburse Celgene for the costs of any additional Materials.

(ii) Each Party will use such Materials only in accordance with the Collaboration Plan and otherwise in accordance with the terms and conditions of this Agreement and any instructions provided by the Party furnishing the Materials. Except with the prior written consent of the supplying Party (such consent not to be unreasonably withheld, delayed or conditioned), the Party receiving any Materials will not distribute or otherwise allow the release of Materials to any

Affiliate (other than wholly-owned subsidiaries) or Third Party, except for subcontracting as permitted hereunder. All Materials delivered to the receiving Party will remain the sole property of the supplying Party and will be used in compliance with all applicable Law. The Materials supplied under this Agreement will be used with prudence and appropriate caution in any experimental work because not all of their characteristics may be known.

2.4 Permitted Subcontracting. Each Party may subcontract any of its activities to be performed under the Collaboration Plan to an Affiliate or Third Party, provided that any such Affiliate or Third Party will have entered into a written agreement with such Party that includes terms and conditions protecting and limiting use and disclosure of Confidential Information and Materials and Know-How at least to the same extent as under this Agreement, and requiring such Affiliate or Third Party and its personnel to assign to such Party all right, title and interest in and to any Patents, Know-How and Materials created, conceived or developed in connection with the performance of subcontracted activities to the extent required to research, Develop, Manufacture and commercialize Product Candidates, provided that with respect to Third Parties that are academic or other non-commercial Persons, a Party will be required only to use commercially reasonable efforts to obtain such assignment, and in the absence of such assignment, the Parties will mutually agree on the rights (*e.g.*, a license or option to license) to be obtained from such academic or non-commercial Persons. Any such subcontracting activities will be described in the reports for the Collaboration Program required by Section 2.3(b).

3. Governance.

3.1 Management. Management of the Collaboration Program activities will be under the responsibility of one person to be designated by Celgene (the "Celgene Program Director") and one person to be designated by Bluebird (the "Bluebird Program Director," and together with the Celgene Program Director, the "Program Directors").

3.2 Joint Steering Committee.

(a) *Steering Committee*. The Parties will establish a Joint Steering Committee, comprised of three (3) representatives of Bluebird and three (3) representatives of Celgene (the "JSC"). Each Party may replace its representatives on the JSC or its Program Director at any time upon written notice to the other Party. With the consent of the other Party (such consent not to be unreasonably withheld, delayed or conditioned), each Party may invite non-voting employees and consultants (including Dr. Malcolm K. Brenner) to attend meetings of the JSC, subject to their agreement to be bound to the same extent as a permitted subcontractor under Section 2.4.

(b) *Meetings*. While in existence, the JSC will meet each calendar quarter and, at a minimum, two (2) of such meetings each calendar year will be in person (which in-person meeting will be held at locations mutually agreed by the Parties). Meetings of the JSC will be effective only if at least one (1) representative of each Party is present or participating. Each Party will be responsible for all of its own expenses of participating in the meetings. The Parties will endeavor to schedule meetings of the JSC at least six (6) months in advance. Bluebird will prepare and circulate a meeting agenda prior to each such meeting. The Parties will alternate in preparing written minutes of such meeting, and the preparing Party will circulate such minutes within fifteen (15) days after such meeting. The Parties will agree on the minutes of each meeting promptly, but in no event later than the next meeting of the JSC.

(c) *Responsibilities*. The JSC will oversee and supervise the overall performance of the Collaboration Plan and within such scope will:

(i) Periodically review the Parties' efforts and progress under the Collaboration Plan;

(ii) Review the Collaboration Program;

(iii) Review any proposed modifications or amendments to the Collaboration Plan and the Collaboration Program;

(iv) Prioritize and oversee execution of specific activities to be performed under the Collaboration Plan and the Collaboration Program;

(v) Review Patent Committee advice with regard to scientific activities to be performed under the Collaboration Plan and the Collaboration Program;

(vi) Review and select Product Candidates for additional work as part of the Collaboration Program;

(vii) Review and evaluate Product Candidates for which Development work should be performed as part of the Collaboration Program;

(viii) Review and approve of the regulatory plans and strategies for Product Candidates;

(ix) Review all Regulatory Filings with respect to Product Candidates;

(x) Form such other committees ("Sub-Committees") as the JSC may deem appropriate. Any such Sub-Committee may make recommendations to the JSC but may not be delegated JSC decision-making authority;

(xi) Address such other matters relating to the activities of the Parties under this Agreement as either Party may bring before the JSC, including any matters that are expressly for the JSC to decide as provided in this Agreement; and

(xii) Attempt to resolve any disputes on an informal basis.

(d) *Decision-making*. The three (3) JSC representatives of each Party will collectively have one (1) vote, and the JSC will make decisions only by unanimous consent in the sole discretion of each Party with respect to its vote. [***]

(e) *Limits on JSC Authority*. Each Party will retain the rights, powers and discretion granted to it under this Agreement and no such rights, powers, or discretion will be delegated to or vested in the JSC unless such delegation or vesting of rights is expressly provided for in this Agreement or the Parties expressly so agree in writing. The JSC will not have the power to, nor will the Party having the tie-breaking vote in the JSC have the power to (i) amend, modify or waive compliance with this Agreement (other than as expressly permitted hereunder), (ii) alter, increase or expand the Parties' rights or obligations under this Agreement, (iii) determine that a Party has fulfilled any obligations under this Agreement or that a Party has breached any obligation under this Agreement, (iv) make a decision that is expressly stated to require the mutual agreement of the Parties, (v) amend or modify the Collaboration Plan, (vi) change the Collaboration Program in

any manner that would alter the fundamental objectives of the Collaboration Program as generally described in Section 2.1(a), or (vi) determine that milestone events required for the payment of milestone payments have or have not occurred.

(f) *Term*. The JSC and any subcommittees thereof will cease to exist three (3) months after the end of the Collaboration Program Term.

3.3 Patent Committee.

(a) The Parties will (i) each designate representative(s) to consult with the other Party's representative(s) with respect to Patent ownership, Prosecution and Maintenance, enforcement and defense matters (the "Patent Liaisons"), and (ii) establish a patent committee (the "Patent Committee"). The purpose of the Patent Committee is to determine ownership of intellectual property, and facilitate the discussion and coordination of Prosecution and Maintenance, enforcement and defense matters, in accordance with and subject to the terms of this Agreement. The Patent Liaisons will be the primary point of contact for the Parties regarding the foregoing activities and will facilitate all such activities hereunder, including preparing and finalizing minutes of the Patent Committee and will be responsible for assisting the Patent Committee in performing its oversight responsibilities.

(b) Decisions. All decisions of the Patent Committee will be made by consensus, with each Party having one vote. If the Patent Committee cannot agree on a matter within the Patent Committee's authority within five (5) days after it has met and attempted to reach such decision, then, either Party may, by written notice to the other, have such issue referred to the Program Directors for resolution. The Parties' respective Program Directors will meet within five (5) days after such matter is referred to them, and will negotiate in good faith to resolve the matter. If the Program Directors are unable to resolve the matter within five (5) days after the matter is referred to them, then the decision will be resolved as set forth below:

(i) *IP Ownership*. The Patent Committee will determine ownership of Collaboration IP in accordance with and subject to the terms of Section 2.1(f); provided that the Patent Committee may allocate ownership of a particular item of intellectual property to improve the prospects of obtaining patent protection with respect to such item of intellectual property, even if such allocation is not in accordance with the terms of Section 2.1(f), so long as the Parties mutually agree to such allocation. In the event the Patent Committee cannot agree on a matter regarding ownership of an item of intellectual property, and the Program Directors are unable to resolve such matter, then such dispute will be resolved by a Third Party patent counsel selected by the Patent Committee who (and whose firm) is not, and was not at any time during the five (5) years prior to such dispute, an employee, consultant, legal advisor, officer, director or stockholder of, and does not have any conflict of interest with respect to, either Party. Such patent counsel will determine ownership of such intellectual property in accordance with U.S. patent law and Section 2.1(f). Expenses of the patent counsel will be shared equally by the Parties.

(ii) *Patent Prosecution*. The Patent Committee will discuss material issues and provide input to each other regarding the Prosecution and Maintenance, enforcement and defense of Bluebird IP, Celgene IP and jointly owned Collaboration IP. The Patent Liaisons will be responsible for coordinating the implementation of each Party's strategies for the protection

of the foregoing intellectual property rights related to Product Candidates. All final decisions related to the Prosecution and Maintenance, enforcement or defense of any Bluebird IP, Celgene IP and jointly-owned Collaboration IP will be made by the Party with the right to control such Prosecution and Maintenance, enforcement or defense, as applicable, as set forth in Section 7.

4. Third Party Licenses.

4.1 New Licenses.

(a) *Identification*. [***]

(b) *Bluebird Contribution to the Collaboration*. [***]

(e) *Celgene Applicable/New In-Licenses*. With respect to each Applicable Celgene In-License that is a Celgene New In-License:

(i) Celgene will be solely responsible for any upfront payment payable to the licensor under such Applicable Celgene In-License.

(ii) Except as provided in Sections 2.1(h)(ii) and 5.6, Celgene and Bluebird will each be responsible for [***] of any other payments required to be paid to the licensor under such Applicable Celgene In-License in respect of Collaboration Program activities or the research, Development, Manufacture or commercialization of Product Candidates, but excluding any payments that are (A) triggered by the grant of a sublicense under the Applicable Celgene In-License (other than sublicenses granted by Bluebird or its sublicensees), (B) annual fees paid to maintain the Applicable Celgene In-License in effect, (C) Patent Costs, (D) any payments that are royalty payments (including sales-based milestone payments), and (E) payments resulting from Celgene's breach of the Applicable Celgene In-License not attributable to Bluebird or its contract Third Parties or sublicensees, which excluded payments will be the sole responsibility of Celgene; provided that Bluebird's [***] share of such payments will become due and payable within [***] days after the execution of the first Development & Commercialization Agreement.

(iii) Any payments that are royalties payable by Celgene or its Affiliates under the Applicable Celgene In-License will be subject to Section 4.3(d) of such License Agreement or Section 11.3(d) of any Co-Development, Co-Promote and Profit Share Agreement, as applicable.

(f) *Celgene Pre-Existing/Applicable In-Licenses*. With respect to any Applicable Celgene In-License that is a Celgene Pre-Existing In-License, except as provided in Sections 2.1(h)(ii) and 5.6, Celgene will be solely responsible for all payments required to be paid to the licensor under such Applicable Celgene In-License, and any payments that are royalties payable by Celgene or its Affiliates under the Applicable Celgene In-License will be subject to Section 4.3(d) of such License Agreement or Section 11.3(d) of any Co-Development, Co-Promote and Profit Share Agreement, as applicable.

4.2 Product Candidate In-Licenses. Other than with respect to Baylor as contemplated by the Baylor Agreements, which are governed by Sections 4.5 and 5.5 hereof, in the event that the Parties desire to enter into an agreement with any Third Party to obtain rights to Patents, Know-How or Materials that would constitute solely a new Product Candidate (if developed pursuant to this Agreement) in the Field, as opposed to only being necessary or useful for supporting research, Development or commercialization of existing Product Candidates (a "Product Candidate In-

License"), the Parties will jointly determine a strategy for endeavoring to procure rights under such Patents, Know-How or Materials, including with respect to allocation of the Parties' responsibilities for any payments that may become due during the Collaboration Program Term under such Product Candidate In-License. Any such Product Candidate In-License addressing any such new Product Candidate will require the prior written approval of both Parties, will be with both Parties and will be committed to the Collaboration Program (and not the Parties on an individual basis). Accordingly, any product candidate in-licensed pursuant to a Product Candidate In-License will be a "Product Candidate" hereunder, and will only be Developed or commercialized by either Party as a part of the Collaboration Program or under an executed Development & Commercialization Agreement, unless and until such Product Candidate becomes a Declined Product Candidate in accordance with Section 5.6. If the Parties agree that any Patents, Know-How or Materials in-licensed under a Product Candidate In-License will be used to Develop and commercialize a Product Candidate under a Development & Commercialization Agreement, the Parties will discuss in good faith and agree on the allocation of the Parties' applicable rights and obligations thereto, including with respect to amounts payable under such Product Candidate In-License (other than a Baylor Product License), which terms will be set forth in such Development & Commercialization Agreement. If an in-license from a Third Party of rights to Patents, Materials or Know-How that would constitute a new Product Candidate also includes other rights that potentially have broader applicability (e.g., that may be useful for supporting research, Development or commercialization of Product Candidates that are against Target Antigens different than the Target Antigen in the Product Candidate in such Third Party in-license), such in-license will be treated as a "Product Candidate In-License" hereunder and the Parties will discuss in good faith the allocation of such other rights and obligations, along with costs, in accordance with the principles set forth in Section 4.1 and this Section 4.2. The Parties acknowledge that the terms of this Section 4.2 may need to be discussed and modified with respect to any particular Product Candidate In-License (other than a Baylor Product License) depending on the then existing facts and circumstances relating to such Product Candidate In-License.

4.3 Maintenance of Bluebird In-Licenses. Bluebird (a) will duly perform and observe all of its obligations under the Bluebird In-Licenses in all material respects and maintain in full force and effect the Bluebird In-Licenses, and (b) will not, without Celgene's prior written consent (such consent not to be unreasonably withheld, conditioned or delayed), (i) amend, modify, restate, cancel, supplement or waive any provision of any Bluebird In-License, or grant any consent thereunder, or agree to do any of the foregoing, or (ii) exercise any right to terminate any Bluebird In-License, in each case ((i) and (ii)) that would reasonably be expected to adversely affect in any respect the rights of Celgene under this Agreement or any potential or executed Development & Commercialization Agreement. Bluebird will provide Celgene with written notice as promptly as practicable (and in any event within five (5) business days) after becoming aware of any of the following: (A) any material breach or default by Bluebird or any of its Affiliates of any covenant, agreement or other provision of any Bluebird In-License, (B) any notice or claim from the counterparty to any Bluebird In-License terminating or providing notice of termination of any Bluebird In-License, (C) any notice or claim alleging any breach of default under any Bluebird In-License, or (D) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events would reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate

any Bluebird In-License. If Bluebird fails to pay any amounts due under any Bluebird In-License and if such nonpayment would permit the counterparty to such Bluebird In-License to terminate or suspend the same or any rights thereunder, Celgene will have the right, but not the obligation, in its sole discretion, to pay such amounts on Bluebird's behalf, and any amounts so paid by Celgene may be taken by Celgene as a credit against any amounts payable to Bluebird under this Agreement or any Development & Commercialization Agreement.

4.4 Maintenance of Celgene In-Licenses. Celgene [***] will duly perform and observe all of its obligations under the Applicable Celgene In-Licenses in all material respects and maintain in full force and effect the Applicable Celgene In-Licenses in the Field [***]. Celgene will provide Bluebird with written notice as promptly as practicable (and in any event within [***] business days) after becoming aware of any of the following: (A) any material breach or default by Celgene or any of its Affiliates of any covenant, agreement or other provision of any Applicable Celgene In-License, (B) any notice or claim from the counterparty to any Applicable Celgene In-License terminating or providing notice of termination of any Applicable Celgene In-License, (C) any notice or claim alleging any breach of default under any Applicable Celgene In-License, or (D) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events would reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate any Applicable Celgene In-License. [***] If Celgene fails to pay any amounts due under any Applicable Celgene In-License and if such nonpayment would permit the counterparty to such Applicable Celgene In-License to terminate or suspend the same or any rights thereunder, Bluebird will have the right, but not the obligation, in its sole discretion, to pay such amounts on Celgene's behalf, and Celgene will reimburse Bluebird for any such payments within [***] days of Celgene's receipt of Bluebird's written invoice therefor.

4.5 Baylor Agreements.

(a) *Maintenance*. Celgene [***] will duly perform and observe all of its obligations under the Baylor Agreements in all material respects [***].

(b) *Notices*. Each Party will provide the other Party with written notice as promptly as practicable (and in any event within [***] business days) after becoming aware of any of the following: (i) any material breach or default by such Party or any of its Affiliates of any covenant, agreement or other provision of any Baylor Agreement, (ii) any notice or claim from the counterparty to any Baylor Agreement terminating or providing notice of termination of any Baylor Agreement, (iii) any notice or claim alleging any breach of default under any Baylor Agreement, or (iv) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events would reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate any Baylor Agreement. If Celgene fails to pay any amounts due under any Baylor Agreement and if such nonpayment would permit Baylor to terminate or suspend the same or any rights thereunder, Bluebird will have the right, but not the obligation, to pay such amounts on Celgene's behalf, and Celgene will reimburse Bluebird for any such payments within thirty (30) days of Celgene's receipt of Bluebird's written invoice therefor.

(c) *Exercise of Rights*. [***] Celgene will not exercise any rights under any of the Baylor Agreements without first consulting with Bluebird and obtaining Bluebird's prior consent (such consent not to be unreasonably withheld, delayed or conditioned), provided that no such consent will be required (A) for Celgene to enter into a Baylor Product License, (B) to terminate any Baylor Agreement other than a Baylor Product License, (C) after consultation with Bluebird, to terminate any Baylor Product License provided Celgene either (I) intends to maintain in force the corresponding Development & Commercialization Agreement or (II) if such Development & Commercialization Agreement is not intended to remain in effect, offers to assign such Baylor Product License to Bluebird before initiating termination of same, (D) for Celgene to exercise any licenses or other similar license rights (such as the right to sublicense) granted to Celgene under any Baylor Agreement, (E) for Celgene to exercise any rights under the Platform License Agreement that do not require Bluebird's consent under the sublicense agreement between Celgene and Bluebird under the Baylor Platform License, and (F) for Celgene to extend or not extend the term of any Baylor Agreement [***]. In addition, Bluebird may exercise its third-party beneficiary rights under any of the Baylor Agreements and Celgene will not interfere with any such exercise by Bluebird. For avoidance of doubt, Celgene's election to not exercise a right, such as an election to not provide research or development funding to Baylor, will not be deemed "an exercise of rights" under the Baylor Agreements for purposes of this Section 4.5(c). The foregoing will apply, without limitation, to the Prosecution and Maintenance, and enforcement and defense, of all Patents, Know-How and Materials licensed under any of the Baylor Agreements, provided that Celgene will not require Bluebird's consent to terminate Prosecution and Maintenance, or to commence, conduct or terminate the enforcement and defense of, any Patents, Know-How and Materials licensed under any of the Baylor Agreements so long as Celgene provides Bluebird with written notice thereof and, if permitted by the Baylor Agreements (including as a third-party beneficiary thereunder), affords Bluebird the right to take such actions, which if taken by Bluebird will be at Bluebird's sole expense, provided that in such an event under the Baylor Platform License, (x) Celgene will agree in writing with Bluebird not to exercise (or grant others the right to exercise) any rights to any such Patent for which Prosecution or Maintenance has been terminated or a defense has not been commenced or conducted or has been terminated, and (y) Bluebird will solely control and not share any recoveries from any such enforcement, in all such cases subject to the Baylor License Agreements. Notwithstanding the foregoing in this Section 4.5(c), if Celgene determines in good faith that any action or inaction under any of the Baylor Agreements is legally required of Celgene (under any of the Baylor Agreements or otherwise) or is required to maintain any rights under the Baylor Agreements (including with respect to confidentiality and indemnification), or if Bluebird does not promptly respond to Celgene's request after prior written notice to Bluebird, Celgene will have the right to take such action, or refrain from taking such action, but will remain subject to the terms of the Baylor Agreements, this Agreement and any Development & Commercialization Agreements.

(d) *Other Agreements*. During the Term, other than as permitted by the Baylor Agreements and pursuant to Section 2.1(f)(ii), neither Party nor its Affiliates will enter into any agreements with Baylor regarding the Baylor Field, nor collaborate with Baylor in the Baylor Field, nor have Baylor work or fund work by Baylor in the Baylor Field, without the prior written consent of the other Party (such consent not to be unreasonably withheld, delayed or conditioned). It is understood and agreed that references to "Baylor" in this Section 4.5(d) include all faculty

members, scientists, employees and students working at Baylor. This Section 4.5(d) will not apply to any Business Program, subject to the requirements of the last proviso in Section 2.1(e).

(e) *Development & Commercialization Agreements*. Celgene will not enter into any Baylor Product License without also entering into the applicable Development & Commercialization Agreement. For clarity this obligation will apply to all product candidates subject to any option rights under the Baylor Research Agreement, even if this Agreement has terminated or expired.

(f) *Payments*. Except as set forth below, Celgene will be responsible for one hundred percent (100%) of all amounts accrued and required to be paid under (i) the Baylor Research Agreement for as long as Celgene is the contracting party thereunder, (ii) the Baylor Platform License for as long as Celgene is the contracting party thereunder (save for those amounts for which Bluebird is responsible under the sublicense agreement between Celgene and Bluebird under the Baylor Platform License), and (iii) all Baylor Product Licenses that correspond to License Agreements between Celgene and Bluebird for as long as Celgene is the contracting party thereunder, provided that any royalties payable under such Baylor Product Licenses will be subject to Section 4.3(d) of such License Agreement, and provided further that the foregoing will not be interpreted to require Celgene to make any payments under the Baylor Agreements that are payments which Celgene has the option to pay or not pay under the terms of the Baylor Agreements. Bluebird will be responsible for one hundred percent (100%) of amounts required to be paid to Baylor to fund the research and Development of Product Candidates by Baylor through Phase 1 Study if Bluebird elects by written notice to Celgene to have Baylor work under the Collaboration Program and such Product Candidates are included in the Collaboration Plan; provided that Baylor-Only Candidates will not be included in this payment obligation. All amounts accrued and required to be paid under those Baylor Product Licenses arising from the applicable Co-Development, Co-Promote and Profit Share Agreements between Celgene and Bluebird will be treated as follows: (A) with respect to the Development and commercialization of Elected Candidate and Licensed Product for U.S. Administration thereunder, such amounts will be treated as U.S. Development Expenses or Allowable Expenses thereunder, (B) with respect to the Development and commercialization of Elected Candidate and Licensed Product for both U.S. Administration and ROW Administration thereunder, such amounts will allocated to and be treated as U.S. Development Expenses or Allowable Expenses thereunder in accordance with Section 4.3(b) thereunder, and (C) with respect to the Development and Commercialization of Elected Candidate and Licensed Product solely for ROW Administration thereunder (including the Manufacture of Vectors and associated Payloads therefor pursuant to Section 7.4 thereunder), Celgene will be responsible for one hundred percent (100%) of all such amounts, provided that any royalties payable under such Baylor Product License will be subject to Section 11.3(d) thereunder.

(g) *Recoveries*. All recoveries arising from any enforcement or defense of any "Licensed Intellectual Property" (as defined in the Baylor Agreements) licensed to Celgene under any of the Baylor Product Licenses will be, after deducting any amounts owed to Baylor thereunder, subject to the recovery provisions of the applicable Development & Commercialization Agreement.

(h) *Baylor Declined Product.* If Celgene receives any payments from Baylor pursuant to Section 4.8(b) of the Baylor Research Agreement with respect to the commercialization of a "Declined Product" (as defined in the Baylor Research Agreement), Celgene will pay to Bluebird (i) [***] percent [***] of any such payment paid to Celgene with respect to a Declined Product that is not a Baylor-Only Candidate, and (ii) [***] percent [***] of any such payment paid to Celgene with respect to a Declined Product that is a Baylor-Only Candidate, in each case ((i) and (ii)) within thirty (30) days of Celgene's receipt thereof.

(i) *Survival.* This Section 4.5 will survive any termination or expiration of this Agreement.

4.6 No Implied Rights. No license, sublicense or other right is or will be created or granted hereunder by implication, estoppel or otherwise. Any licenses, sublicenses or rights will be granted only as expressly provided in this Agreement or any executed Development & Commercialization Agreement.

5. Option for Licensed Candidates.

5.1 Option Period. Bluebird will provide written notice to Celgene of the enrollment of the first patient in each initial Clinical Study for each Product Candidate (the "Clinical Study Initiation Notice"). On a Product Candidate-by-Product Candidate basis, from the period commencing on the date of a Clinical Study Initiation Notice for such Product Candidate, and ending [***] thereafter (the "Celgene Option Period"), Celgene will have the exclusive option to take a license to such Product Candidate. Celgene may exercise such option by providing to Bluebird, prior to the expiration of the Celgene Option Period, (a) written notice that a Product Candidate is selected by Celgene to be an Optioned Candidate hereunder, and (b) the additional information set forth in Exhibit G (collectively, the "Celgene Option Notice"). A separate Celgene Option Notice and Initial Option Fee will be required for each Product Candidate optioned by Celgene pursuant to this Section 5.1, and Celgene will pay to Bluebird the Initial Option Fee for each such Optioned Candidate as set forth in Section 6.2. Subject to Section 5.6, (i) if Celgene does not exercise its option for a Product Candidate prior to the expiration of the applicable Celgene Option Period, the option and other rights granted to Celgene under this Section 5 with respect to a Product Candidate will terminate in full and will no longer be exercisable, and (ii) if (A) Bluebird provides a Clinical Study Initiation Notice for the Lead Product Candidate, and (B) Celgene does not exercise its option for such Lead Product Candidate prior to the expiration of the applicable Celgene Option Period, then all options and other rights granted to Celgene under this Section 5 with respect to the Next Generation Product Candidate and any other Product Candidate or Optioned Candidate (unless Celgene has previously exercised its option for such Lead Product Candidate) will terminate in full and will no longer be exercisable, and all remaining Celgene Option Periods will expire.

5.2 Celgene's Exercise of Option. Within [***] of Celgene's delivery of a Celgene Option Notice to Bluebird, Celgene (or an Affiliate designated by Celgene) and Bluebird will enter into a License Agreement in the form attached hereto as Exhibit A with respect to such Optioned Candidate (updating the appendices thereto), modified, if appropriate, as provided in Sections 4.2 or 5.5, and subject to Section 5.8. Upon execution of such License Agreement, such Optioned Candidate will be an "Elected Candidate" thereunder.

5.3 Co-Promotion/Co-Development Option Exercise. On an Optioned Candidate-by-Optioned Candidate basis, within [***] after completion of the initial Phase 1 Study with respect to such Optioned Candidate, and subject to Section 5.8, Bluebird may exercise an option, by delivery of written notice to Celgene (the "Bluebird Option Notice") to co-promote and co-Develop such Optioned Candidate in the U.S. as set forth in the Co-Development, Co-Promote and Profit Share Agreement attached hereto as Exhibit B, provided that (a) if Bluebird does not exercise such option to co-promote and co-Develop the Optioned Candidate that is the Lead Product Candidate, then this Section 5.3 shall not apply to, and for clarity Bluebird shall not have any option to co-promote or co-Develop, the Next Generation Product Candidate or any other Optioned Candidate, and (b) with respect to a Baylor-Only Candidate for which Celgene has delivered a Celgene Option Notice, such option will end on the earlier of (i) [***] following Celgene's commencement of a Pivotal Study (as defined in the License Agreement) for such Baylor-Only Candidate, and (ii) the date that Bluebird delivers written notice to Celgene that Bluebird is declining to exercise such option. Prior to the expiration of such option for [***] a Baylor-Only Candidate, upon Bluebird's written request, Celgene will provide Bluebird with (A) a reasonably detailed accounting of any payments made or other actions taken by Celgene pursuant to the License Agreement executed pursuant to Section 5.2 that would be the responsibility of Bluebird under the Co-Development, Co-Promote and Profit Share Agreement, including, for avoidance of doubt, costs incurred by Celgene in Developing such Baylor-Only Candidate through and including the Pivotal Study for such Baylor-Only Candidate, and (B) all safety and efficacy data in Celgene's possession as of the date of such request generated with respect to such Baylor-Only Candidate in all clinical studies conducted by Celgene for such Baylor-Only Candidate, all correspondence to and from any Regulatory Authority in Celgene's possession as of the date of such request regarding such Baylor-Only Candidate, and any other information relating to such Baylor-Only Candidate reasonably requested by Bluebird and in Celgene's possession as of the date of such request. In the event that Bluebird exercises such option, the Parties will promptly, but in any event within [***], terminate the License Agreement executed pursuant to Section 5.2 with respect to such Optioned Candidate, and enter into a Co-Development, Co-Promote and Profit Share Agreement in the form attached hereto as Exhibit B with respect to such Optioned Candidate, with appropriate amendments to reflect and reimburse Celgene for any payments made or other actions taken by Celgene pursuant to the License Agreement executed pursuant to Section 5.2 that are the responsibility of Bluebird under the Co-Development, Co-Promote and Profit Share Agreement, including, for avoidance of doubt, costs incurred by Celgene in Developing a Baylor-Only Candidate through and including the Pivotal Study for the Baylor-Only Candidate. Upon execution of such Co-Development, Co-Promote and Profit Share Agreement, such Optioned Candidate will be an "Elected Candidate" thereunder.

5.4 Non-Co-Promotion/Co-Development Option Exercise. If during the [***] following Celgene's delivery of a Celgene Option Notice to Bluebird, Bluebird notifies Celgene in writing that Bluebird will not exercise the option set forth above in Section 5.3, or Bluebird does not deliver a Bluebird Option Notice to Celgene prior to the expiration of the [***] period following Celgene's delivery of a Celgene Option Notice to Bluebird, Celgene will pay to Bluebird the Additional Option Fee as set forth in Section 6.3, subject to Section 5.5.

5.5 Baylor-Only Candidate Royalty & Milestone Payments. In the event that any Optioned Candidate is also a Baylor-Only Candidate (as reasonably determined by the Parties), (a) the Initial

Option Fee and the Additional Option Fee will each be reduced [***], and (b) any royalties or milestone payments payable under the applicable Development & Commercialization Agreement with respect to such Optioned Candidate will be reduced [***]. All such payments will become due and payable only upon the commencement of a Pivotal Study (as defined in the applicable Development & Commercialization Agreement) for such Optioned Candidate. At such time that the Optioned Candidate no longer satisfies all of the requirements of the definition of Baylor-Only Candidate as set forth below in this Section 5.5, all future milestone and royalty payments thereunder will be payable in the original amounts thereunder [***]. For clarity, such [***] reduction will only apply to royalties and milestone payments and no other payments under the applicable Development & Commercialization Agreement (and for clarity, in the Co-Development, Co-Promote and Profit Share Agreement attached hereto as Exhibit B, the profit share/loss will be unaffected). [***]

5.6 Declined Product Candidates.

(a) *Bluebird Development.* If (i) Celgene does not exercise its option with respect to a Product Candidate as set forth in Section 5.1, such Product Candidate will become a "Declined Product Candidate" hereunder, (ii) Celgene does not exercise its option with respect to the Lead Product Candidate as set forth in Section 5.1, all Product Candidates will become "Declined Product Candidates" hereunder, and (iii) if this Agreements expires or terminates for any reason prior to Celgene's right to exercise its options with respect to one or more Product Candidate(s) as set forth in Section 5.1, then such Product Candidate(s) will become "Declined Product Candidate(s)" hereunder. On a Declined Product Candidate-by-Declined Product Candidate basis, Bluebird will have the option, exercisable upon written notice to Celgene (a "Bluebird Development Notice"), to Develop such Declined Product Candidate outside of the scope of the Collaboration Program, and Celgene hereby grants to Bluebird an exclusive, worldwide, perpetual, irrevocable, royalty-free right and license, with the right to grant sublicenses, under the Celgene IP and Celgene's interest in jointly owned Collaboration IP, solely to Develop such Declined Product Candidate. If any royalty, milestone or other payment, [***] becomes due under any Applicable Celgene In-License that is attributable to Bluebird as a sublicensee thereunder with respect to such Development work, Celgene will pay same, provided that Bluebird will reimburse Celgene for any such payment within thirty (30) days of Bluebird's receipt of Celgene's written invoice therefor, and Bluebird's failure to pay such reimbursement within such time period will entitle Celgene to terminate Bluebird's sublicense under the Applicable Celgene In-License upon thirty (30) days written notice. In connection with any such Development activities, Bluebird will (I) maintain, or cause to be maintained, records of its activities with respect to the Development of such Declined Product Candidate in sufficient detail and in good scientific manner appropriate for scientific, Patent and regulatory purposes, for a period of at least ten (10) years after the creation of such records, but in no event less than required by applicable Laws, and Celgene will have the right to request and receive a copy of any such records, and (II) furnish Celgene with a copy of any safety and efficacy data generated by Bluebird or its Affiliates in connection with a Clinical Study performed with respect to such Declined Product Candidate, and all correspondence to and from any Regulatory Authority regarding such Declined Product Candidate, at least thirty (30) days prior to initiating a Declined Product Candidate Study for such Declined Product Candidate.

(i) On a Declined Product Candidate-by-Declined Product Candidate basis, (A) the Development license granted by Celgene to Bluebird under Section 5.6(a) will also include the rights to Manufacture and commercialize such Declined Product Candidate, provided that such license shall be limited to the Celgene IP and jointly owned Collaboration IP as it exists at the time Celgene's option to such Declined Product Candidate has expired or been terminated (including in each case any additions, divisions, continuations, continuations-in-part, invention certificates, substitutions, reissues, reexaminations, extensions, registrations, supplementary protection certificates and renewals of such Celgene IP and Joint Collaboration IP), (B) such Declined Product Candidate will continue to be excluded from the scope of the Collaboration Program, (C) Bluebird will reimburse Celgene within ten (10) days of the expiration of Celgene's option for such Declined Product Candidate for any royalty, milestone or other payments made by Celgene under the Applicable Celgene In-License (other than any upfront payment) in respect of such Declined Product Candidate; (D) if any royalty, milestone or other payment becomes due under any Applicable Celgene In-License that is attributable to Bluebird as a sublicensee (together with its licensees and their respective Affiliates) thereunder with respect to such Development, Manufacture or commercialization of such Declined Product Candidate, Celgene will pay same, provided that Bluebird will reimburse Celgene for any such payment within thirty (30) days of Bluebird's receipt of Celgene's written invoice therefor, and Bluebird's failure to pay such reimbursement within such time period will entitle Celgene to terminate Bluebird's sublicense under the Applicable Celgene In-License upon thirty (30) days written notice; and (E) subject to the exclusivity restrictions set forth in Section 2.1(e), Section 3.5 of the License Agreement (if applicable) or Section 10.4 of the Co-Development, Co-Promote and Profit Share Agreement (if applicable), Bluebird will be free to research, Develop, Manufacture and commercialize such Declined Product Candidate alone or with others with no further obligation to Celgene other than with respect to any payment that may become due under any Applicable Celgene In-License that is attributable to Bluebird as a sublicensee (together with its licensees and their respective Affiliates) thereunder with respect to such Development, Manufacture and commercialization.

5.7 Bluebird In-Licenses. Any Pre-Existing In-Licenses that are necessary or useful for a Product Candidate under a Development & Commercialization Agreement will automatically be included within the definition of Applicable Pre-Existing In-Licenses in such Development & Commercialization Agreement, and any Bluebird Collaboration In-Licenses that Celgene elects to include within the definition of Applicable New In-Licenses in such Development & Commercialization Agreement will be so included. Any Bluebird Collaboration In-Licenses that Celgene does not elect to include in such Development & Commercialization Agreement will be an Other In-License with respect to such Development & Commercialization Agreement unless and until Celgene elects to convert such Other In-License to an Applicable New In-License in accordance with the terms of the applicable Development & Commercialization Agreement. Promptly following Celgene's delivery of a Celgene Option Notice with respect to a Product Candidate, the Parties will mutually update the applicable Appendices to the Development & Commercialization Agreement. If the Parties cannot agree on such update, Celgene will have the right to make the final decision with respect to such update. For clarity, if, during the Collaboration Program Term, Celgene elects to convert a Bluebird New In-License into a Bluebird Collaboration In-License pursuant to Section 4.1(d), such Collaboration In-License will be an "Other In-License" with respect to any Development & Commercialization Agreement in effect at the time of such

election, and Celgene may elect to convert such Other In-License to an Applicable New In-License in accordance with the terms of such applicable Development & Commercialization Agreement.

5.8 Government Approvals.

(a) Each of Celgene and Bluebird shall use its commercially reasonable good faith efforts to eliminate any concern on the part of any court or government authority regarding the legality of any proposed Development & Commercialization Agreement, including, if required by federal or state antitrust authorities, promptly taking all steps to secure government antitrust clearance, including cooperating in good faith with any government investigation including the prompt production of documents and information demanded by a second request for documents and of witnesses if requested. Notwithstanding anything to the contrary in this Agreement, this Section 5.8 and the term "commercially reasonable good faith efforts" do not require that either Party (i) offer, negotiate, commit to or effect, by consent decree, hold separate order, trust or otherwise, the sale, divestiture, license or other disposition of any capital stock, assets, rights, products or businesses of Celgene, Bluebird or their respective Affiliates, (ii) agree to any restrictions on the businesses of Celgene, Bluebird or their respective Affiliates, or (iii) pay any material amount or take any other action to prevent, effect the dissolution of, vacate, or lift any decree, order, judgment, injunction, temporary restraining order, or other order in any suit or proceeding that would otherwise have the effect of preventing or delaying the transactions contemplated by any proposed Development & Commercialization Agreement.

(b) Each of Celgene and Bluebird shall, within ten (10) business days after the execution of a Development & Commercialization Agreement (or such later time as may be agreed to in writing by the Parties) file with the United States of America Federal Trade Commission ("FTC") and the Antitrust Division of the United States of America Department of Justice ("DOJ") any HSR Filing required of it under the HSR Act in the reasonable opinion of either Party with respect to the transactions contemplated by such Development & Commercialization Agreement. The Parties shall cooperate with one another to the extent necessary in the preparation of any such HSR Filing. [***] In the event that the Parties make an HSR Filing under this Section 5.8, the relevant Development & Commercialization Agreement shall terminate (i) at the election of either Party, immediately upon notice to the other Party, in the event that the FTC or the DOJ obtains a preliminary injunction under the HSR Act against the Parties to enjoin the transactions contemplated by such Development & Commercialization Agreement or (ii) at the election of either Party, immediately upon notice to the other Party, in the event that the HSR Clearance Date shall not have occurred on or prior to one hundred eighty (180) days after the effective date of the HSR Filing. Notwithstanding anything to the contrary contained herein, except for the terms and conditions of this Section 5.8, none of the terms and conditions contained in a Development & Commercialization Agreement shall be effective until the "Implementation Date," which is agreed and understood to mean the later of (A) the execution date of the Development & Commercialization Agreement, (B) if a determination is made pursuant to this Section 5.8 that a notification of this Agreement is not required to be made under the HSR Act, the date of such determination, or (C) if notification of this Agreement is required to be made under the HSR Act, the HSR Clearance Date. As used herein: (I) "HSR Act" means the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and the rules and regulations promulgated thereunder; (II) "HSR Clearance Date" means the earliest date on which the Parties have actual knowledge

that all applicable waiting periods under the HSR Act with respect to the transactions contemplated by a Development & Commercialization Agreement have expired or have been terminated; and (III) "HSR Filing" means a filing by Celgene and Bluebird with the FTC and the DOJ of a Notification and Report Form for Certain Mergers and Acquisitions (as that term is defined in the HSR Act) with respect to the matters set forth in this Agreement, together with all required documentary attachments thereto.

(c) Each of Celgene and Bluebird shall, in connection with any HSR Filing, (i) reasonably cooperate with each other in connection with any communication, filing or submission and in connection with any investigation or other inquiry, including any proceeding initiated by a private party; (ii) keep the other Party and/or its counsel informed of any communication received by such Party from, or given by such Party to, the FTC, the DOJ or any other U.S. or other governmental authority and of any communication received or given in connection with any proceeding by a private party, in each case regarding the transactions contemplated by any proposed Development & Commercialization Agreement; (iii) consult with each other in advance of any meeting or conference with the FTC, the DOJ or any other governmental authority or, in connection with any proceeding by a private party, with any other person, and to the extent permitted by the FTC, the DOJ or such other governmental authority or other person, give the other Parties and/or their counsel the opportunity to attend and participate in such meetings and conferences; and (iv) permit the other Parties and/or their counsel to review in advance any submission, filing or communication (and documents submitted therewith) intended to be given by it to the FTC, the DOJ or any other governmental authority; provided, that materials may be redacted to remove references concerning the valuation of the business of Bluebird. Bluebird and Celgene, as each deems advisable and necessary, may reasonably designate any competitively sensitive material to be provided to the other under this Section 5.8(c) as "Antitrust Counsel Only Material." Such materials and the information contained therein shall be given only to the outside antitrust counsel of the recipient and will not be disclosed by such outside counsel to employees, officers or directors of the recipient unless express permission is obtained in advance from the source of the materials (Celgene or Bluebird, as the case may be) or its legal counsel.

(d) Celgene and Bluebird shall cooperate and use respectively all reasonable efforts to make all other registrations, filings and applications, to give all notices and to obtain as soon as practicable all governmental or other consents, transfers, approvals, orders, qualifications authorizations, permits and waivers, if any, and to do all other things necessary or desirable for the consummation of the transactions as contemplated hereby. Neither Party shall be required, however, to divest or out-license products or assets or materially change its business if doing so is a condition of obtaining approval of the transactions contemplated by this Agreement.

(e) If a Development & Commercialization Agreement is terminated pursuant to this Section 5.8, then, notwithstanding any provision in this Agreement to the contrary, neither Party shall have any further obligation to the other Party with respect to the subject matter of such Development & Commercialization Agreement.

5.9 Section 365(n) of the Bankruptcy Code. All rights and licenses granted pursuant to any section of this Agreement are, and will be deemed to be, rights and licenses to "intellectual property" (as defined in Section 101(35A) of title 11 of the United States Code and of any similar provisions of applicable Laws under any other jurisdiction (the "Bankruptcy Code")). Each Party

agrees that the other Party, as a licensee of rights and licenses under this Agreement, will retain and may fully exercise all of its rights and elections under the Bankruptcy Code. The Parties further agree that, in the event of the commencement of a bankruptcy proceeding by or against a Party under the Bankruptcy Code or analogous provisions of applicable Law outside the United States, the other Party will be entitled to a complete duplicate of (or complete access to, as appropriate) any intellectual property licensed to such Party and all embodiments of such intellectual property, which, if not already in such Party's possession, will be promptly delivered to it (a) upon any such commencement of a bankruptcy proceeding upon such Party's written request therefor, unless the Party in the bankruptcy proceeding elects to continue to perform all of its obligations under this Agreement or (b) if not delivered under clause (a), following the rejection of this Agreement by the Party in the bankruptcy proceeding upon written request therefor by the other Party.

6. Payments.

6.1 Research Fee.

(a) Within [***] of the Amendment Date, Celgene will pay to Bluebird a one-time payment of twenty five million dollars ($25,000,000) in consideration for the research and Development work to be performed by or on behalf of Bluebird as a part of the Collaboration Program for the Lead Product Candidate and Next Generation Product Candidate, which will be non-refundable and non-creditable and not subject to set-off, as follows: [***]

(b) [***]

6.2 Initial Option Fee. Subject to Section 5, Celgene will pay to Bluebird (a) ten million dollars ($10,000,000) within [***] after the Implementation Date for the first License Agreement, which fee will, except as otherwise set forth in Sections 4.1(e), 4.3 and 10.6 hereof, Section 10.6 of the License Agreement (if applicable) or Section 17.6 of the Co-Development, Co-Promote and Profit Share Agreement (if applicable), be non-refundable and non-creditable and not subject to set-off, such payment to be made as follows: Celgene Corp. will pay [***] of such amount and Celgene Europe will pay [***] of such amount, and (b) fifteen million dollars ($15,000,000) within [***] days after the Implementation Date for each subsequent License Agreement, which fee will, except as otherwise set forth in Sections 4.1(e), 4.3 and 10.6 hereof, Section 10.6 of the License Agreement (if applicable) or Section 17.6 of the Co-Development, Co-Promote and Profit Share Agreement (if applicable), be non-refundable and non-creditable and not subject to set-off, such payment to be made as follows: Celgene Corp. will pay [***] of such amount and Celgene Europe will pay [***] of such amount (any such fee under clause (a) or (b), an "Initial Option Fee").

6.3 Additional Option Fee. Subject to Section 5, Celgene Corp. will pay to Bluebird ten million dollars ($10,000,000) (the "Additional Option Fee") within [***] after the later to occur of (a) Bluebird's written notice to Celgene that that Bluebird will not exercise the option set forth above in Section 5.3, (b) Bluebird does not deliver a Bluebird Option Notice to Celgene prior to the expiration of the applicable [***] period following completion of the initial Phase 1 Study with respect to such Optioned Candidate, and (c) the Implementation Date, which Additional Option Fee will, except as otherwise set forth in Sections 4.1(e), 4.3 and 10.6 hereof, Section 10.6 of the License Agreement (if applicable) or Section 17.6 of the Co-Development, Co-Promote and Profit Share Agreement (if applicable), be non-refundable and non-creditable and not subject to set-off.

6.4 In-Licenses; New Celgene In-Licenses.

(a) *Pre-Existing In-Licenses*. If any payments become due during the Term under any Pre-Existing In-License, Bluebird will be solely responsible for such payments, other than as expressly provided in Section 7.2 and, provided such payment obligation is not specifically attributable to any executed Development & Commercialization Agreement, which will be addressed thereunder. Bluebird will not use any Patents, Know-How or Materials in-licensed pursuant to a Pre-Existing In-License in the Collaboration Program if Bluebird does not have the right under such Pre-Existing In-License to use such Patents, Know-How or Materials in the Field.

(b) *Bluebird Collaboration In-Licenses*. If any payments become due during the Term under any Bluebird Collaboration In-License, Bluebird will be solely responsible for such payments, other than as expressly provided in Section 7.2, provided that [***].

(c) *Celgene In-Licenses*. Except as otherwise provided in Sections 2.1(h)(ii) and 5.6, payments that become due under any Applicable Celgene In-License will be paid as set forth in Section 4.1(e), and any royalties payable under such applicable Celgene In-License will be paid by Celgene and will be subject to Section 4.3(d) of any License Agreement or Section 11.3(d) of any Co-Development, Co-Promote and Profit Share Agreement, as applicable.

6.5 Taxes. [***]

7. Patent Prosecution and Maintenance.

7.1 Generally. Subject to Sections 7.2 and 7.3, Bluebird will have the sole right to Prosecute and Maintain Patents within the Bluebird IP, Celgene will have the sole right to Prosecute and Maintain Patents with the Celgene IP, and the Parties will jointly control the Prosecution and Maintenance of any Patents within jointly-owned Collaboration IP.

7.2 Celgene Input; Expenses. Bluebird will regularly provide Celgene with copies of all applications for Patents within the Bluebird IP, and all other material submissions and correspondence with any patent authorities regarding such Patents, in sufficient time to allow for review and comment by Celgene. In addition, Bluebird will provide Celgene and its counsel with an opportunity to consult with Bluebird and its counsel regarding Prosecution and Maintenance of any such Patents in the Field, and Bluebird will consider in good faith all comments timely made by Celgene and its counsel. In the event of any disagreement between any of Bluebird or Celgene, Bluebird will have the final decision-making authority with respect to the matter involved as long as Bluebird acts in good faith, provided that if Celgene requests that Bluebird Prosecute and Maintain Patents in a particular jurisdiction, Bluebird will comply with such request, and provided further that Bluebird will not abandon Prosecution and Maintenance of any Patents within the Bluebird IP without Celgene's prior written consent (such consent not to be unreasonably withheld, delayed or conditioned). In addition, for each Product Candidate, the Parties shall cooperate to develop a mutually acceptable patent strategy designed to obtain Patents that include only claims Covering the Product Candidate, pharmaceutical compositions comprising the Product Candidate, or their manufacture or use, and no other product (or its manufacture or use), and Bluebird shall, to the extent permitted under applicable Law, use its reasonable best efforts to implement such strategy. [***]

7.3 Bluebird Input; Expenses. Celgene will regularly provide Bluebird with copies of all applications for Patents (a) within Collaboration IP solely owned by Celgene pursuant to Section 2.1(f) and (b) within the Celgene IP that are in-licensed by Celgene pursuant to an Applicable Celgene New In-License (other than those sublicensed to Bluebird on a non-exclusive basis), and all other material submissions and correspondence with any patent authorities regarding such Patents, in sufficient time to allow for review and comment by Bluebird. In addition, Celgene will provide Bluebird and its counsel with an opportunity to consult with Celgene and its counsel regarding Prosecution and Maintenance of any such Patents in the Field, and Celgene will consider in good faith all comments timely made by Bluebird and its counsel. In the event of any disagreement between any of Bluebird or Celgene, Celgene will have the final decision-making authority with respect to the matter involved as long as Celgene acts in good faith. During the Term, Celgene will be solely responsible for all Patent Costs incurred in connection with the Prosecution and Maintenance of Patents within the Celgene IP.

7.4 Jointly Owned Collaboration IP. The Prosecution and Maintenance and the enforcement and defense of any Patents within jointly-owned Collaboration IP will be jointly managed by the Parties on mutually agreeable terms to be entered into by the Parties at the time any such Patents are first filed, provided that (a) absent further agreement, the enforcement and defense of any Patents within jointly-owned Collaboration IP will be governed by, and all recoveries and Patent Costs arising from the enforcement or defense of any Patents within jointly-owned Collaboration IP will be retained or borne, as applicable, in accordance with the principles set forth in Section 2.1(f)(iii) (i.e., U.S. patent law for joint ownership of Patents will apply), and (b) Patent Costs incurred in connection with the Prosecution and Maintenance of Patents within jointly-owned Collaboration IP will be apportioned as set forth in Section 7.2, for the purposes of which, such Patents will be treated as Patents within the Bluebird IP, provided that in each case ((a) and (b)), if either Party elects not to pay any such Patent Costs for any such Patent, the Parties will meet and agree upon an equitable way to treat such Patent.

7.5 Third Party Rights.

(a) To the extent that a Third Party licensor of Bluebird has retained any right to Prosecute or Maintain any Patent within the Bluebird IP licensed to Bluebird pursuant to a Bluebird In-License, or otherwise be involved in such activities, Bluebird will use commercially reasonable efforts to cause such Third Party licensor to take the actions specified by Section 7. in a manner consistent with the Bluebird In-Licenses applicable thereto, but Bluebird will not be deemed to be in breach of its obligations under Section 7 if, after using such commercially reasonable efforts, it is unable to comply with such obligations because of actions taken or not taken by such Third Party licensor.

(b) To the extent that a Third Party licensor of Celgene has retained any right to Prosecute or Maintain any Patent within the Celgene In-Licensed IP licensed to Celgene pursuant to an Applicable Celgene In-License, or otherwise be involved in such activities, Celgene will use commercially reasonable efforts to cause such Third Party licensor to take the actions specified by Section 7 in a manner consistent with the Applicable Celgene In-Licenses applicable thereto, but Celgene will not be deemed to be in breach of its obligations under Section 7 if, after using such commercially reasonable efforts, it is unable to comply with such obligations because of actions taken or not taken by such Third Party licensor.

7.6 Common Interest Disclosures. With regard to any information or opinions disclosed pursuant to this Agreement by one Party to the other Party regarding Prosecution and Maintenance of Patent within the Bluebird IP, Celgene IP or Collaboration IP or enforcement or defense of intellectual property and/or technology by or against Third Parties, Bluebird and Celgene agree that they have a common legal interest in determining the ownership, scope, validity and/or enforcement of the Bluebird IP, Celgene IP or Collaboration IP, and whether, and to what extent, Third Party intellectual property rights may affect the conduct of the Development and commercialization of any Product Candidate, and have a further common legal interest in defending against any actual or prospective Third Party claims based on allegations of misuse or infringement of intellectual property rights relating to the Development or commercialization of any Product Candidate. Accordingly, the Parties agree that all such information and materials obtained by the Parties from each other will be used solely for purposes of the Parties' common legal interests with respect to the conduct of the Agreement and otherwise for each Party to exercise its rights and perform its obligations hereunder. All such information and materials will be treated as protected by the attorney-client privilege, the work product privilege, and any other privilege or immunity that may otherwise be applicable. By sharing any such information and materials, neither Party intends to waive or limit any privilege or immunity that may apply to the shared information and materials. Neither Party will have the authority to waive any privilege or immunity on behalf of the other Party without such other Party's prior written consent, nor will the waiver of privilege or immunity resulting from the conduct of one Party be deemed to apply against any other Party. This Section 7.6 will be subject to any right granted by Bluebird to any Third Party or by Celgene to any Third Party, provided that the grant of such right to such Third Party does not conflict with the other Party's rights or a Party's obligations under this Agreement.

8. Confidentiality.

8.1 Confidential Information.

(a) *Confidential Information*. Each Party ("Disclosing Party") may have disclosed or will disclose to the other Party ("Receiving Party"), and Receiving Party may acquire during the course and conduct of activities under this Agreement or any executed Development & Commercialization Agreement, certain proprietary or confidential information of Disclosing Party. The term "Confidential Information" means (i) all Materials and (ii) all ideas and information of any kind, whether in written, oral, graphical, machine-readable or other form, whether or not marked as confidential or proprietary, which are transferred, disclosed or made available by Disclosing Party or at the request of Receiving Party, including any of the foregoing of Third Parties. Without limiting the foregoing, Collaboration IP solely owned by Bluebird will be considered Confidential Information of Bluebird, Collaboration IP solely owned by Celgene will be considered Confidential Information of Celgene, and Collaboration IP jointly owned by the Parties will be considered Confidential Information of both Parties.

(b) *Restrictions*. During the Term and for ten (10) years thereafter, Receiving Party will keep all Disclosing Party's Confidential Information in confidence with the same degree of care with which Receiving Party holds its own confidential information, provided that the foregoing obligation will apply to any Confidential Information that constitutes a trade secret for so long as such Confidential Information is afforded trade secret protection under applicable Law. Receiving Party will not use Disclosing Party's Confidential Information except for in connection

with the performance of its obligations and exercise of its rights under this Agreement or any executed Development & Commercialization Agreement. Receiving Party has the right to disclose Disclosing Party's Confidential Information without Disclosing Party's prior written consent (such consent not to be unreasonably withheld, delayed or conditioned), to the extent and only to the extent reasonably necessary, to Receiving Party's Affiliates and their employees, subcontractors, sublicensees, consultants or agents who have a need to know such Confidential Information in order to perform its obligations and exercise its rights under this Agreement or any executed Development & Commercialization Agreement and who are required to comply with restrictions on use and disclosure similarly restrictive as those in this Section 8.1(b). Receiving Party will use diligent efforts to cause those entities and persons to comply with such restrictions on use and disclosure. Receiving Party assumes responsibility for those entities and persons maintaining Disclosing Party's Confidential Information in confidence and using same only for the purposes described herein.

(c) *Exceptions*. Receiving Party's obligation of nondisclosure and the limitations upon the right to use the Disclosing Party's Confidential Information will not apply to the extent that Receiving Party can demonstrate that the Disclosing Party's Confidential Information: (i) was known to Receiving Party or any of its Affiliates prior to the time of disclosure; (ii) is or becomes public knowledge through no fault or omission of Receiving Party or any of its Affiliates; (iii) is obtained by Receiving Party or any of its Affiliates from a Third Party under no obligation of confidentiality to Disclosing Party; or (iv) has been independently developed by employees, subcontractors, consultants or agents of Receiving Party or any of its Affiliates without the aid, application or use of Disclosing Party's Confidential Information, as evidenced by contemporaneous written records.

(d) *Permitted Disclosures*. Receiving Party may disclose Disclosing Party's Confidential Information to the extent (and only to the extent) such disclosure is reasonably necessary in the following instances:

(i) in order to comply with applicable Law (including any securities law or regulation or the rules of a securities exchange) or with a legal or administrative proceeding;

(ii) in connection with prosecuting or defending litigation, Regulatory Approvals and other regulatory filings and communications, and filing, prosecuting and enforcing Patents in connection with Receiving Party's rights and obligations pursuant to this Agreement or any executed Development & Commercialization Agreement; and

(iii) in connection with performing its obligations or exercising its rights hereunder or any executed Development & Commercialization Agreement, to its Affiliates; and subject to Section 8.3(a), to potential and future collaborators, licensees, sublicensees and permitted acquirers or assignees, and investment bankers, investors and lenders;

provided that (A) with respect to Sections 8.1(d)(i) or 8.1(d)(ii), where reasonably possible, Receiving Party will notify Disclosing Party of Receiving Party's intent to make any disclosure pursuant thereto sufficiently prior to making such disclosure so as to allow Disclosing Party adequate time to take whatever action it may deem appropriate to protect the confidentiality of the information to be disclosed, and (B) with respect to Section 8.1(d)(iii), each of those named people and entities are required to comply with restrictions on use and disclosure at least as restrictive as

those in Section 8.1(b) (other than investment bankers, investors and lenders, which must be bound prior to disclosure by commercially reasonable obligations of confidentiality).

8.2 Publications. The Parties may desire to publish in scientific journals and present at scientific conferences the results of the Collaboration Program, subject to the following process. Notwithstanding anything to the contrary herein, either Party may propose publication of the results of the Collaboration Program following scientific review by the JSC (if in force) and subsequent written approval by Bluebird's and Celgene's management, which approval will not be unreasonably withheld, delayed or conditioned. After receipt of the proposed publication by both Celgene's and Bluebird's managements, such written approval or disapproval will be provided within thirty (30) days. Both Parties understand that a reasonable commercial strategy may require delay of publication of information or filing of Patent applications, therefore the Parties agree to review and consider delay of publication and filing of Patent applications under certain circumstances for a reasonably limited period of time. Once publications have been reviewed by each Party and have been approved for publication, the same publications do not have to be provided again to the other Party for review for a later submission for publication. Expedited reviews for abstracts or poster presentations may be arranged if mutually agreeable to the Parties. Each Party will acknowledge the other Party's technical, non-financial contributions in any such publication. For the avoidance of doubt, the foregoing requirements and restrictions will not apply with respect to either Party's proposed publication of results of any work performed (a) following the expiration or termination of the Collaboration Program, or (b) with respect to any Declined Product Candidate, in each case except as such results specifically relate to any Optioned Candidate or to any Product Candidate for which Celgene has an option hereunder (unless such option expires without Celgene having exercised such option), in which case Bluebird may not publish or present such results without Celgene's prior written approval, which will not be unreasonably withheld, delayed or conditioned.

8.3 Terms of this Agreement; Publicity.

(a) *Restrictions*. The Parties agree that the terms of this Agreement (including, for clarity, for this Section 8.3(a), the Exhibits hereto) and any executed Development & Commercialization Agreement will be treated as Confidential Information of both Parties, and thus may be disclosed only as permitted by Section 8.1(d). Each Party shall also be permitted to disclose the terms of this Agreement, in each case under appropriate confidentiality provisions at least as protective as those contained in this Agreement, on a need to know basis, to a bona fide potential or future permitted acquirer or assignee, investment banker, investor, licensee, sublicensee, collaborator or lender with whom a Party has entered into good faith negotiations regarding a proposed transaction, provided that (i) such disclosure is solely in the form of redacted versions of this Agreement and any Development & Commercialization Agreement in such forms as are consistent with the corresponding redacted versions filed by Bluebird with the United States Securities and Exchange Commission (the "SEC") in connection with the Original Agreement) and (ii) a corresponding summary of financial terms for each such agreement also attached as an Exhibit or Appendix (as applicable) thereto. Only after negotiations with any such Third Party have progressed so that such Party reasonably and in good faith believes it will execute a definitive agreement with such Third Party with respect to the proposed transaction within the following fifteen (15) business days may such Party provide an unredacted version of this Agreement and

any executed Development & Commercialization Agreement to such Third Party. In addition to the foregoing, (I) Bluebird may provide an unredacted version of this Agreement and any executed Development & Commercialization Agreement to its investment bankers and other advisors, and (II) if Bluebird desires to enter into any such proposed transaction through an auction process, Bluebird may disclose the redacted form of this Agreement and any executed Development & Commercialization Agreement as part of that process, along with the financial summary, and may provide an unredacted version of this Agreement and any executed Development & Commercialization Agreement to those Third Parties that make a bona fide bid as part of such process. Except as required by Law, each Party agrees not to issue any press release or public statement disclosing information relating to this Agreement, any executed Development & Commercialization Agreement, the transactions contemplated hereby or thereby or any of the terms hereof or thereof without the prior written consent of the other Party (such consent not to be unreasonably withheld, delayed or conditioned), or as such consent may be obtained in accordance with Section 8.3(b), or as permitted by Section 8.3(d).

(b) *Review*. In the event either Party (the "Issuing Party") desires to issue a press release or other public statement disclosing information relating to this Agreement, any executed Development & Commercialization Agreement, the transactions contemplated hereby or thereby or the terms hereof or thereof, the Issuing Party will provide the other Party (the "Reviewing Party") with a copy of the proposed press release or public statement (the "Release"). The Issuing Party will specify with each such Release, taking into account the urgency of the matter being disclosed, a reasonable period of time within which the Reviewing Party may provide any comments on such Release and if the Reviewing Party fails to provide any comments during the response period called for by the Issuing Party, the Reviewing Party will be deemed to have consented to the issuance of such Release. If the Reviewing Party provides any comments, the Parties will consult on such Release and work in good faith to prepare a mutually acceptable Release. If the Reviewing Party does not provide its consent, not to be unreasonably withheld, conditioned or delayed, to the issuance of the Release, the Issuing Party will not issue the Release except as required by Law. Either Party may subsequently publicly disclose any information previously contained in any Release so consented to.

(c) *Joint Press Release*. The Parties agree to issue the joint press release on Exhibit H.

(d) *Securities Filings*. Each Party acknowledges and agrees that the other Party may submit this Agreement (including, for clarity, the Exhibits hereto) and any executed Development & Commercialization Agreement to the SEC and if a Party does submit this Agreement or any executed Development & Commercialization Agreement to the SEC, such Party agrees to consult with the other Party with respect to the preparation and submission of a confidential treatment request for this Agreement or such executed Development & Commercialization Agreement. If a Party is required by Law to make a disclosure of the terms of this Agreement or any executed Development & Commercialization Agreement in a filing with or other submission to the SEC, and (i) such Party has provided copies of the disclosure to the other Party as far in advance of such filing or other disclosure as is reasonably practicable under the circumstances, (ii) such Party has promptly notified the other Party in writing of such requirement and any respective timing constraints, and (iii) such Party has given the other Party a reasonable time under the circumstances from the date of notice by such Party of the required disclosure to comment upon, request

confidential treatment or approve such disclosure, then such Party will have the right to make such public disclosure at the time and in the manner reasonably determined by its counsel to be required by Law. Notwithstanding anything to the contrary herein, it is hereby understood and agreed that if a Party seeking to make a disclosure to the SEC as set forth in this Section 8.3(d), and the other Party provides comments within the respective time periods or constraints specified herein or within the respective notice, the Party seeking to make such disclosure or its counsel, as the case may be, will in good faith (A) consider incorporating such comments and (B) use reasonable efforts to incorporate such comments, limit disclosure or obtain confidential treatment to the extent reasonably requested by the other Party.

8.4 Relationship to the Confidentiality Agreement. This Agreement supersedes that certain "Mutual Confidentiality Agreement" between the Parties dated May 21, 2012; provided that all "Confidential Information" disclosed or received by the Parties thereunder will be deemed "Confidential Information" hereunder and will be subject to the terms and conditions of this Agreement.

9. Warranties; Limitations of Liability; Indemnification.

9.1 Representations and Warranties. Each Party represents and warrants to the other as of the Amendment Date that it has the legal right and power to enter into this Agreement, to extend the rights granted or to be granted to the other in this Agreement, and to fully perform its obligations hereunder.

9.2 Additional Representations and Warranties of Bluebird. Bluebird represents and warrants to Celgene as of the Amendment Date that:

(a) Except for the Pre-Existing In-Licenses and Bluebird Collaboration In-Licenses, neither Bluebird nor any of its Affiliates is a party to any license, sublicense or other agreement pursuant to which Bluebird or such Affiliate has received a license or other rights relating to the Collaboration Program or the Field.

(b) The Pre-Existing In-Licenses and Bluebird Collaboration In-Licenses in effect as of the Amendment Date are valid and binding obligations of Bluebird and, to the Knowledge of Bluebird, the applicable licensor, enforceable against Bluebird and, to the Knowledge of Bluebird, the applicable licensor, in accordance with their terms, except as may be limited by general principles of equity (regardless of whether considered in a proceeding at law or in equity) and by applicable bankruptcy, insolvency, moratorium and other similar Laws of general application relating to or affecting creditors' rights generally. Neither Bluebird nor any of its Affiliates has received any notice of any counterparty's intention to terminate any Pre-Existing In-Licenses or Bluebird Collaboration In-Licenses in whole or in part or any notice requesting any amendment, alteration or modification of such Pre-Existing In-License or Bluebird Collaboration In-Licenses or any sublicense or assignment thereunder. There is no breach or default, or event which upon notice or the passage of time, or both, would give rise to any breach or default, in the performance of any Pre-Existing In-License or Bluebird Collaboration In-Licenses by Bluebird or any of its Affiliates or, to the Knowledge of Bluebird, the counterparty thereto, and Bluebird has not received any notice of any such breach, default or event. All Patents and Know-How licensed to Bluebird under the Pre-Existing In-Licenses and Bluebird Collaboration In-Licenses are Controlled by

Bluebird for purposes of the licenses granted to Celgene under this Agreement and under any Development & Commercialization Agreement.

(c) Neither Bluebird nor any of its Affiliates has entered into any agreement or otherwise licensed, granted, assigned, transferred, conveyed or otherwise encumbered or disposed of any right, title or interest in or to any of its assets, including any intellectual property rights, that would in any way conflict with or impair the scope of any rights or licenses granted to Celgene hereunder or that would be granted to Celgene under any Development & Commercialization Agreement, including under any of the agreements which Bluebird has identified to Celgene prior to the Amendment Date.

(d) Exhibit I sets forth a complete and accurate list of all Patents included in the Bluebird IP, indicating the owner, licensor and/or co-owner(s), if applicable. Bluebird Controls the Patents listed on Exhibit I and the Know-How within the Bluebird IP, and is entitled to grant the licenses specified herein. To Bluebird's Knowledge, the Patents listed on Exhibit I have been procured or are being procured from the respective patent offices in accordance with applicable Law. None of the Patents included in the Bluebird IP is or has been involved in any opposition, cancellation, interference, reissue or reexamination proceeding, and no Bluebird IP is the subject of any judicial, administrative or arbitral order, award, decree, injunction, lawsuit, proceeding or stipulation. Neither Bluebird nor any of its Affiliates has received any notice alleging that the Patents in the Bluebird IP are invalid or unenforceable, or challenging Bluebird's ownership of or right to use any such rights.

(e) Exhibit J sets forth a complete and accurate list of all agreements relating to the licensing, sublicensing or other granting of rights by Bluebird to any Person with respect to the Bluebird IP and the Target Antigen, and Bluebird has provided complete and accurate copies of all such agreements to Celgene. Except for the Pre-Existing In-Licenses and Bluebird Collaboration In-Licenses, Bluebird and its Affiliates are not subject to any payment obligations to Third Parties as a result of the execution or performance of this Agreement. Neither Bluebird nor any of its Affiliates has granted any liens or security interests on the Bluebird IP and the Bluebird IP is free and clear of any mortgage, pledge, claim, security interest, covenant, easement, encumbrance, lien or charge of any kind.

(f) The execution, delivery and performance by Bluebird of this Agreement and the consummation of the transactions contemplated hereby will not result in any violation of, conflict with, result in a breach of or constitute a default under any understanding, contract or agreement to which Bluebird is a party or by which it is bound, including each of the agreements which Bluebird has identified to Celgene prior to the Amendment Date.

(g) There is no action, suit, proceeding or investigation pending or, to the Knowledge of Bluebird, currently threatened in writing against or affecting Bluebird that questions the validity of this Agreement or the right of Bluebird to enter into this Agreement or consummate the transactions contemplated hereby.

(h) Other than with respect to any Patents, Know-How or Materials licensed to Celgene pursuant to any of the Baylor Agreements, (i) neither Bluebird nor any of its Affiliates has received any notice of any claim that any Patent, Know-How or other intellectual property owned or controlled by a Third Party would be infringed or misappropriated by the production, use, research,

Development, Manufacture or commercialization of any Product Candidate pursuant to this Agreement and any Development & Commercialization Agreement, and (ii) to the Knowledge of Bluebird, except as disclosed to Celgene in writing on the Amendment Date, there are no Patents, Know-How or other intellectual property owned by a Third Party and not included in the Bluebird IP that are necessary for the production, use, research, Development, Manufacture or commercialization of any Product Candidate.

9.3 Disclaimers. Without limiting the respective rights and obligations of the Parties expressly set forth herein, each Party specifically disclaims any guarantee that the Collaboration Program will be successful, in whole or in part. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS AGREEMENT, THE PARTIES MAKE NO REPRESENTATIONS AND EXTEND NO WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO ANY BLUEBIRD IP, CELGENE IP, PRODUCT CANDIDATES, MATERIALS, INCLUDING WARRANTIES OF VALIDITY OR ENFORCEABILITY OF ANY PATENT RIGHTS, TITLE, QUALITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR USE OR PURPOSE, PERFORMANCE, AND NONINFRINGEMENT OF ANY THIRD PARTY PATENTS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

9.4 [***]

9.5 Performance by Others. The Parties recognize that each Party may perform some or all of its obligations under this Agreement through Affiliates and permitted subcontractors provided, however, that each Party will remain responsible and liable for the performance by its Affiliates and permitted subcontractors and will cause its Affiliates and permitted subcontractors to comply with the provisions of this Agreement in connection therewith.

9.6 Indemnification.

(a) *Indemnification by Celgene*. Celgene will indemnify Bluebird, its Affiliates and their respective directors, officers, employees, Third Party licensors and agents, and their respective successors, heirs and assigns (collectively, "Bluebird Indemnitees"), and defend and save each of them harmless, from and against any and all losses, damages, liabilities, costs and expenses (including reasonable attorneys' fees and expenses) (collectively, "Losses") in connection with any and all suits, investigations, claims or demands of Third Parties (collectively, "Third Party Claims") against the Bluebird Indemnitees arising from or occurring as a result of: (i) the material breach by Celgene of any term of this Agreement; (ii) Celgene's performance of the Collaboration Program (other than with respect to claims of actual or alleged infringement, misappropriation or other violation of a Third Party's Patents, trade secrets, or other intellectual property or proprietary rights); or (iii) any gross negligence or willful misconduct on the part of Celgene in performing its obligations under this Agreement, except in each case for those Losses for which Bluebird has an obligation to indemnify Celgene pursuant to Section 9.6(b), as to which Losses each Party will indemnify the other to the extent of their respective liability; provided, however, that Celgene will not be obligated to indemnify Bluebird Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of a Bluebird Indemnitee.

(b) *Indemnification by Bluebird*. Bluebird will indemnify Celgene, its Affiliates and their respective directors, officers, employees and agents, and their respective successors, heirs

and assigns (collectively, "Celgene Indemnitees"), and defend and save each of them harmless, from and against any and all Losses in connection with any and all Third Party Claims against Celgene Indemnitees arising from or occurring as a result of: (i) the material breach by Bluebird of any term of this Agreement; (ii) Bluebird's performance of the Collaboration Program (other than with respect to claims of actual or alleged infringement, misappropriation or other violation of a Third Party's Patents, trade secrets, or other intellectual property or proprietary rights); (iii) [***]; or (iv) any gross negligence or willful misconduct on the part of Bluebird in performing its obligations under this Agreement, except in each case for those Losses for which Celgene has an obligation to indemnify Bluebird pursuant to Section 9.6(a), as to which Losses each Party will indemnify the other to the extent of their respective liability for the Losses; provided, however, that Bluebird will not be obligated to indemnify Celgene Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of a Celgene Indemnitee.

(c) *Notice of Claim*. All indemnification claims provided for in Section 9.6(a) and 9.6(b) will be made solely by such Party to this Agreement (the "Indemnified Party"). The Indemnified Party will promptly notify the indemnifying Party (an "Indemnification Claim Notice") of any Losses or the discovery of any fact upon which the Indemnified Party intends to base a request for indemnification under Section 9.6(a) or 9.6(b), but in no event will the indemnifying Party be liable for any Losses that result from any delay in providing such notice. Each Indemnification Claim Notice must contain a description of the claim and the nature and estimated amount of such Loss (to the extent that the nature and amount of such Loss is known at such time). The Indemnified Party will furnish promptly to the indemnifying Party copies of all papers and official documents received in respect of any Losses and Third Party Claims.

(d) *Defense, Settlement, Cooperation and Expenses.*

(i) *Control of Defense*. At its option, the indemnifying Party may assume the defense of any Third Party Claim by giving written notice to the Indemnified Party within thirty (30) days after the indemnifying Party's receipt of an Indemnification Claim Notice, provided however that (A) the Third Party Claim solely seeks monetary damages and (B) the indemnifying Party expressly agrees in writing that as between the indemnifying Party and the Indemnified Party, the indemnifying Party will be solely obligated to satisfy and discharge the Third Party Claim in full and is able to reasonably demonstrate that it has sufficient financial resources (the matters described in (A) and (B), the "Litigation Conditions"). The assumption of the defense of a Third Party Claim by the indemnifying Party will not be construed as an acknowledgment that the indemnifying Party is liable to indemnify the Indemnified Party in respect of the Third Party Claim (except as provided in the immediately prior sentence), nor will it constitute a waiver by the indemnifying Party of any defenses it may assert against the Indemnified Party's claim for indemnification. Upon assuming the defense of a Third Party Claim, the indemnifying Party may appoint as lead counsel in the defense of the Third Party Claim any legal counsel selected by the indemnifying Party (the indemnifying Party will consult with the Indemnified Party with respect to a possible conflict of interest of such counsel retained by the indemnifying Party). In the event the indemnifying Party assumes the defense of a Third Party Claim, the Indemnified Party will immediately deliver to the indemnifying Party all original notices and documents (including court papers) received by the Indemnified Party in connection

with the Third Party Claim. Should the indemnifying Party assume the defense of a Third Party Claim, except as provided in Section 9.6(d)(ii), the indemnifying Party will not be liable to the Indemnified Party for any legal costs or expenses subsequently incurred by such Indemnified Party in connection with the analysis, defense or settlement of the Third Party Claim. The Indemnified Party may, at any time, assume the defense of a Third Party Claim if at any time the Litigation Conditions are not satisfied with respect to such Claim. In the event that it is ultimately determined that the indemnifying Party is not obligated to indemnify, defend or hold harmless the Indemnified Party from and against the Third Party Claim, the Indemnified Party will reimburse the indemnifying Party for any and all costs and expenses (including attorneys' fees and costs of suit) and any Third Party Claims incurred by the indemnifying Party in its defense of the Third Party Claim.

(ii) *Right to Participate in Defense*. Without limiting Section 9.6(d)(i), any Indemnified Party will be entitled to participate in, but not control, the defense of such Third Party Claim and to employ counsel of its choice for such purpose; provided, however, that such employment will be at the Indemnified Party's own cost and expense unless (A) the employment thereof has been specifically authorized by the indemnifying Party in writing, (B) the indemnifying Party has failed to assume the defense and employ counsel in accordance with Section 9.6(d)(i) (in which case the Indemnified Party will control the defense), (C) the interests of the Indemnified Party and the indemnifying Party with respect to such Third Party Claim are sufficiently adverse to prohibit the representation by the same counsel of both Parties under applicable Law, ethical rules or equitable principles, or (D) the indemnifying Party no longer satisfies the Litigation Conditions, in which case the indemnifying Party will assume one hundred percent (100%) of any such costs and expenses of counsel for the Indemnified Party.

(iii) *Settlement.* With respect to any Third Party Claims that relate solely to the payment of money damages in connection with a Third Party Claim and that will not result in the Indemnified Party's becoming subject to injunctive or other relief or otherwise adversely affecting the business of the Indemnified Party in any manner, and as to which the indemnifying Party will have acknowledged in writing the obligation to indemnify the Indemnified Party hereunder, and subject to the Litigation Conditions being satisfied, the indemnifying Party will have the sole right to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss, on such terms as the indemnifying Party, in its sole discretion, will deem appropriate. With respect to all other Losses in connection with Third Party Claims, where the indemnifying Party has assumed the defense of the Third Party Claim in accordance with Section 9.6(d)(i), the indemnifying Party will have authority to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss provided it obtains the prior written consent of the Indemnified Party (such consent not to be unreasonably withheld, delayed or conditioned). The indemnifying Party will not be liable for any settlement or other disposition of a Loss by an Indemnified Party that is reached without the prior written consent of the indemnifying Party. Regardless of whether the indemnifying Party chooses to defend or prosecute any Third Party Claim, no Indemnified Party will admit any liability with respect to or settle, compromise or discharge, any Third Party Claim without the prior written consent of the indemnifying Party, such consent not to be unreasonably withheld, delayed or conditioned.

(iv) *Cooperation*. If the indemnifying Party chooses to defend or prosecute any Third Party Claim, the Indemnified Party will, and will cause each other Indemnified Party to, cooperate in the defense or prosecution thereof and will furnish such records, information and testimony, provide such witnesses and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection therewith. Such cooperation will include access during normal business hours afforded to indemnifying Party to, and reasonable retention by the Indemnified Party of, records and information that are reasonably relevant to such Third Party Claim, and making Indemnified Parties and other employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder, and the indemnifying Party will reimburse the Indemnified Party for all its reasonable out-of-pocket costs and expenses in connection therewith.

(v) *Costs and Expenses*. Except as provided above in this Section 9.6(d), the costs and expenses, including attorneys' fees and expenses, incurred by the Indemnified Party in connection with any claim will be reimbursed on a calendar quarter basis by the indemnifying Party, without prejudice to the indemnifying Party's right to contest the Indemnified Party's right to indemnification and subject to refund in the event the indemnifying Party is ultimately held not to be obligated to indemnify the Indemnified Party.

9.7 [***]

10. Term and Termination.

10.1 Term. This Agreement will commence as of the Original Agreement Date and, unless sooner terminated in accordance with the terms hereof or by mutual written consent, will continue until the later of the expiration of the Collaboration Program Term and expiration of the last-to-expire Celgene Option Period (the "Term"), [***].

10.2 Termination by Bluebird. Bluebird will have the right to terminate this Agreement in full upon delivery of written notice to Celgene in the event of any material breach by Celgene of any terms and conditions of this Agreement in a manner that fundamentally frustrates the transactions contemplated by this Agreement, provided that such termination will not be effective if such breach has been cured within [***] days after written notice thereof is given by Bluebird to Celgene specifying the nature of the alleged breach (or, if such default cannot be cured within such [***] after such notice if Celgene commences actions to cure such default within such [***] period and thereafter diligently continues such actions, but fails to cure the default by the end of such [***]); provided, however, that to the extent such material breach involves the failure to make a payment when due, such breach must be cured within [***] after written notice thereof is given by Bluebird to Celgene.

10.3 Termination by Celgene.

(a) *Breach*. Celgene will have the right to terminate this Agreement in full upon delivery of written notice to Bluebird in the event of any material breach by Bluebird of any terms and conditions of this Agreement in a manner that fundamentally frustrates the transactions contemplated by this Agreement, provided that such termination will not be effective if such breach has been cured within [***] after written notice thereof is given by Celgene to Bluebird specifying the nature of the alleged breach (or, if such default cannot be cured within such [***]

after such notice if Bluebird commences actions to cure such default within such [***] period and thereafter diligently continues such actions, but fails to cure the default by the end of such [***]).

(b) *Discretionary Termination*. Celgene will have the right to terminate this Agreement in full at its discretion for any reason [***] days after delivery of written notice to Bluebird.

10.4 Effects of Termination or Expiration. Upon termination or expiration of this Agreement for any reason, all rights granted by Bluebird to Celgene hereunder will terminate, provided that:

(a) Other than with respect to the rights and licenses granted to Bluebird hereunder pursuant to Sections 2.1(h)(ii) or 5.6, all rights granted by Celgene to Bluebird hereunder will terminate.

(b) All executed Development & Commercialization Agreements will continue in full force and effect, provided that if Celgene has terminated this Agreement pursuant to Section 10.3(a), then (i) Bluebird's rights to co-develop, co-promote and share in profits under any Co-Development, Co-Promote and Profit Share Agreements will terminate, and the Parties promptly will execute a License Agreement to replace each such Co-Development, Co-Promote and Profit Share Agreement, and (ii) all up-front payments, milestone payments and royalty payments under any License Agreement will be reduced by [***], provided that such reduction will not apply to the extent any such up-front payments, milestone payments and royalty payments have already been reduced pursuant to Section 10.3(c) of such License Agreement.

10.5 Survival. In addition to the termination consequences set forth in Section 10.4, the following provisions will survive termination or expiration of this Agreement: Sections 1, 2.1(f), 2.1(h)(ii), 2.2, 2.3(a), 2.3(c), 4.3 (through the expiration of any options granted to Celgene hereunder), 4.4, 4.5, 4.6, 5.5, 5.6, 5.8, 5.9, 6.5, 7.4, 8, 9, 10.4, 10.5 and 11, and any other provisions of this Agreement that are required to survive to give effect to any Development & Commercialization Agreement. Termination or expiration of this Agreement will not relieve the Parties of any liability or obligation which accrued hereunder prior to the effective date of such termination or expiration nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any breach of this Agreement nor prejudice either Party's right to obtain performance of any obligation. All other rights and obligations will terminate upon expiration of this Agreement.

10.6 Right to Set-off. Notwithstanding anything to the contrary in this Agreement, each Party has the right at all times to retain and set off against all amounts due and owing to the other Party as determined in a final judgment any damages recovered by such Party for any Losses incurred by such Party.

11. General Provisions.

11.1 Dispute Resolution for this Agreement and Executed Development & Commercialization Agreements.

(a) *Disputes*. Disputes arising under or in connection with this Agreement or any executed Development and Commercialization Agreement will be resolved pursuant to this Section 11.1.

(b) *Dispute Escalation*. In the event of a dispute between the Parties, the Parties will first attempt in good faith to resolve such dispute by negotiation and consultation between themselves or the Program Directors. In the event that such dispute is not resolved on an informal basis within twenty (20) days, any Party may, by written notice to the other, have such dispute referred to the Bluebird CEO and the Celgene CEO or in either case his or her designee (who will be a senior executive), who will attempt in good faith to resolve such dispute by negotiation and consultation for a thirty (30) day period following receipt of such written notice.

(c) *Dispute Resolution*. In the event the Parties are not able to resolve such dispute in accordance with Section 11.1(b), either Party may at any time after such twenty (20) day period submit such dispute to be finally settled in the federal courts located in the Southern District of New York. Each Party hereby irrevocably and unconditionally consents to submit to the exclusive jurisdiction of the federal courts located in the Southern District of New York, for any actions, suits or proceedings arising out of or relating to this Agreement and the transactions contemplated hereby. Each Party hereby irrevocably and unconditionally waives any objection to the laying of venue of any action, suit or proceeding arising out of or relating to this Agreement and the transactions contemplated hereby in the federal courts located in the Southern District of New York, and waives and agrees not to plead or claim in any such court that any such action, suit or proceeding brought in such court has been brought in an inconvenient forum. Notwithstanding the foregoing, a Party will be entitled to seek enforcement of a judgment entered pursuant to this Section in any court having competent jurisdiction thereof where enforcement is deemed necessary.

(d) *Injunctive Relief*. Notwithstanding the dispute resolution procedures set forth in this Section 11.1, in the event of an actual or threatened breach hereunder (or any executed Development & Commercialization Agreement, if applicable), the aggrieved Party may seek equitable relief (including restraining orders, specific performance or other injunctive relief) in any court or other forum, without first submitting to any dispute resolution procedures hereunder.

(e) *Tolling*. The Parties agree that all applicable statutes of limitation and time-based defenses (such as estoppel and laches) will be tolled while the dispute resolution procedures set forth in this Section 11.1 are pending, and the Parties will cooperate in taking all actions reasonably necessary to achieve such a result. In addition, during the pendency of any dispute under this Agreement initiated before the end of any applicable cure period under Section 10.2 or 10.3 (or the cure periods under any executed Development & Commercialization Agreement, if applicable), (i) this Agreement (or any executed Development & Commercialization Agreement, if applicable) will remain in full force and effect, (ii) the provisions of this Agreement (or any executed Development & Commercialization Agreement, if applicable) relating to termination for material breach will not be effective, (iii) the time periods for cure under Section 10 (and the time periods from any executed Development & Commercialization Agreement, if applicable) as to any termination notice given prior to the initiation of the court proceeding will be tolled, and (iv) neither Party will issue a notice of termination pursuant to this Agreement (or any executed Development & Commercialization Agreement, if applicable) based on the subject matter of the court proceeding (and no effect will be given to previously issued termination notices), until the court has confirmed the existence of the facts claimed by a Party to be the basis for the asserted material breach.

11.2 Cumulative Remedies and Irreparable Harm. All rights and remedies of the Parties hereunder will be cumulative and in addition to all other rights and remedies provided hereunder or available by agreement, at law or otherwise. Each Party acknowledges and agrees that breach of any of the terms or conditions of this Agreement would cause irreparable harm and damage to the other and that such damage may not be ascertainable in money damages and that as a result thereof the non-breaching Party would be entitled to seek from a court equitable or injunctive relief restraining any breach or future violation of the terms contained herein by the breaching Party without the necessity of proving actual damages or posting bond. Such right to equitable relief is in addition to whatever remedies either Party may be entitled to as a matter of law or equity, including money damages.

11.3 Business Combination and IP.

(a) *Bluebird Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this Agreement and any Development & Commercialization Agreement, no Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Bluebird or any of its Affiliates prior to a Business Combination of Bluebird will be Controlled for purposes of this Agreement or any Development & Commercialization Agreement after such Business Combination of Bluebird, other than (i) Collaboration IP, (ii) Bluebird In-Licenses to the extent in effect immediately prior to such Business Combination of Bluebird and later Bluebird Collaboration In-Licenses (provided that after any such Business Combination, Bluebird may, but will not be obligated to, make any Bluebird New In-License available to Celgene or the JSC for review, election or conversion into a Bluebird Collaboration In-License pursuant to Section 4.1), and (iii) any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Bluebird will be Controlled thereafter no matter when such Patent is filed or issued.

(b) *Celgene Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this Agreement and any Development & Commercialization Agreement, no Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Celgene or any of its Affiliates prior to a Business Combination of Celgene will be Controlled for purposes of this Agreement or any Development & Commercialization Agreement after such Business Combination of Celgene, other than (i) Collaboration IP, (ii) Applicable Celgene In-Licenses, and (iii) any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Celgene will be Controlled thereafter no matter when such Patent is filed or issued.

11.4 Relationship of Parties. Nothing in this Agreement is intended or will be deemed to constitute a partnership, agency, employer-employee or joint venture relationship between the Parties. No Party will incur any debts or make any commitments for the other, except to the extent, if at all, specifically provided therein. There are no express or implied third party beneficiaries hereunder (except for Bluebird Indemnitees and Celgene Indemnitees, and any Third Party indemnitees under any executed Development & Commercialization Agreement, if applicable, for purposes of Section 9.6).

11.5 Compliance with Law. Each Party will perform or cause to be performed any and all of its obligations or the exercise of any and all of its rights hereunder in good scientific manner

and in compliance with all applicable Law. Without limiting the foregoing, Bluebird will comply with comply with all applicable Laws and regulations (including U.S. Foreign Corrupt Practices Act and any other applicable anti-bribery or anti-kickback laws or regulations).

11.6 Force Majeure. Neither Party will be liable to the other for failure of or delay in performing obligations set forth in this Agreement (other than any obligation to pay monies when due), and neither will be deemed in breach of such obligations, if such failure or delay is due to natural disasters or any causes reasonably beyond the control of such Party and without the fault or negligence of the Party so failing or delaying; provided that the Party affected will promptly notify the other of the force majeure condition and will exert reasonable efforts to eliminate, cure or overcome any such causes and to resume performance of its obligations as soon as possible.

11.7 Governing Law. This Agreement will be governed by and construed in accordance with the Laws of the state of New York, without respect to its conflict of laws rules; provided, however, that any dispute relating to the scope, validity, enforceability or infringement of any Patents or Know-How will be governed by, and construed and enforced in accordance with, the substantive Laws of the jurisdiction in which such Patents or Know-How apply.

11.8 Counterparts; Facsimiles. This Agreement may be executed in one or more counterparts, each of which will be deemed an original, and all of which together will be deemed to be one and the same instrument. Facsimile or PDF execution and delivery of this Agreement by either Party will constitute a legal, valid and binding execution and delivery of this Agreement by such Party

11.9 Headings. All headings in this Agreement are for convenience only and will not affect the meaning of any provision hereof.

11.10 Waiver of Rule of Construction. Each Party has had the opportunity to consult with counsel in connection with the review, drafting and negotiation of this Agreement. Accordingly, the rule of construction that any ambiguity in this Agreement will be construed against the drafting party will not apply.

11.11 Interpretation. Whenever any provision of this Agreement uses the term "including" (or "includes"), such term will be deemed to mean "including without limitation" (or "includes without limitations"). "Herein," "hereby," "hereunder," "hereof" and other equivalent words refer to this Agreement as an entirety and not solely to the particular portion of this Agreement in which any such word is used. All definitions set forth herein will be deemed applicable whether the words defined are used herein in the singular or the plural. Unless otherwise provided, all references to Sections and Exhibits in this Agreement are to Sections and Exhibits of this Agreement. References to any Sections include Sections and subsections that are part of the related Section (*e.g.*, a section numbered "Section 2.1" would be part of "Section 2", and references to "Section 2.1" would also refer to material contained in the subsection described as "Section 2.1(a)").

11.12 Binding Effect. This Agreement will inure to the benefit of and be binding upon the Parties, their Affiliates, and their respective lawful successors and assigns.

11.13 Assignment. This Agreement may not be assigned by either Party, nor may either Party delegate its obligations or otherwise transfer licenses or other rights created by this Agreement,

except as expressly permitted hereunder or otherwise without the prior written consent of the other Party, which consent will not be unreasonably withheld, delayed or conditioned; provided that without consent (a) Celgene may assign this Agreement to (i) an Affiliate or (ii) its successor in connection with the merger, consolidation, or sale of all or substantially all of its assets, and (b) Bluebird may assign this Agreement to (i) an Affiliate or (ii) its successor in connection with the merger, consolidation, or sale of all or substantially all of its assets or that portion of its business pertaining to the subject matter of this Agreement; provided however that, except in the case where a Party is involved in a merger or consolidation where it is the surviving entity and no assets of such Party have been transferred as a result of such merger or consolidation, that (A) such assigning Party provides the other Party to this Agreement with at least thirty (30) business days advance written notice of such assignment(s) and the assigning Party agrees in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to remain fully liable for the performance of its obligations under this Agreement by its assignee(s), (B) the assignee(s) agree in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to assume performance of all such assigned obligations, (C) in the case of any assignment(s) by Bluebird, all Bluebird IP licensed to Celgene or subject to Celgene's option rights under this Agreement, along with all Product Candidates will be transferred to such assignee(s) effective as of such assignment(s), (D) all of the matters referred to in clauses (A), (B) and (C), as applicable, will be set forth in documentation reasonably acceptable to the non-assigning Party prior to any such assignment(s) (and with such reasonable acceptance not to be unreasonably withheld, conditioned or delayed) and in all cases will provide the non-assigning Party with the full benefits of its rights under this Agreement (after taking into account all risks involving applicable counter-party performance and bankruptcy and insolvency risks, including those involving contractual rejection under 11 USC §365) as if no such assignment(s) had occurred, and (E) in the case of any assignment(s), the assigning Party will reimburse the non-assigning Party for all of the legal fees and expenses incurred by such non-assigning Party in connection with the matters set forth in clause (D) of this sentence in an aggregate amount not to exceed fifty thousand dollars ($50,000); and provided, further, that if Bluebird wishes to assign any Bluebird IP to its Affiliates, it will be permitted to do so conditioned on such Affiliate becoming a party to this Agreement, in the form of an amendment to this Agreement executed by Celgene, Bluebird and such Affiliate, pursuant to which such Affiliate would agree to assume all obligations hereunder, and grant to Celgene all rights hereunder, with respect to the Bluebird IP so assigned. The terms of this Agreement will be binding upon and will inure to the benefit of the successors, heirs, administrators and permitted assigns of the Parties. Any purported assignment in violation of this Section 11.13 will be null and void *ab initio*.

11.14 Notices. All notices, requests, demands and other communications required or permitted to be given pursuant to this Agreement will be in writing and will be deemed to have been duly given upon the date of receipt if delivered by hand, recognized international overnight courier, confirmed facsimile transmission, or registered or certified mail, return receipt requested, postage prepaid to the following addresses or facsimile numbers:

If to Bluebird: bluebird bio, Inc.
150 Second Street
Third Floor
Cambridge, MA 02142
Attention: General Counsel
Facsimile:

With a copy to: Goodwin|Procter LLP
53 State Street
Boston, MA 02109
Attention: Michael Bison, Esq. & Kingsley Taft, Esq.
Facsimile: 617-523-1231

If to Celgene: Celgene Corporation
Corp.: 86 Morris Avenue
Summit, NJ 07901
Attention: George Golumbeski, Ph. D.
Facsimile: 908-673-2791

If to Celgene: Celgene European Investment Company LLC
Europe :c/o Celgene International Sarl
Route de Perreux 1
2017 Boudry
Switzerland
Attention: Nakisa Serry
Facsimile: 011-41-32-729-8604

with copies to (in the case of Celgene Corp., Celgene Europe, or both):

Celgene Legal
86 Morris Avenue
Summit, NJ 07901
Attention: General Counsel
Telephone: (908) 673-9000
Facsimile: (908) 673-2771

and:

Dechert LLP
902 Carnegie Center
Suite 500
Princeton, NJ 08540
Attention: James J. Marino, Esq.
David E. Schulman, Esq.
Telephone: (609) 955-3230
Facsimile: (609) 873-9138

Either Party may change its designated address and facsimile number by notice to the other Party in the manner provided in this Section 11.14.

11.15 Amendment and Waiver. This Agreement may be amended, supplemented, or otherwise modified only by means of a written instrument signed by both Parties; provided that any unilateral undertaking or waiver made by one Party in favor of the other will be enforceable if undertaken in a writing signed by the Party to be charged with the undertaking or waiver. Any waiver of any rights or failure to act in a specific instance will relate only to such instance and will not be construed as an agreement to waive any rights or fail to act in any other instance, whether or not similar.

11.16 Severability. In the event that any provision of this Agreement will, for any reason, be held to be invalid or unenforceable in any respect, such invalidity or unenforceability will not affect any other provision hereof, and the Parties will negotiate in good faith to modify this Agreement to preserve (to the extent possible) their original intent.

11.17 Payment Floor. Except as permitted by Section 10.6, Section 10.6 of any License Agreement or Section 17.6 of any Co-Development, Co-Promote and Profit Share Agreement, in no event will any credits permitted to be taken by Celgene under this Agreement or any Development & Commercialization Agreement against any particular Milestone Payment, royalty payment or Profit & Loss Share payment owed to Bluebird under any Development & Commercialization Agreement act to reduce such payment by more than [***] than would otherwise be payable to Bluebird thereunder or thereunder (and for clarity "otherwise payable" above means that (a) any reductions pursuant to Section 10.3(c) of any License Agreement or Section 17.3 of any Co-Development, Co-Promote and Profit Share Agreement will be made before determining the [***] floor specified above, but (b) any royalty reductions pursuant to Section 4.3(d) of any License Agreement or Section 11.3(d) of any Co-Development, Co-Promote and Profit Share Agreement will be included in calculating the up to [***] reduction permitted above).

11.18 Entire Agreement. This Agreement is the sole agreement with respect to the subject matter and supersedes all other agreements and understandings between the Parties with respect to same (including the Confidential Agreement and the Original Agreement).

11.19 **Celgene Parties.** [***]

[*Remainder of this Page Intentionally Left Blank*]

IN WITNESS WHEREOF, the Parties have caused this Master Collaboration Agreement to be executed by their respective duly authorized officers as of the Amendment Date.

bluebird bio, Inc.

By: /s/ Nick Leschy
(Signature)

Name: Nick Leschly

Title: CEO

Date: June 3, 2015

Celgene Corporation

By: /s/ Peter Kellog
(Signature)

Name: Peter Kellog

Title: EVP, CFO

Date: June 3, 2015

Celgene European Investment Company LLC (CEICO)

By: Celgene International Sarl, the sole member of CEICO

By: /s/ Jürg Ochen
(Signature)

Name: Jürg Ochen

Title: Director

Date: June 3, 2015

and

By: /s/ Paul D'Angio
(Signature)

Name: Paul D'Angio

Title: Director

Date: June 3, 2015

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Exhibit A

Amended and Restated License Agreement

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Amended and Restated License Agreement

by and between

bluebird bio, Inc.

and

Celgene Corporation

and

Celgene European Investment Company LLC

[_____]

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

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List of Appendices

Amended and Restated License Agreement

This Amended and Restated License Agreement (this "License Agreement"), dated as of [_____] (the "License Agreement Effective Date"), is made by and between bluebird bio, Inc., a Delaware corporation ("Bluebird"), and Celgene Corporation, a Delaware Corporation ("Celgene Corp"), with respect to all rights and obligations under this License Agreement in the United States (subject to Section 11.18), and Celgene European Investment Company LLC, a Delaware limited liability company, with respect to all rights and obligations under this License Agreement outside of the United States (subject to Section 11.18) ("Celgene Europe" and together with Celgene Corp, "Celgene"). Each of Bluebird and Celgene may be referred to herein as a "Party" or together as the "Parties."

WHEREAS, Bluebird has developed and owns or has rights to certain Patents and technology relating to developing innovative gene therapies for genetic disorders;

WHEREAS, Celgene is a biopharmaceutical company focused on acquiring, Developing and Commercializing innovative anti-cancer agents; and

WHEREAS, Bluebird and Celgene are parties to that certain Master Collaboration Agreement, dated as of March 19, 2013, pursuant to which the Parties entered into a global strategic collaboration to research, develop and commercialize therapeutic products in the Field (the "Original MCA");

WHEREAS, the Parties entered into an Amended and Restated Collaboration Agreement, dated as of June 3, 2015 (the "Master Collaboration Agreement"), pursuant to which the Parties amended and restated the Original MCA in order to continue the research and development of the Product Candidates pursuant to the terms set forth therein;

WHEREAS, pursuant to the terms of the Master Collaboration Agreement, Celgene has exercised its option to select a Product Candidate to be an Optioned Candidate by delivering to Bluebird a Celgene Option Notice and payment of the applicable Initial Option Fee and Additional Option Fee (such Optioned Candidate, as defined more fully in Appendix A, the "Elected Candidate"); and

WHEREAS, the Parties now wish to enter into an exclusive licensing arrangement whereby Celgene will have exclusive rights to Develop Elected Candidate and Commercialize Licensed Product, all on the terms and conditions set forth here.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the amount and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. **Definitions.**

The following terms and their correlatives will have the meanings set forth below. Capitalized terms used, but not defined, herein will have the meanings ascribed to such terms in the Master Collaboration Agreement.

1.1 "Applicable Bluebird In-Licenses" means the Applicable Pre-Existing In-Licenses and the Applicable New In-Licenses.

1.2 "Applicable New In-Licenses" means all New In-Licenses of Bluebird or its Affiliates necessary or useful for the research, Development and/or Commercialization of Elected Candidate and Licensed Product that Celgene has elected to list on Appendix B as of the License Agreement Effective Date, plus any other New In-License of Bluebird or its Affiliates that Celgene has elected to include as an Applicable New In-License pursuant to Section 3.2(b).

1.3 "Applicable Pre-Existing In-Licenses" means all Pre-Existing In-Licenses necessary or useful for the research, Development and/or Commercialization of Elected Candidate and Licensed Product, and any extensions or expansions of the scope of such Pre-Existing In-Licenses, including those listed on Appendix C.

1.4 "Biosimilar Product" means, with respect to a Licensed Product in any country, any biosimilar product sold by a Third Party not authorized by or on behalf of Celgene, its Affiliates or Sublicensees, (a) that is a biosimilar biological product, as defined in 21 USC 379j-51 (or any successor or replacement thereof), a similar biological medicinal product, as defined in Annex I to Directive 2001/83/EC (or any successor or replacement thereof), or any similar biosimilar or generic product under the Laws of any country or jurisdiction, or (b) regarding which Regulatory Approval is obtained by referencing Regulatory Data of such Licensed Product.

1.5 "Bluebird In-Licensed IP" means all Patents, Materials and Know-How in-licensed by Bluebird pursuant to Applicable Bluebird In-Licenses, including any extensions or expansions of the scope thereof.

1.6 "Bluebird Technology" means all Bluebird Solely Owned IP and all of Bluebird's right, title and interest in and to Joint IP.

1.7 "Celgene Development & Commercialization Program" means a Development and Commercialization program for Licensed Product in the Field worldwide.

1.8 "Celgene Licensed Product In-License" means any Applicable Celgene In-License or other agreement between Celgene or any of its Affiliates and a Third Party entered into under Section 4.3(d) pursuant to which Celgene or any of its Affiliates in-licenses any Know-How, Materials or Patents that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.9 "Celgene Licensed Product In-Licensed IP" means any Patents, Materials and Know-How Controlled at any time during the License Agreement Term by Celgene or any of its Affiliates pursuant to a Celgene Licensed Product In-License or Celgene Other In-License that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.10 "Celgene Licensed Product IP" means (a) Celgene Technology, (b) Collaboration IP solely owned by Celgene and Celgene's interest in jointly owned Collaboration IP, and (c) Patents, Materials or Know-How (to the extent not included in subsection (a) or (b)) owned by Celgene or its Affiliates that are Controlled at any time during the License Agreement Term by Celgene or any of its Affiliates, in each case that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.11 "Celgene Other In-License" means any agreement between Celgene or any of its Affiliates and a Third Party, other than Applicable Celgene In-Licenses and any agreement between Celgene or any of its Affiliates and a Third Party entered into under Section 4.3(d),

pursuant to which Celgene or any of its Affiliates in-licenses any Know-How, Materials or Patents that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.12 "Celgene Regulatory Rights" means all Regulatory Data, Regulatory Filings and Regulatory Approvals for Elected Candidate and Licensed Product worldwide Controlled by Celgene or any of its Affiliates.

1.13 "Celgene Technology" means all Celgene Solely Owned IP and all of Celgene's right, title and interest in and to Joint IP.

1.14 "Clinical Study" means any human clinical trial of a Product Candidate.

1.15 "Commercialization" means any and all activities directed to the Manufacturing, marketing, detailing, promotion and securing of reimbursement of a product after Regulatory Approval has been obtained (including making, having made, using, importing, selling and offering for sale such product), and will include post-approval clinical studies, post-launch marketing, promoting, detailing, marketing research, distributing, customer service, administering and commercially selling such product, importing, exporting or transporting such product for commercial sale, and all regulatory compliance with respect to the foregoing.

1.16 "Commercially Reasonable Efforts" means, with respect to the Development or Commercialization of Licensed Product by a Party, that level of efforts and resources that such Party would normally devote to the Development or Commercialization, as the case may be, of a product owned by it or to which it has rights of the type it has hereunder, which is of a similar commercial potential at a similar stage in its lifecycle, in each case taking into account issues of safety and efficacy, product profile, the proprietary position, the then current competitive environment for such product and the likely timing of such product's entry into the market, the pricing and launching strategy for the respective product, the regulatory environment and status of such product, and other relevant scientific, technical and commercial factors.

1.17 "Control" or "Controlled" means, with respect to any Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals, the possession (whether by ownership or license, other than by a license or sublicense granted pursuant to this License Agreement) by a Party or its Affiliates of the ability to grant to the other Party a license or access as provided herein to such item, without violating the terms of any agreement or other arrangement with any Third Party or, other than under Applicable Bluebird In-Licenses, being obligated to pay any royalties or other consideration therefor ("Additional Payments"). For clarity, Other In-Licenses are not "Controlled" for purposes of this License Agreement, unless and only after such Other In-License is converted into an Applicable New In-License pursuant to Section 3.2(b). Notwithstanding the foregoing, as provided in Section 3.2(a), if on or after the License Agreement Effective Date and for such time as the other Party agrees to pay and does in fact pay all Additional Payments with respect to such Party's access or license to any Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals (other than that in-licensed by Bluebird pursuant to an Other In-License), such Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals will be deemed to be included in the definition of "Control".

1.18 "Covers", with reference to (a) a Patent, means that the making, using, selling, offering for sale or importing of a product or practice of a method would infringe a Valid Claim of such Patent in the country in which such activity occurs, and (b) Materials or Know-How, means that the Manufacture, Development or Commercialization of a product incorporates, embodies or otherwise makes use of such Materials or Know-How.

1.19 "EU" means the organization of member states of the European Union as it may be constituted from time to time.

1.20 "EU Regulatory Event" means, with respect to a Licensed Product, the earlier to occur of [***].

1.21 "Field" means the targeting of the Target Antigen by the use of (a) T-cells expressing a CAR (with or without other engineering to enhance functionality and/or safety), including virus specific genetically modified T-cells expressing a synthetic CAR, and (b) T-cells expressing native antigen receptors or engineered antigen receptors in which the T-cells are genetically modified to enhance their performance, persistence or safety, in each case under (a) and (b) for the treatment, modulation, palliation or prevention of cancer in humans.

1.22 "First Commercial Sale" means the first sale for use or consumption of any Licensed Product in a country after all required Regulatory Approvals for commercial sale of such Licensed Product have been obtained in such country.

1.23 "First Indication" means the first disease condition for which a particular Licensed Product has been approved by a Regulatory Authority.

1.24 "GAAP" means U.S. generally accepted accounting principles or International Financial Reporting Standards, consistently applied, as designated and used by the applicable Party.

1.25 "Gene Editing" means homing endonuclease (HE) and megaTAL gene editing technologies, including HE/megaTAL-mediated homology directed recombination and Bluebird's proprietary DARIC cell signaling technology.

1.26 "In-License Payments" means any amounts paid or payable under any Applicable Bluebird In-License that are incurred by Bluebird solely and directly as a result of the grant of a sublicense thereunder under this License Agreement to Celgene, any of Celgene's contract Third Parties under Section 3.5, or any further Sublicensees of Celgene (including of Celgene's Affiliates that are granted sublicenses) under this License Agreement. Any such payments will include [***] but excluding [***].

1.27 "Licensed IP" means all (a) Patents, Materials and Know-How Controlled at any time during the term of this License Agreement by Bluebird or any of its Affiliates (including any applicable Collaboration IP and Bluebird Technology), other than pursuant to an Applicable Bluebird In-License, and (b) Bluebird In-Licensed IP, in each case to the extent necessary or useful to Develop Elected Candidate and Develop and Commercialize Licensed Product. [***]

1.28 "Licensed Product" means any product that constitutes or incorporates an Elected Candidate (including all modified and improved versions thereof), in all forms, presentations, and formulations (including manner of delivery and dosage). A modified or improved version of an

Elected Candidate constituted or incorporated in a product will be deemed a "Modified Licensed Product" for purposes of Section 4.2 if it is Covered by patentable technology Controlled by Bluebird that (a) is first discovered, created, conceived, developed or reduced to practice after the later of (i) the License Agreement Effective Date and (ii) the end of the Collaboration Program Term, (b) requires the submission of a new BLA with respect to such modified or improved Elected Candidate, and (c) materially contributes to the Elected Candidate being approved for a new indication or new patient population. For clarity, "Modified Licensed Products" are Licensed Products hereunder for all purposes other than Section 4.2.

1.29 "Manufacturing" means the production, manufacture, processing, filling, finishing, packaging, labeling, shipping and holding of product or any intermediate thereof, including process development, process qualification and validation, scale-up, commercial manufacture and analytic development, product characterization, stability testing, quality assurance and quality control. With reference to Elected Candidate and Licensed Product, Manufacturing includes Vector and associated Payload supply.

1.30 "Net Sales" means [***].

1.31 "Pivotal Study" means (a) a Phase 3 Study that is intended by Celgene to be submitted (together with any other registration trials that are prospectively planned when such Phase 3 Study is initiated) for Regulatory Approval in the U.S. or the EU, or (b) any other clinical study that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which clinical study is a registration trial intended to be sufficient for filing an application for a Regulatory Approval for the Licensed Product in the U.S. or another country or some or all of an extra-national territory, solely as evidenced by the acceptance for filing for a Regulatory Approval for such product after completion of such study.

1.32 "Regulatory Exclusivity Period" means with respect to a Licensed Product in a country, the period of time during which (a) Celgene or any of its Affiliates or Sublicensees has been granted the exclusive legal right by a Regulatory Authority (or is otherwise entitled to the exclusive legal right by operation of Law) in such country to market and sell the Licensed Product, or (b) the data and information submitted by Celgene or any of its Affiliates or Sublicensees to the relevant Regulatory Authority in such country for purposes of obtaining Regulatory Approval may not be disclosed, referenced or relied upon in any way by such Regulatory Authority (including by relying upon the Regulatory Authority's previous findings regarding the safety or effectiveness of the Licensed Product) to support the Regulatory Approval or marketing of any product by a Third Party in such country.

1.33 "Second Indication" means [***].

1.34 "Selling Party" means Celgene and its Sublicensees (including Celgene's Affiliates that are granted sublicenses pursuant to Section 3.3).

1.35 "Sublicensee" means any person or entity (including Affiliates of Celgene) that is granted a sublicense as permitted by Section 3.3 (or an option to take such a sublicense), either directly by Celgene or indirectly by any other Sublicensee hereunder.

1.36 "Target Antigen" means the antigen designated as B-cell maturation antigen (BCMA)as further set forth on Appendix D, and naturally occurring variants thereof.

1.37 "Valid Claim" means, with respect to a particular country, (a) any claim of an issued and unexpired Patent in such country that (i) has not been held revoked, unenforceable or invalid by a decision of a court or governmental agency of competent jurisdiction, which decision is unappealable or unappealed within the time allowed for appeal and (ii) has not been abandoned, disclaimed, denied or admitted to be invalid or unenforceable through reissue or disclaimer or otherwise in such country, or (b) a claim of a pending Patent application that has not been finally abandoned or finally rejected or expired and which has been pending [***] from the date of filing of the earliest priority Patent application to which such pending Patent application is entitled to claim benefit.

1.38 "Vector Supplies" means supplies of Vectors and associated Payloads Manufactured for incorporation into Elected Candidate and Licensed Product for Development or Commercialization thereof.

Definitions for each of the following terms are found in the body of this License Agreement or the Appendices hereto as indicated below:

Defined Terms	***Location***
Additional IP	Section 3.2(a)
Additional Payments	Section 1.17
Applicable Bluebird In-License	Section 1.1
Applicable New In-License	Section 1.2
Applicable Pre-Existing In-License	Section 1.3
Bankruptcy Code	Section 3.7
Biosimilar Application	Section 7.2(f)
Biosilimar Product	Section 1.4
Biosimilar Product Competition	Section 4.3(e)
Bluebird	Preamble
Bluebird In-Licensed IP	Section 1.5
Bluebird Indemnitees	Section 9.6(a)
Bluebird Technology	Section 1.6
Business Acquisition	Section 3.4(b)
Business Party	Section 3.4(b)
Business Program	Section 3.4(b)
Celgene	Preamble
Celgene Corp	Preamble
Celgene Development & Commercialization Program	Section 1.7
Celgene Europe	Preamble
Celgene Indemnitees	Section 9.6(b)
Celgene Licensed Product In-License	Section 1.8
Celgene Licensed Product In-Licensed IP	Section 1.9
Celgene Licensed Product IP	Section 1.10

Defined Terms	***Location***
Celgene Other In-License	Section 1.11
Celgene Regulatory Rights	Section 1.12
Celgene Technology	Section 1.13
Clinical Study	Section 1.14
Combination Product	Section 1.30
Commercialization	Section 1.15
Commercially Reasonable Efforts	Section 1.16
Competitive Infringement	Section 7.1
Control	Section 1.17
Covers	Section 1.18
Elected Candidate	Appendix A
EU	Section 1.19
EU Regulatory Event	Section 1.20
Field	Section 1.21
First Commercial Sale	Section 1.22
First Indication	Section 1.23
Fully Burdened Manufacturing Cost	Appendix H
GAAP	Section 1.24
Gene Editing	Section 1.25
In-License Payment	Section 1.26
Indemnification Claim Notice	Section 9.6(c)
Indemnified Party	Section 9.6(c)
Joint IP	Section 5.2
License Agreement	Preamble
License Agreement Effective Date	Preamble
License Agreement Term	Section 10.1
Licensed IP	Section 1.27
Licensed Product	Section 1.28
Litigation Conditions	Section 9.6(d)(i)
Losses	Section 9.6(a)
Major EU Countries	Section 1.20
Manufacturing	Section 1.29
Manufacturing and Supply Agreement	Section 2.4(c)(ii)
Master Collaboration Agreement	Preamble
Milestone Event	Section 4.2
Milestone Payment	Section 4.2
Modified Licensed Product	Section 1.28
Net Sales	Section 1.30
Original MCA	Preamble
Party(ies)	Preamble
Patent Challenge	Section 10.2(b)
PHSA	Section 7.2(f)

Defined Terms	***Location***
Pivotal Study	Section 1.31
Regulatory Exclusivity Period	Section 1.32
Second Indication	Section 1.33
Selling Party	Section 1.34
Solely Owned IP	Section 5.1
Specific Patent	Section 6.3
Sublicensee	Section 1.35
Third Party Claims	Section 9.6(a)
Valid Claim	Section 1.37
Vector Supplies	Section 1.38

2. **Development and Commercialization.**

2.1 Development. As of and after the License Agreement Effective Date, Celgene will assume sole responsibility for, and control of, Developing Elected Candidate and Licensed Product in the Field worldwide, and will establish a Celgene Development & Commercialization Program for that purpose. As of and after the License Agreement Effective Date, Celgene will have sole responsibility for all costs and expenses arising from the Development and Commercialization of Elected Candidate and Licensed Product in the Field worldwide. Notwithstanding the foregoing, if the initial Phase 1 Study with respect to Optioned Candidate has not been completed as of the License Agreement Effective Date, Bluebird will continue to be responsible for the performance of such initial Phase 1 Study under the oversight of the JSC under the Master Collaboration Agreement until completion of such initial Phase 1 Study. In the event Bluebird continues to be responsible for the performance of such initial Phase 1 Study, Bluebird will be responsible for the costs of performing such initial Phase 1 Study on the terms set forth in the Master Collaboration Agreement.

2.2 Regulatory. Subject to the last sentence of Section 2.1, (a) as of and after the License Agreement Effective Date, Celgene will lead and have sole control of all efforts with Regulatory Authorities regarding the Development and Commercialization of Elected Candidate and Licensed Product in the Field worldwide, including taking full responsibility for preparing and filing the relevant Regulatory Filings and seeking Regulatory Approval and (b) promptly following the License Agreement Effective Date, Bluebird will, at Celgene's expense, assign to Celgene all Regulatory Filings with respect to Elected Candidate and Licensed Product. For clarity, in the event Bluebird continues to be responsible for the performance of an initial Phase 1 Study following the License Agreement Effective Date in accordance with Section 2.1, Bluebird will retain ownership of any Regulatory Filings (including the IND) for Optioned Candidate until completion of such initial Phase 1 Study. In the event of failure to assign such Regulatory Filings to Celgene, Bluebird hereby consents and grants to Celgene the right to access and reference (without any further action required on the part of Bluebird, whose authorization to file this consent with any Regulatory Authority is hereby granted) any such Regulatory Filing.

2.3 Technical Assistance. During the Collaboration Program Term, Bluebird will reasonably cooperate with Celgene to provide all technical assistance, and to transfer to Celgene any additional Know-How licensed to Celgene under Section 3.1, requested by Celgene to

facilitate the transfer of Development efforts related to Elected Candidate and Licensed Product. Such cooperation will include providing Celgene with reasonable access by teleconference or in-person at Bluebird's facilities to Bluebird personnel involved in the research and Development of Elected Candidate to provide Celgene with a reasonable level of technical assistance and consultation in connection with the transfer of such Know-How. Following the Collaboration Program Term, Bluebird will reasonably cooperate with Celgene to provide reasonable amounts of technical assistance, including to transfer to Celgene any additional Know-How licensed to Celgene under Section 3.1, with respect to Elected Candidate or Licensed Product as reasonably requested by Celgene with reasonable advance notice to Bluebird. Any dispute with respect to the amount and completeness of the technical assistance and cooperation to be provided by Bluebird under this Section 2.3 will be referred to and finally resolved by binding arbitration by a mutually agreeable, disinterested, conflict-of-interest-free individual not affiliated or consulting with either Party. Any such arbitration will be conducted under the then-current rules of the American Arbitration Association.

2.4 Manufacture and Supply.

(a) *Manufacturing*. Subject to Section (b), Celgene will be solely responsible for, and will bear all the costs and expenses of, Manufacturing and supplying all Elected Candidate and Licensed Product for Development and Commercialization in the Field worldwide and, subject to Section 2.4(c), Celgene will purchase Vector Supply from Bluebird or its designee for such purpose.

(b) *Vector Supply*. Bluebird will have the sole right to Manufacture or have Manufactured Vector Supply, and Celgene will have no rights with respect thereto except as provided in Section 2.4(c)(iv). Except as provided in Section 2.4(c)(iv) or in the Manufacturing and Supply Agreement, neither Celgene nor any Affiliate of Celgene (nor any others on behalf of or under license or sublicense from Celgene or any of its Affiliates) will Manufacture (i) any Vector and associated Payload for Licensed Product or (ii) Licensed Product, except for the Manufacture of Licensed Product using Vector Supply supplied by or on behalf of Bluebird. Except as provided in Section 2.4(c)(iv) or in the Manufacturing and Supply Agreement, Celgene and its Affiliates and Sublicensees will purchase all Vector Supply exclusively from Bluebird or its designee.

(c) *Vector Supply Terms*.

(i) Except as provided otherwise in this Section 2.4(c) or in the Manufacturing and Supply Agreement, Bluebird and its Affiliates will Manufacture, or cause a Third Party to Manufacture, all Vector Supply for all Elected Candidate and Licensed Product required for clinical Development and Commercialization in the Field worldwide, and will have the right to make all necessary decisions regarding arrangements with Third Party manufacturers, provided that Bluebird will reasonably consult with Celgene with respect to all such arrangements and obtain Celgene's prior written consent, which will not be unreasonably withheld, conditioned or delayed. [***]

(ii) The Parties will enter into a "Manufacturing and Supply Agreement," between each other or among the Parties and an Affiliate or a Third Party, covering Vector Supply as soon as reasonably practicable after the License Agreement Effective Date, which agreement will be

consistent with and supersede the terms of this Section 2.4(c) and will otherwise be subject in all respects to the terms and conditions of this License Agreement.

(iii) The cost to Celgene of Vector Supply will equal [***] of Bluebird's Fully Burdened Manufacturing Cost for such Manufacture, plus [***] unless otherwise agreed by the Parties in writing.

(iv) The Manufacturing and Supply Agreement will include the terms set forth in Appendix I, including terms permitting Celgene to establish "back-up" and/or "second source" rights for Vector Supply and license grants from Celgene to Bluebird under the Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP to the extent necessary or useful for Bluebird to Manufacture Vector Supply. [***]

(v) At Celgene's request, Bluebird will cooperate with Celgene's reasonable requests, at Celgene's cost and expense, to engage in a technology transfer to allow Celgene, in accordance with Section 2.4(c)(iv), to Manufacture Vector Supply (through the first commercial batch of Vector Supply) itself or by through its designated Third Party manufacturer, by transferring all Know-How, Materials, technology and trade secrets Controlled by Bluebird or its Affiliates that are necessary to Manufacture Vector Supply, thereby enabling Celgene (or such Third Party) to Manufacture the Vector Supply.

(vi) Any purchase of Vector Supply from Bluebird or its designee will expressly not include any license rights to any Know-How or Patents, but instead all licenses (implied, by exhaustion or otherwise) will arise under Section 3.1, if and as applicable.

(vii) For the purpose of this License Agreement, certain words and phrases (and their correlatives) relating to Manufacturing will have the meanings set forth on Appendix I.

2.5 Celgene Diligence. Celgene, directly or through one or more of its Sublicensees, will use Commercially Reasonable Efforts: (a) to Develop Licensed Product in the Field and to obtain Regulatory Approvals therefor; and (b) to Commercialize Licensed Product in the Field after obtaining such Regulatory Approval, in each country worldwide where Commercializing Licensed Product would be warranted by using Commercially Reasonable Efforts.

2.6 Annual Update Meetings. At least once during each consecutive twelve (12)-month period from the License Agreement Effective Date until the earlier of first approval of a BLA for Licensed Product by the FDA or first approval of an MAA for Licensed Product by the EMA, within thirty (30) days of Bluebird's written request, the Parties will meet in person at a U.S. site of Celgene for Celgene to provide Bluebird with an update on the Development of Licensed Product by Celgene and its Sublicensees. During such meeting, Celgene will disclose to Bluebird all material information regarding such Development.

2.7 Reports by Celgene. Celgene will prepare and maintain, and will cause its Sublicensees to prepare and maintain, reasonably complete and accurate records regarding the Development of Elected Candidate and Licensed Product, and Commercialization of Licensed Product worldwide after Regulatory Approval therefor. Celgene will provide to Bluebird a reasonably detailed report regarding such efforts at least once every twelve (12)-month period from the License Agreement Effective Date. Such report will contain sufficient detail to enable Bluebird to assess Celgene's compliance with its Development and Commercialization obligations in Section 2.5, including

information with respect to the following: (a) the design, status and results of any animal studies and clinical trials for Licensed Product; (b) any regulatory milestones, and any Regulatory Approvals achieved, for Licensed Product; and (c) activities with respect to selling, promoting, supporting, detailing and marketing of Licensed Product. In addition to the foregoing, Celgene will provide Bluebird with such additional information regarding any such activities as Bluebird may reasonably request from time to time.

2.8 Applicable Bluebird In-Licenses and Other IP.

(a) *Maintenance of Applicable Bluebird In-Licenses*. Bluebird (i) will duly perform and observe all of its obligations under the Applicable Bluebird In-Licenses in all material respects and maintain in full force and effect the Applicable Bluebird In-Licenses, and (ii) will not, without Celgene's prior written consent (such consent not to be unreasonably withheld, conditioned or delayed), (A) amend, modify, restate, cancel, supplement or waive any provision of any Applicable Bluebird In-License, or grant any consent thereunder, or agree to do any of the foregoing, or (B) exercise any right to terminate any Applicable Bluebird In-License in each case ((A) and (B)) that would reasonably be expected to adversely affect in any respect the rights of Celgene under this License Agreement, provided that Bluebird will provide prior written notice to Celgene of all of the foregoing notwithstanding whether or not any of the foregoing would reasonably be expected to adversely affect in any respect the rights of Celgene under this License Agreement. Bluebird will provide Celgene with written notice as promptly as practicable (and in any event within five (5) business days) after becoming aware of any of the following: (I) any material breach or default by Bluebird or any of its Affiliates of any covenant, agreement or other provision of any Applicable Bluebird In-License, (II) any notice or claim from the counterparty to any Applicable Bluebird In-License terminating or providing notice of termination of any Applicable Bluebird In-License, (III) any notice or claim alleging any breach of default under any Applicable Bluebird In-License, or (IV) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events could reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate any Applicable Bluebird In-License. If Bluebird fails to pay any amounts due under any Applicable Bluebird In-License and if such nonpayment would permit the counterparty to such Applicable Bluebird In-License to terminate or suspend the same or any rights thereunder, Celgene will have the right, but not the obligation, in its sole discretion, to pay such amounts on Bluebird's behalf, and any amounts so paid by Celgene may be taken by Celgene as a credit against any amounts payable to Bluebird under this License Agreement.

(b) [***]

(c) *Applicable Bluebird In-License Requirements*. Celgene will abide, and will cause all its Affiliates and applicable Sublicensees to abide, by all requirements of each Applicable Bluebird In-License in all material respects (and in any case in all respects in the case that failure to so abide would result in a breach under the Applicable Bluebird In-License), to the extent applicable to Sublicensees thereunder and to the extent disclosed by Bluebird to Celgene, with the understanding that disclosure by Bluebird of any Applicable Bluebird In-License to Celgene will be deemed disclosure of such requirements of such Applicable Bluebird In-License to Celgene. In the event of a termination of any Applicable Bluebird In-License, Bluebird agrees, to the extent requested by Celgene, to reasonably assist Celgene in securing a direct license from the applicable

licensor under any Patents, Materials and Know-How that was licensed to Bluebird and sublicensed to Celgene hereunder prior to such termination. In addition, Bluebird agrees, if requested by Celgene, to reasonably assist Celgene in securing a standby license from the applicable licensor under any Patents, Materials and Know-How that are licensed to Bluebird and sublicensed to Celgene.

3. **License Grants.**

3.1 License by Bluebird. Subject to the terms and conditions of this License Agreement, Bluebird hereby grants to Celgene a worldwide, exclusive (even as to Bluebird) license, with the right to sublicense only as permitted by Section 3.4, under Licensed IP, to Develop Elected Candidate and to Develop and Commercialize Licensed Product. Further, (a) the license to Commercialize granted in this Section 3.1 will cover only the sale and offer for sale of Licensed Product in finished form and not the sale or offer for sale of Vectors (other than as and to the extent incorporated in the Licensed Product), and (b) rights to Manufacture Vectors and associated Payloads are included within the scope of the license granted to Celgene under this Section 3.1, which rights are subject to the terms and conditions of Section 2.4(c).

3.2 Additional IP; Other In-Licenses.

(a) *Additional IP*. Except as set forth in Section 3.2(b), Celgene may, on or after the License Agreement Effective Date, elect to include within the scope of the Licensed IP any Know-How, Material, Patent, Regulatory Data, Regulatory Filings or Regulatory Approvals ("Additional IP"), that would be Controlled by Bluebird but for required payments of Additional Payments to a Third Party, by (i) providing notice to Bluebird of same and (ii) agreeing to pay and in fact paying all Additional Payments with respect to Celgene's access or license to such Additional IP. Following Bluebird's receipt of such notice and subject to Celgene's performance of its obligations to pay any Additional Payments with respect to Celgene's access or license to such Additional IP, such Additional IP will be deemed Licensed IP hereunder. For avoidance of doubt, this Section 3.2(a) does not apply to Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals licensed to Bluebird under the Applicable Bluebird In-Licenses, all of which are deemed Controlled by Bluebird notwithstanding this Section 3.2(a).

(b) *Other In-Licenses*. Celgene may, on or after the License Agreement Effective Date, elect to convert any Other In-License to an Applicable New In-License by providing notice to Bluebird of same. Upon Bluebird's receipt of such notice, such Other In-License will be an Applicable New In-License hereunder, Appendix B will automatically be updated to include such New In-License and the provisions of this License Agreement applicable to New In-Licenses, including Section 4.1(b), will apply with respect to such New In-License.

3.3 Sublicensing Rights.

(a) *Transfer*. The licenses granted in Sections 3.1 are transferable only upon a permitted assignment of this License Agreement in accordance with Section 11.12.

(b) *Celgene Sublicenses*. The license granted in Section 3.1 may be sublicensed, in full or in part, by Celgene by a written agreement to its Affiliates and Third Parties (with the right to sublicense through multiple tiers), provided, that as a condition precedent to and requirement of any such sublicense:

(i) Celgene will provide Bluebird with a copy of any sublicense agreement with a non-Affiliated Sublicensee within thirty (30) days of execution thereof, and to the extent permitted under any Applicable Bluebird In-License, such sublicense agreement may be redacted as necessary to protect commercially sensitive information;

(ii) Celgene will be responsible for any and all obligations of such Sublicensee as if such Sublicensee were "Celgene" hereunder; and

(iii) Any such Sublicensee will agree in writing to be bound by substantially identical obligations as Celgene hereunder with respect to the activities of such Sublicensee hereunder (and not with respect to the activities of any other), including Know-How disclosure obligations Celgene has to Bluebird hereunder with respect to the activities of such Sublicensee hereunder (but excluding payment obligations).

3.4 Exclusivity.

(a) During the License Agreement Term, neither Party nor its Affiliates (nor any others on behalf of or with, or under license (including a covenant not to sue) or sublicense from, such Party or any its Affiliates) will research, Develop, Manufacture or Commercialize any actual or potential products (including Vectors and associated Payloads) to be used in the Field (which, for the purposes of this Section 3.4, will include all indications and will not be limited to cancer) that specifically target the Target Antigen, other than pursuant to this License Agreement (which includes, for avoidance of doubt, research, Development, Manufacture and Commercialization of improved and modified versions of the Licensed Product by Celgene) or any other Development & Commercialization Agreement (which includes, for avoidance of doubt, research, Development, Manufacture and Commercialization of improved and modified versions of the Licensed Product by Celgene).

(b) Notwithstanding Section 3.4(a), if (i) a Business Combination occurs with respect to either Party with a Third Party or (ii) a Party acquires a Third Party (including by a merger or consolidation) so that such Third Party becomes an Affiliate over which the acquiring Party has control (as defined in the definition of Affiliate), or (iii) a Party acquires all or substantially all of the assets of a Third Party (including any subsidiaries or divisions thereof) (each of (i), (ii) and (iii), a "Business Acquisition"; such Party, the "Business Party"), and, in each case, the Third Party (or any of such Third Party's Affiliates or any successors or assigns of such Third Party or such Third Party's Affiliates, other than the Business Party and its Affiliates as of the Business Acquisition) (A) already has, or the acquired assets contain, as applicable, a program that existed prior to, or was planned prior to and is demonstrably to be implemented shortly after, the Business Acquisition or (B) initiates and pursues a new program following such Business Acquisition, in each case that would otherwise violate Section 3.4(a) (a "Business Program"), then such Third Party (or any of such Third Party's Affiliates or any successors or assigns of such Third Party or such Third Party's Affiliates, other than the Business Party and its Affiliates as of the Business Acquisition), as applicable, will be permitted to initiate, pursue and continue such Business Program after such Business Acquisition and such initiation, pursuit and continuation will not constitute a violation of Section 3.4(a); provided however that (I) none of the Licensed IP, or other Patents, Materials or Know-How Controlled by the other Party and, in each case, licensed to the Business Party will be used in the Business Program, and (II) the research or Development

activities required under this License Agreement will be conducted separately from any research or Development activities directed to such Business Program, including the maintenance of separate lab notebooks and records (password-protected to the extent kept on a computer network) and separate personnel working on each of the activities under this License Agreement and the activities covered under such Business Program. [***]

3.5 Contract Manufacturers. Subject to the terms and conditions of this License Agreement, either Party will have the right to appoint by a written agreement "contract manufacturers", meaning any Third Party or Affiliate of such Party that manufactures Licensed Product (or components therefor, including for Bluebird, Vectors and associated Payloads) for re-sale, but who itself is not a "Sublicensee" hereunder and thereby exercises "have made" rights granted by the other Party hereunder, as well as "contract research organizations" and other providers performing services on Celgene's behalf, none of which will be deemed a "Sublicensee" hereunder. Each Party will be responsible for any such contract manufacturer, contract research organization or service provider hereunder, and further will require any such contract manufacturer, contract research organization or service provider to agree in writing to comply with Sections 3.6 and 8.

3.6 No Implied Rights. No license, sublicense or other right is or will be created or granted hereunder by implication, estoppel or otherwise. Any licenses, sublicenses or rights will be granted only as expressly provided in this License Agreement. Celgene will not practice or otherwise use any Licensed IP other than in accordance with the licenses granted in Section 3.1.

3.7 Section 365(n) of the Bankruptcy Code. All rights and licenses granted pursuant to any section of this License Agreement are, and will be deemed to be, rights and licenses to "intellectual property" (as defined in Section 101(35A) of title 11 of the United States Code and of any similar provisions of applicable Laws under any other jurisdiction (the "Bankruptcy Code")). Bluebird agrees that Celgene, as a licensee of rights and licenses under this License Agreement, will retain and may fully exercise all of its rights and elections under the Bankruptcy Code. The Parties further agree that, in the event of the commencement of a bankruptcy proceeding by or against Bluebird under the Bankruptcy Code or analogous provisions of applicable Law outside the United States, Celgene will be entitled to a complete duplicate of (or complete access to, as appropriate) any intellectual property licensed to Celgene and all embodiments of such intellectual property, which, if not already in Celgene's possession, will be promptly delivered to it (a) upon any such commencement of a bankruptcy proceeding upon Celgene's written request therefor, unless Bluebird elects to continue to perform all of its obligations under this License Agreement or (b) if not delivered under clause (a), following the rejection of this License Agreement by Bluebird in the bankruptcy proceeding upon written request therefor by Celgene.

4. **Payments and Royalties.**

4.1 Applicable Bluebird In-Licenses and Celgene Licensed Product In-Licenses.

(a) *Applicable Pre-Existing In-Licenses*. If any In-License Payment becomes due under any Applicable Pre-Existing In-License during the License Agreement Term, Bluebird will pay same, provided that Celgene will reimburse Bluebird for any such In-License Payment within thirty (30) days of Celgene's receipt of Bluebird's written invoice therefor, which In-License Payment (other than payments that are royalties) will not exceed [***], and subject to Section 6.1.

Any such reimbursement by Celgene to Bluebird (i) is in addition to and not in lieu of the other payments required by this Section 4 and (ii) will not be subject to Section 4.3(d).

(b) *Applicable New In-Licenses*. Celgene may elect to take a sublicense under any New In-License of Bluebird and its Affiliates and upon such election, such New In-License will be an Applicable New In-License hereunder for all purposes. For the purposes of determining the Parties' respective payment obligations, all Applicable New In-Licenses as of and following the License Agreement Effective Date will be listed on Appendix B. If any In-License Payment becomes due under any Applicable New In-License during the License Agreement Term, Bluebird will pay same and, subject to Section 6.1, Celgene will reimburse Bluebird for (i) [***] of such payment that are royalties, which royalties will be subject to Section 4.3(d), and (ii) [***] of such payment that are not royalties, in each case ((i) and (ii)) within thirty (30) days of receipt of Bluebird's written invoice therefor. If Celgene elects to convert an Other In-License to an Applicable New In-License pursuant to Section 3.2(b), Celgene will reimburse Bluebird for [***] of any In-License Payments that became due under such Applicable New In-License during the License Agreement Term to the same extent as if such Applicable New In-License was designated as such as of the License Agreement Effective Date, including with respect to applicable Patent Costs in accordance with Section 6.1, provided that Bluebird provides Celgene with a reasonable accounting of same. If any In-License Payments are royalties due under any Applicable New In-License during the License Agreement Term, such royalties will be subject to Section 4.3(d). To the extent that any grant of a sublicense by Celgene or any Sublicensees under an Applicable New In-License triggers a payment obligation under such Applicable New In-License, Bluebird will pay same and Celgene will reimburse Bluebird for [***] of such payment within thirty (30) days of receipt of Bluebird's written invoice therefor.

(c) *Celgene Licensed Product In-Licenses*. If any payments become due under any Celgene Licensed Product In-License with respect to the Licensed Product, Bluebird will be responsible for [***] of such payments as provided in Section 4.1(e) of the Master Collaboration Agreement, provided that if any such payments are royalties, such royalties will be subject to Section 4.3(d).

4.2 Milestone Payments. Celgene will make milestone payments (each, a "Milestone Payment") to Bluebird upon the occurrence of each of the milestones events (each, a "Milestone Event") as set forth below in this Section 4.2. Each of the Milestone Payments will be payable to Bluebird by Celgene within forty-five (45) days of the achievement of the specified Milestone Event, and such payments when owed or paid will be non-refundable and non-creditable, and not subject to set-off, except as otherwise set forth in Sections 2.8(a), 10.3(c) and 10.6 hereof, and Sections 4.1(e), 4.3 and 10.6 of the Master Collaboration Agreement. Except with respect to Modified Licensed Products, each of the Milestone Payments are payable only once in total under this License Agreement, whether achieved by one or more Licensed Products. Notwithstanding the foregoing, Bluebird will be entitled to receive [***] of the Milestone Payments below, other than the Milestone Payment for the first Milestone Event (i.e., [***].

Milestone Event	***Milestone Payment***
[***]	
[***]	

4.3 Royalties.

(a) *Rates*. Subject to the remainder of this Section 4.3, Celgene will pay to Bluebird running royalties, on a Licensed Product-by-Licensed Product basis, based on the total aggregate annual Net Sales worldwide by Selling Parties of such Licensed Product in a given calendar year at the following royalty rates:

Annual Worldwide Net Sales of each Licensed Product	***Royalty Rate***
[***]	

By way of example, in a given calendar year, if the aggregate annual worldwide Net Sales for a Licensed Product is [***], the following royalty payment would be payable for those Net Sales under this Section 4.3(a): [***].

(b) *Royalty Term*. Royalties under Section 4.3(a) will be payable, on a Licensed Product-by-Licensed Product and country-by-country basis, on the Net Sales of any Licensed Product if at least one of the following two (2) conditions apply: [***]

(c) *Royalty Reduction*. If Licensed Product is royalty-bearing only on account of Section 4.3(b)(ii), then the royalty rates set forth in Section 4.3(a) with respect to Net Sales attributable to Licensed Product will be reduced by [***].

(d) *Third Party Royalty Payments*. If Celgene or its Sublicensee, in its reasonable judgment, is required to obtain a license from any Third Party under any Patent Covering Licensed Product in order to Develop or Commercialize such Licensed Product, and if Celgene (or its Sublicensee) is required to pay to such Third Party under such license any royalties, and the infringement of such Patent cannot reasonably be avoided by Celgene (or its Sublicensee), or if Celgene (or its Sublicensee) is required by a court of competent jurisdiction to pay royalties or lost profits to such a Third Party (and the infringement of such Patent cannot reasonably be avoided), then the amount of Celgene's royalty obligations under this Section 4.3 will be reduced by [***] of the amount of such royalties paid to such Third Party, provided however, that the royalties payable under Section 4.3(a) will not be reduced in any such event below [***] of the amounts set forth in Section 4.3(a) (but as may be further reduced pursuant to Section 4.3(c) or Section 4.3(e)) for each royalty tier. Any royalties payable under any Applicable Pre-Existing In-Licenses may not be deducted under this Section 4.3(d) from royalties owed to Bluebird. Any royalties payable under any Applicable New In-Licenses and Celgene Licensed Product In-Licenses may be deducted under this Section 4.3(d) from royalties owed to Bluebird. Celgene (or its Sublicensee) will use its commercially reasonable efforts to minimize the amount of any of the foregoing payments owed to Third Parties. Prior to Celgene or its Sublicensee exercising its reasonable judgment under this Section 4.3(d), Celgene will provide Bluebird with written notice of a potential need to obtain any license from Third Parties. The Parties will discuss the best course of action to resolve such potential license requirement(s).

(e) [***]

(f) *Additional Royalty Provisions*. The royalties payable under Section 4.3(a) will be subject to the following:

(i) only one (1) royalty will be payable hereunder with respect to each Licensed Product unit;

(ii) royalties when owed or paid hereunder will, except as provided in Section 4.3(d), be non-refundable and non-creditable and not subject to set-off (except as otherwise provided in Sections 2.8(a), 10.3(c) and 10.6 hereof, Section 17.6 of any Co-Development, Co-Promote and Profit Share Agreement, and Sections 4.1(e), 4.3 and 10.6 of the Master Collaboration Agreement); and

(iii) except as expressly set forth in Sections 4.3(c), 4.3(d) and 4.3(e), no other royalty deductions are permitted hereunder.

4.4 Payment Terms. [***]

Mutual Convenience of the Parties. The royalty and other payment obligations set forth hereunder have been agreed to by the Parties for the purpose of reflecting and advancing their mutual convenience, including the ease of calculating and paying royalties and other amounts to Bluebird.

5. **Ownership and Inventorship of IP.**

5.1 Solely-Owned IP. Subject to Section 5.2, as between the Parties, each Party will own and retain all right, title and interest in and to any and all Know-How and Patents arising therefrom that are discovered, created, conceived, developed or reduced to practice solely by or on behalf of such Party under or in connection with this License Agreement, including as part the Celgene Development & Commercialization Program ("Solely Owned IP"). Subject to the licenses hereunder and the other terms and conditions of this License Agreement, each Party will be solely responsible for the Prosecution and Maintenance, and the enforcement and defense, of any Patents within its Solely Owned IP, and the other Party will have no rights with respect thereto.

5.2 Joint IP. The Parties will jointly own any and all Know-How and Patents arising therefrom that are discovered, created, conceived, developed or reduced to practice jointly by or on behalf of the Parties, under or in connection with this License Agreement, including as part of the Celgene Development & Commercialization Program ("Joint IP"). Each Party will have an undivided one-half interest in and to Joint IP. Each Party will exercise its ownership rights in and to such Joint IP, including the right to license and sublicense or otherwise to exploit, transfer or encumber its ownership interest, without an accounting or obligation to, or consent required from, the other Party, but subject to the licenses hereunder and the other terms and conditions of this License Agreement, including Section 3.4. At the reasonable written request of a Party, the other Party will in writing grant such consents and confirm that no such accounting is required to effect the foregoing regarding Joint IP. Each Party, for itself and on behalf of its Affiliates, licensees and Sublicensees, and employees, subcontractors, consultants and agents of any of the foregoing, hereby assigns (and to the extent such assignment can only be made in the future hereby agrees to assign), to the other Party a joint and undivided interest in and to all Joint IP. The Prosecution and Maintenance, and the enforcement and defense, of any Patents within Joint IP will be jointly managed by the Parties on mutually agreeable terms to be entered into by the Parties at the time

any such Patents are first filed, provided that (a) all recoveries and Patent Costs arising from the enforcement or defense of any Patents within Joint IP, absent further agreement, will be shared by the Parties in accordance with Section 7.2(e) (provided that sufficient advance written notice of any such Patent Costs is given to the Party not incurring same) and (b) Patent Costs incurred in connection with the Prosecution and Maintenance of Patents within Joint IP will be apportioned as set forth in Sections 6.1 and 6.3, provided that in each case ((a) and (b)), if either Party elects not to pay any such Patent Costs for any such Patent, the Parties will meet and agree upon an equitable way to treat such Patent.

5.3 Inventorship. Inventorship determination for all Patents worldwide arising from any Know-How created, conceived or developed by or on behalf of the Parties under or in connection with this License Agreement and thus the ownership thereof will be made in accordance with applicable United States patent Laws.

5.4 Allocation. Notwithstanding Sections 5.1 – 5.3, the Patent Committee may allocate ownership of a particular item of intellectual property to improve the prospects of obtaining patent protection with respect to such item of intellectual property, even if such allocation is not in accordance with the terms of Sections 5.1 – 5.3, so long as the Parties mutually agree to such allocation.

6. **Patent Prosecution and Maintenance.**

6.1 Generally. Subject to Sections 6.2 and 6.3, Bluebird will have the sole right to Prosecute and Maintain Patents within the Licensed IP. Bluebird will use commercially reasonable efforts to, where applicable and upon Celgene's reasonable request, separate parent Patent applications within the Licensed IP into one or more separate Patent applications for Specific Patents, to the extent permitted under applicable Law, where doing so would not reasonably be expected to materially harm any Patent within the Licensed IP or other Patents owned by Bluebird or its Affiliates, provided that the foregoing limitation will not apply to Licensed IP that is Collaboration IP. [***]

6.2 Celgene Input. Bluebird will regularly provide Celgene with copies of all applications for Patents within the Licensed IP, and all other material submissions and correspondence with any patent authorities regarding such Patents, in sufficient time to allow for review and comment by Celgene. In addition, Bluebird will provide Celgene and its counsel with an opportunity to consult with Bluebird and its counsel regarding Prosecution and Maintenance of any such Patents in the Field, and Bluebird will consider in good faith all comments timely made by Celgene and its counsel. In the event of any disagreement between any of Bluebird or Celgene, Bluebird will have the final decision-making authority with respect to the matter involved as long as Bluebird acts in good faith.

6.3 Specific Patents. For any Patent within the Licensed IP [***] (each "Specific Patent"), the following will apply: upon Celgene's written request, and provided that Bluebird reasonably agrees with Celgene that the following Prosecution and Maintenance activities would not materially harm any other Patent within the Licensed IP or other Patents owned by Bluebird or its Affiliates (other than Collaboration IP), Celgene will control the Prosecution and Maintenance of the Specific Patents, and notwithstanding anything in Section 6.1 to the contrary, Celgene will be solely responsible for the payment of all related Patent Costs. In addition, Celgene will provide

Bluebird and its counsel with an opportunity to consult with Celgene and its counsel regarding Prosecution and Maintenance of any such Specific Patents, and Celgene will include or reflect all reasonable comments timely made by Bluebird and its counsel. Celgene acknowledges and agrees that Bluebird may grant similar rights to other exclusive Third Party licensees under any Patent within the Licensed IP that has claims Covering only a product that is not a Licensed Product (or its manufacture or use) and no other product (or its manufacture or use), other than Specific Patents. If the Parties cannot agree whether or not any Patent within the Licensed IP is a Specific Patent, or if Bluebird claims that the foregoing Prosecution and Maintenance activities would materially harm any other Patent within the Licensed IP or other Patents owned by Bluebird or any of its Affiliates, either of the Parties may refer such dispute to a mutually agreeable, disinterested, conflict-of-interest-free individual not affiliated or consulting with either Party and who has at least fifteen (15) years of patent prosecution experience in the pharmaceutical field. Any such arbitration will be conducted under the then-current rules of the American Arbitration Association, and the decision of the arbitrator will be final.

6.4 Election Not to Prosecute or Maintain or Pay Patent Costs. If Bluebird elects not (a) to Prosecute or Maintain any Patents within the Licensed IP in any particular country before the applicable filing deadline or continue such activities once filed in a particular country, or (b) to pay the Patent Costs associated with Prosecution or Maintenance of any Patents within the Licensed IP, then in each such case Bluebird will so notify Celgene, promptly in writing and in good time to enable Bluebird to meet any deadlines by which an action must be taken to preserve such Patent in such country, if Celgene so requests. Upon receipt of each such notice by Bluebird, Celgene will have the right, but not the obligation, to notify Bluebird in writing on a timely basis that Celgene will assume control of the Prosecution or Maintenance of such Patent, and bear the Patent Costs thereafter incurred by Celgene with respect thereto. In addition, Celgene will provide Bluebird and its counsel with an opportunity to consult with Celgene and its counsel regarding Prosecution and Maintenance of any such Patents, and Celgene will include or reflect all reasonable comments timely made by Bluebird and its counsel. If after making such election, Celgene elects not to pay the Patent Costs associated with Prosecution or Maintenance of any such Patent, then in each such case Celgene will so notify Bluebird and on the ninetieth (90th) day after Bluebird's receipt of such notice such Patent will no longer be licensed to Celgene hereunder and will no longer be included within the "Licensed IP" hereunder.

6.5 Third Party Rights. To the extent that a Third Party licensor of Bluebird has retained any right to Prosecute or Maintain any Patent within the Licensed IP licensed to Celgene hereunder (including pursuant to an Applicable Bluebird In-License), or otherwise be involved in such activities, Bluebird will use commercially reasonable efforts to cause such Third Party licensor to take the actions specified by this Section 6 (including Sections 6.6 and 6.7) in a manner consistent with the in-license applicable thereto, but Bluebird will not be deemed to be in breach of its obligations under this Section 6 if, after using such commercially reasonable efforts, it is unable to comply with such obligations because of actions taken or not taken by such Third Party licensor.

6.6 Patent Extensions. Subject to the remainder of this Section 6.6, if any election for patent term restoration or extension, supplemental protection certificate or any of their equivalents may be made with respect to any Patent within the Licensed IP, after consultation with Celgene, the Parties will discuss and seek to reach mutual agreement whether or not to take such action. If

the Parties are not able to reach mutual agreement, (a) Celgene will have the sole right to make the final decision whether or not to seek such patent term restoration or extension, supplemental protection certificate or any of their equivalents with respect to Specific Patents and Patents within the Collaboration IP licensed to Celgene hereunder and (b) Bluebird will have the sole right to make the final decision whether or not to seek such patent term restoration or extension, supplemental protection certificate or any of their equivalents with respect to all other Patents within the Licensed IP.

6.7 Regulatory Exclusivity Periods. With respect to any Patent listings required for any Regulatory Exclusivity Periods for Product, the Parties will mutually agree on which Patents within the Licensed IP to list, provided that if the Parties are not able to agree, Celgene will have the right to make the final decision, and provided further that the exercise of such right by Celgene will not increase or otherwise change the rights or obligations of the Parties hereunder.

6.8 Cooperation. Each Party will reasonably cooperate with the other Party in the Prosecution and Maintenance of Patents within the Licensed IP. Such cooperation includes promptly executing all documents, or requiring inventors, subcontractors, employees and consultants and agents of Celgene and Bluebird and their respective Affiliates and Sublicensees to execute all documents, as reasonable and appropriate so as to enable the Prosecution and Maintenance of any such Patents in any country.

6.9 Patent Marking. Celgene will mark, and will cause all other Selling Parties to mark, Product with all Patents within the Licensed IP in accordance with applicable Law, which marking obligation will continue for as long as (and only for as long as) required under applicable Law.

6.10 Common Interest Disclosures. With regard to any information or opinions disclosed pursuant to this License Agreement by one Party to the other Party regarding Prosecution and Maintenance of Patent within the Licensed IP, or enforcement of intellectual property and/or technology by or against Third Parties, Bluebird and Celgene agree that they have a common legal interest in determining the ownership, scope, validity and/or enforcement of the Licensed IP, and whether, and to what extent, Third Party intellectual property rights may affect the conduct of the Development and Commercialization of any Licensed Product, and have a further common legal interest in defending against any actual or prospective Third Party claims based on allegations of misuse or infringement of intellectual property rights relating to the Development or Commercialization of any Licensed Product. Accordingly, the Parties agree that all such information and materials obtained by the Parties from each other will be used solely for purposes of the Parties' common legal interests with respect to the conduct of the Agreement. All such information and materials will be treated as protected by the attorney-client privilege, the work product privilege, and any other privilege or immunity that may otherwise be applicable. By sharing any such information and materials, neither Party intends to waive or limit any privilege or immunity that may apply to the shared information and materials. Neither Party will have the authority to waive any privilege or immunity on behalf of the other Party without such other Party's prior written consent, nor will the waiver of privilege or immunity resulting from the conduct of one Party be deemed to apply against any other Party. This Section 6.10 will be subject to any right granted by either Party to any Third Party, provided that the grant of such right to such Third Party does not conflict with the other Party's rights or the first Party's obligations under this License Agreement.

7. **Patent Enforcement and Defense.**

7.1 Notice. Each Party will promptly notify, in writing, the other Party upon learning of any actual or suspected Competitive Infringement of any Patents within the Licensed IP by a Third Party, or of any claim of invalidity, unenforceability, or non-infringement of any Patents within the Licensed IP, and will, along with such notice, supply the other Party with any evidence in its possession pertaining thereto. For purposes of this License Agreement, "Competitive Infringement" means any allegedly infringing activity in the Field (which, for the purposes of this definition, will include all indications and will not be limited to cancer) with respect to a Patent within the Licensed IP, which activity (a) falls within the scope then in effect of the licenses granted by Bluebird to Celgene as set forth in Sections 3.1, (b) is subject to Section 7.2(f), or (c) would be competitive with a Licensed Product and targets the same Target Antigen as such Licensed Product.

7.2 Enforcement and Defense. [***]

7.3 Third Party Rights. To the extent that a Third Party licensor of Bluebird has retained any right to (a) defend against a declaratory judgment action or other action challenging any Patents within the Licensed IP, (b) seek to abate any Competitive Infringement of the Patents within the Licensed IP by a Third Party, or (c) take any other actions described in Section 7.2(f) for any Patent within the Licensed IP licensed to Celgene hereunder (including pursuant to an Applicable Bluebird In-License), or otherwise be involved in such activities, Bluebird will use commercially reasonable efforts to cause such Third Party licensor to take the actions specified by this Section 7.3 in a manner consistent with the in-license applicable thereto, but Bluebird will not be deemed to be in breach of its obligations under this Section 7.3 if, after using such commercially reasonable efforts, it is unable to comply with such obligations because of actions taken or not taken by such Third Party licensor.

8. **Confidentiality.**

The Parties acknowledge and agree that terms of this License Agreement and all Materials, ideas and information of any kind, whether in written, oral, graphical, machine-readable or other form, whether or not marked as confidential or proprietary, which are transferred, disclosed or made available by a Party or at the request of a Party, including any of the foregoing of Third Parties, will be subject to the provisions of Section 10 of the Master Collaboration Agreement. The Parties agree to issue the joint press release on Appendix E promptly following the License Agreement Effective Date. A redacted version of this License Agreement will be agreed to by the Parties and shall be consistent with the corresponding redacted version of this License Agreement in such manner as is provided in Section 8.3 of the Master Collaboration Agreement.

9. **Warranties; Limitations of Liability; Indemnification.**

9.1 Representations and Warranties. Each Party represents and warrants to the other as of the License Agreement Effective Date that it has the legal right and power to enter into this License Agreement, to extend the rights and licenses granted or to be granted to the other in this License Agreement, and to fully perform its obligations hereunder.

9.2 Additional Representations and Warranties of Bluebird. Except as set forth in Schedule 9.2, Bluebird represents and warrants to Celgene that, as of the License Agreement Effective Date:

(a) *Licensed IP*. Appendix F sets forth a complete and accurate list of all Patents included in the Licensed IP, indicating the owner, licensor and/or co-owner(s), if applicable, and, for any Elected Candidate and Licensed Product-relevant subject matter or Materials, if no Patent is specifically licensed, a list of all subject matter or Materials that are included in the Licensed IP, including those licensed under a materials use license or equivalent. Bluebird Controls the Patents listed on Appendix F and the Know-How within the Licensed IP, and is entitled to grant the licenses specified herein. Bluebird has not granted to any Third Party any rights or licenses under such Patents or Know-How within the Licensed IP that would conflict with the licenses granted to Celgene hereunder.

(b) *Third Party Agreements*. The Applicable Bluebird In-Licenses are valid and binding obligations of Bluebird and, to the Knowledge of Bluebird, the applicable licensor, enforceable against Bluebird and, to the Knowledge of Bluebird, the applicable licensor, in accordance with their terms, except as may be limited by general principles of equity (regardless of whether considered in a proceeding at law or in equity) and by applicable bankruptcy, insolvency, moratorium and other similar Laws of general application relating to or affecting creditors' rights generally. Neither Bluebird nor any of its Affiliates has received any notice of any counterparty's intention to terminate any Applicable Bluebird In-License in whole or in part or any notice requesting any amendment, alteration or modification of such Applicable Bluebird In-License or any sublicense or assignment thereunder. There is no breach or default, or event which upon notice or the passage of time, or both, could give rise to any breach or default, in the performance of any Applicable Bluebird In-License by Bluebird or any of its Affiliates or, to the Knowledge of Bluebird, the counterparty thereto, and Bluebird has not received any notice of any such breach, default or event. Except for the Applicable Bluebird In-Licenses, neither Bluebird nor any of its Affiliates is a party to any license, sublicense or other agreement pursuant to which Bluebird or such Affiliate has received a license or other rights relating to the Elected Candidate or Licensed Product. All Patents and Know-How licensed to Bluebird under the Applicable Bluebird In-Licenses are Controlled by Bluebird for purposes of the licenses granted to Celgene under this License Agreement.

(c) *Patents*. To Bluebird's Knowledge, the Patents listed on Appendix F have been procured or are being procured from the respective patent offices in accordance with applicable Law. None of the Patents included in the Licensed IP is or has been involved in any opposition, cancellation, interference, reissue or reexamination proceeding, and no Licensed IP is the subject of any judicial, administrative or arbitral order, award, decree, injunction, lawsuit, proceeding or stipulation. Neither Bluebird nor any of its Affiliates has received any notice alleging that the Patents in the Licensed IP are invalid or unenforceable, or challenging Bluebird's ownership of or right to use any such rights.

(d) *No Conflicts*. The execution, delivery and performance by Bluebird of this License Agreement and the consummation of the transactions contemplated hereby will not result in any violation of, conflict with, result in a breach of or constitute a default under any understanding, contract or agreement to which Bluebird is a party or by which it is bound. Neither Bluebird nor any of its Affiliates has entered into any agreement or otherwise licensed, granted, assigned, transferred, conveyed or otherwise encumbered or disposed of any right, title or interest in or to

any of its assets, including any intellectual property rights, that would in any way conflict with or impair the scope of any rights or licenses granted to Celgene hereunder.

(e) *Outlicenses.* Appendix G sets forth a complete and accurate list of all agreements relating to the licensing, sublicensing or other granting of rights by Bluebird to any Person with respect to the Licensed IP and the Target Antigen, and Bluebird has provided complete and accurate copies of all such agreements to Celgene. Except for the Applicable Bluebird In-Licenses, Bluebird and its Affiliates are not subject to any payment obligations to Third Parties as a result of the execution or performance of this License Agreement. Neither Bluebird nor any of its Affiliates has granted any liens or security interests on the Licensed IP and the Licensed IP is free and clear of any mortgage, pledge, claim, security interest, covenant, easement, encumbrance, lien or charge of any kind.

(f) *No Proceedings*. There is no action, suit, proceeding or investigation pending or, to the Knowledge of Bluebird, currently threatened in writing against or affecting Bluebird that questions the validity of this License Agreement or the right of Bluebird to enter into this License Agreement or consummate the transactions contemplated hereby.

(g) *No Infringement.* Neither Bluebird nor any of its Affiliates has received any notice of any claim that any Patent, Know-How or other intellectual property Controlled by a Third Party would be infringed or misappropriated by the production, use, research, Development, Manufacture or Commercialization of the Elected Candidate or Licensed Product pursuant to this License Agreement, and, to the Knowledge of Bluebird, there are no Patents, Know-How or other intellectual property owned by a Third Party and not included in the Licensed IP or In-Licensed IP that are necessary for the production, use, research, Development, Manufacture or Commercialization of Elected Candidate or Licensed Product.

9.3 Disclaimers. Without limiting the respective rights and obligations of the Parties expressly set forth herein, each Party specifically disclaims any guarantee that any Licensed Product will be successful, in whole or in part. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS LICENSE AGREEMENT, THE PARTIES MAKE NO REPRESENTATIONS AND EXTEND NO WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO ANY PATENTS, KNOW-HOW, ELECTED CANDIDATE OR LICENSED PRODUCT, INCLUDING WARRANTIES OF VALIDITY OR ENFORCEABILITY OF ANY PATENT RIGHTS, TITLE, QUALITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR USE OR PURPOSE, PERFORMANCE, AND NONINFRINGEMENT OF ANY THIRD PARTY PATENTS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

9.4 [***]

9.5 Performance by Others. The Parties recognize that each Party may perform some or all of its obligations under this License Agreement through Affiliates and permitted subcontractors provided, however, that each Party will remain responsible and liable for the performance by its Affiliates and permitted subcontractors and will cause its Affiliates and permitted subcontractors to comply with the provisions of this License Agreement in connection therewith.

9.6 Indemnification.

(a) *Indemnification by Celgene*. Celgene will indemnify Bluebird, its Affiliates and their respective directors, officers, employees, Third Party licensors and agents, and their respective successors, heirs and assigns (collectively, "Bluebird Indemnitees"), and defend and save each of them harmless, from and against any and all losses, damages, liabilities, costs and expenses (including reasonable attorneys' fees and expenses) (collectively, "Losses") in connection with any and all suits, investigations, claims or demands of Third Parties (collectively, "Third Party Claims") against the Bluebird Indemnitees arising from or occurring as a result of: (i) the material breach by Celgene of any term of this License Agreement; (ii) any gross negligence or willful misconduct on the part of Celgene in performing its obligations under this License Agreement; or (iii) the Development or Commercialization by or on behalf of Celgene or any of its Affiliates or Sublicensees of Elected Candidate or Licensed Product, except in each case for those Losses for which Bluebird has an obligation to indemnify Celgene pursuant to Section 9.6(b), as to which Losses each Party will indemnify the other to the extent of their respective liability; provided, however, that Celgene will not be obligated to indemnify Bluebird Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of an Bluebird Indemnitee.

(b) *Indemnification by Bluebird*. Bluebird will indemnify Celgene, its Affiliates and their respective directors, officers, employees and agents, and their respective successors, heirs and assigns (collectively, "Celgene Indemnitees"), and defend and save each of them harmless, from and against any and all Losses in connection with any and all Third Party Claims against Celgene Indemnitees arising from or occurring as a result of: (i) the material breach by Bluebird of any term of this License Agreement; (ii) any gross negligence or willful misconduct on the part of Bluebird in performing its obligations under this License Agreement; or (iii) the Development by or on behalf of Bluebird or any of its Affiliates or Sublicensees of Elected Candidate or Licensed Product, except in each case for those Losses for which Celgene has an obligation to indemnify Bluebird pursuant to Section 9.6(a), as to which Losses each Party will indemnify the other to the extent of their respective liability for the Losses; provided, however, that Bluebird will not be obligated to indemnify Celgene Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of a Celgene Indemnitee.

(c) *Notice of Claim*. All indemnification claims provided for in Sections 9.6(a) and 9.6(b) will be made solely by such Party to this License Agreement (the "Indemnified Party"). The Indemnified Party will promptly notify the indemnifying Party (an "Indemnification Claim Notice") of any Losses or the discovery of any fact upon which the Indemnified Party intends to base a request for indemnification under Sections 9.6(a) and 9.6(b), but in no event will the indemnifying Party be liable for any Losses that result from any delay in providing such notice. Each Indemnification Claim Notice must contain a description of the claim and the nature and estimated amount of such Loss (to the extent that the nature and amount of such Loss is known at such time). The Indemnified Party will furnish promptly to the indemnifying Party copies of all papers and official documents received in respect of any Losses and Third Party Claims.

(d) *Defense, Settlement, Cooperation and Expenses*.

(i) *Control of Defense*. At its option, the indemnifying Party may assume the defense of any Third Party Claim by giving written notice to the Indemnified Party within thirty (30) days after the indemnifying Party's receipt of an Indemnification Claim Notice, provided

however that (A) the Third Party Claim solely seeks monetary damages and (B) the indemnifying Party expressly agrees in writing that as between the indemnifying Party and the Indemnified Party, the indemnifying Party will be solely obligated to satisfy and discharge the Third Party Claim in full and is able to reasonably demonstrate that it has sufficient financial resources (the matters described in (A) and (B), the "Litigation Conditions"). The assumption of the defense of a Third Party Claim by the indemnifying Party will not be construed as an acknowledgment that the indemnifying Party is liable to indemnify the Indemnified Party in respect of the Third Party Claim, nor will it constitute a waiver by the indemnifying Party of any defenses it may assert against the Indemnified Party's claim for indemnification. Upon assuming the defense of a Third Party Claim, the indemnifying Party may appoint as lead counsel in the defense of the Third Party Claim any legal counsel selected by the indemnifying Party (the indemnifying Party will consult with the Indemnified Party with respect to a possible conflict of interest of such counsel retained by the indemnifying Party). In the event the indemnifying Party assumes the defense of a Third Party Claim, the Indemnified Party will immediately deliver to the indemnifying Party all original notices and documents (including court papers) received by the Indemnified Party in connection with the Third Party Claim. Should the indemnifying Party assume the defense of a Third Party Claim, except as provided in Section 9.6(d)(ii), the indemnifying Party will not be liable to the Indemnified Party for any legal costs or expenses subsequently incurred by such Indemnified Party in connection with the analysis, defense or settlement of the Third Party Claim. The Indemnified Party may, at any time, assume the defense of a Third Party Claim if at any time the Litigation Conditions are not satisfied with respect to such Claim. In the event that it is ultimately determined that the indemnifying Party is not obligated to indemnify, defend or hold harmless the Indemnified Party from and against the Third Party Claim, the Indemnified Party will reimburse the indemnifying Party for any and all costs and expenses (including attorneys' fees and costs of suit) and any Third Party Claims incurred by the indemnifying Party in its defense of the Third Party Claim.

(ii) *Right to Participate in Defense*. Without limiting Section 9.6(d)(i), any Indemnified Party will be entitled to participate in, but not control, the defense of such Third Party Claim and to employ counsel of its choice for such purpose; provided, however, that such employment will be at the Indemnified Party's own cost and expense unless (A) the employment thereof has been specifically authorized by the indemnifying Party in writing, (B) the indemnifying Party has failed to assume the defense and employ counsel in accordance with Section 9.6(d)(i) (in which case the Indemnified Party will control the defense), (C) the interests of the Indemnified Party and the indemnifying Party with respect to such Third Party Claim are sufficiently adverse to prohibit the representation by the same counsel of both Parties under applicable Law, ethical rules or equitable principles, or (D) the indemnifying Party no longer satisfies the Litigation Conditions, in which case the indemnifying Party will assume [***] percent ([***]) of any such costs and expenses of counsel for the Indemnified Party.

(iii) *Settlement*. With respect to any Third Party Claims that relate solely to the payment of money damages in connection with a Third Party Claim and that will not result in the Indemnified Party's becoming subject to injunctive or other relief or otherwise adversely affecting the business of the Indemnified Party in any manner, and as to which the indemnifying Party will have acknowledged in writing the obligation to indemnify the Indemnified Party hereunder, and subject to the Litigation Conditions being satisfied, the indemnifying Party will have the sole right

to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss, on such terms as the indemnifying Party, in its sole discretion, will deem appropriate. With respect to all other Losses in connection with Third Party Claims, where the indemnifying Party has assumed the defense of the Third Party Claim in accordance with Section 9.6(d)(i), the indemnifying Party will have authority to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss provided it obtains the prior written consent of the Indemnified Party (such consent not to be unreasonably withheld, delayed or conditioned). The indemnifying Party will not be liable for any settlement or other disposition of a Loss by an Indemnified Party that is reached without the prior written consent of the indemnifying Party. Regardless of whether the indemnifying Party chooses to defend or prosecute any Third Party Claim, no Indemnified Party will admit any liability with respect to or settle, compromise or discharge, any Third Party Claim without the prior written consent of the indemnifying Party, such consent not to be unreasonably withheld, delayed or conditioned.

(iv) *Cooperation*. If the indemnifying Party chooses to defend or prosecute any Third Party Claim, the Indemnified Party will, and will cause each other Indemnified Party to, cooperate in the defense or prosecution thereof and will furnish such records, information and testimony, provide such witnesses and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection therewith. Such cooperation will include access during normal business hours afforded to indemnifying Party to, and reasonable retention by the Indemnified Party of, records and information that are reasonably relevant to such Third Party Claim, and making Indemnified Parties and other employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder, and the indemnifying Party will reimburse the Indemnified Party for all its reasonable out-of-pocket costs and expenses in connection therewith.

(v) *Costs and Expenses*. Except as provided above in this Section 9.6(d), the costs and expenses, including attorneys' fees and expenses, incurred by the Indemnified Party in connection with any claim will be reimbursed on a calendar quarter basis by the indemnifying Party, without prejudice to the indemnifying Party's right to contest the Indemnified Party's right to indemnification and subject to refund in the event the indemnifying Party is ultimately held not to be obligated to indemnify the Indemnified Party.

9.7 Insurance. Each Party will maintain at its sole cost and expense, an adequate liability insurance or self-insurance program (including product liability insurance) to protect against potential liabilities and risk arising out of activities to be performed under this License Agreement, and any agreement related hereto and upon such terms (including coverages, deductible limits and self-insured retentions) as are customary in the U.S. pharmaceutical industry for the activities to be conducted by such Party under this License Agreement. Subject to the preceding sentence, such liability insurance or self-insurance program will insure against all types of liability, including personal injury, physical injury or property damage arising out of the manufacture, sale, use, distribution or marketing of Licensed Product. The coverage limits set forth herein will not create any limitation on a Party's liability to the other under this License Agreement.

10. **Term and Termination.**

10.1 Term. This License Agreement will commence as of the License Agreement Effective Date and, unless sooner terminated in accordance with the terms hereof or by mutual written consent, will continue on a country-by-country basis, until there are no more payments owed Bluebird on Licensed Product in such country (the longest such period of time for any Licensed Product hereunder, the "License Agreement Term"). Upon there being no more such payments hereunder for any such Licensed Product in such country, the licenses contained in Section 3.1 for such Licensed Product will become fully paid up and will remain exclusive with respect to such Licensed Product in such country.

10.2 Termination by Bluebird.

(a) *Breach*. Bluebird will have the right to terminate this License Agreement in full upon delivery of written notice to Celgene in the event of any material breach by Celgene of any terms and conditions of this License Agreement in a manner that fundamentally frustrates the transactions contemplated by this License Agreement, provided that such termination will not be effective if such breach, has been cured within [***] after written notice thereof is given by Bluebird to Celgene specifying the nature of the alleged breach (or, if such default cannot be cured within such [***] period, within [***] after such notice if Celgene commences actions to cure such default within such [***] period and thereafter diligently continues such actions, but fails to cure the default by the end of such [***]); provided, however, that to the extent such material breach involves the failure to make a payment when due, such breach must be cured within [***] after written notice thereof is given by Bluebird to Celgene.

(b) [***]

10.3 Termination by Celgene.

(a) *Breach*. Celgene will have the right to terminate this License Agreement in full upon delivery of written notice to Bluebird in the event of any material breach by Bluebird of any terms and conditions of this License Agreement in a manner that fundamentally frustrates the transactions contemplated by this License Agreement, provided that such termination will not be effective if such breach has been cured within [***] after written notice thereof is given by Celgene to Bluebird specifying the nature of the alleged breach (or, if such default cannot be cured within such [***] period, within [***] after such notice if Bluebird commences actions to cure such default within such [***] period and thereafter diligently continues such actions, but fails to cure the default by the end of such [***].

(b) *Discretionary Termination*. Beginning with the [***], Celgene will have the right to terminate this License Agreement in full at its discretion for any reason by delivering written notice to Bluebird, such termination to be effective [***] following the date of such notice.

(c) *Alternative to Termination Under Section 10.3(a).* If Celgene has the right to terminate this License Agreement under Section 10.3(a) (including expiration of all applicable cure periods thereunder), in lieu of exercising such termination right, Celgene may elect once by written notice to Bluebird before the end of such applicable cure period to have this License Agreement continue in full force and effect and instead have, starting immediately after the end of such applicable cure period, any future Milestone Payments set forth in Section 4.2 and the royalty rates set forth in the table set forth in Section 4.3(a) be reduced by [***], provided that such

reduction will not apply if such future Milestone Payments and royalty rates have already been reduced pursuant to Section 11.4(c) of the Master Collaboration Agreement.

10.4 Effects of Termination. Upon termination (but not expiration pursuant to Section 10.1) of this License Agreement for any reason:

(a) *Wind Down*. Celgene will responsibly wind-down, in accordance with accepted pharmaceutical industry norms and ethical practices, any on-going clinical studies for which it has responsibility hereunder in which patient dosing has commenced or, if reasonably practicable and requested by Bluebird, allow Celgene, its Affiliates or its Sublicensees to complete such trials. Celgene will be responsible for any costs associated with such wind-down. Bluebird will pay all costs incurred by either Party to complete such studies should Bluebird request that such studies be completed.

(b) *Sublicenses*. A termination of this License Agreement will not automatically terminate any sublicense granted by Celgene pursuant to Section 3.3 for Commercialization rights with respect to a non-Affiliated Sublicensee, provided that (i) such Sublicensee is not then (A) in material breach of any provision of this License Agreement or (B) in material breach of the applicable sublicense agreement or otherwise in breach of such sublicense agreement in a manner that would give rise to a right of termination on the part of Celgene, (ii) if Bluebird terminates this License Agreement pursuant to Section 10.2(a) for Celgene's failure to fulfill its payment obligations hereunder, such Sublicensee agrees to and does pay to Bluebird all outstanding amounts that accrued as a result of such Sublicensee's activities under the sublicense, (iii) Bluebird will have the right to step into the role of Celgene as sublicensor under any such sublicense executed after the License Agreement Effective Date, with all the rights that Celgene had under such sublicense, solely with respect to the Licensed IP, prior to termination of this License Agreement (including the right to receive any payments to Celgene by such Sublicensee that accrue from and after the date of the termination of this License Agreement solely with respect to the Licensed IP), (iv) such Sublicensee will pay to Bluebird all amounts that Celgene would have been obligated to pay to Bluebird hereunder with respect to such Sublicensee's activities had this License Agreement not terminated (less any amounts received by Bluebird in clause (iii) above) and (v) the survival of such sublicense will not result in an imposition of any additional obligations on the part of Bluebird that are not included within the scope of this License Agreement. Celgene will include in any sublicense agreement executed after the License Agreement Effective Date that relates solely to the Licensed IP a provision in which said Sublicensee acknowledges its obligations to Bluebird under this Section 10.4(b).

(c) *Cessation of Rights*. Except as otherwise expressly provided in Section 10.4(b), all rights and licenses granted by Bluebird to Celgene in Section 3 will terminate, and Celgene and its Affiliates and Sublicensees will cease all use of Licensed IP and all Development, Manufacture and Commercialization of Elected Candidate and Licensed Product.

(d) *Regulatory Approvals*. To the extent permitted by applicable Law, and subject to Bluebird paying commercially reasonable compensation to Celgene for the assets to be transferred pursuant to this Section 10.4(d) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 10.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this License Agreement is

terminated by Bluebird pursuant to Section 10.2(a)), all Regulatory Approvals and other regulatory filings and communications owned (in whole or in part) or otherwise Controlled by Celgene and its Affiliates and Sublicensees solely relating to the Elected Candidate and/or Licensed Product, and all other documents solely relating to and necessary to further Develop and Commercialize Elected Candidate and Licensed Product, as such items exist as of the effective date of such termination (including all solely related completed and ongoing clinical studies) will be assigned to Bluebird, and Celgene will provide to Bluebird one (1) copy of the foregoing and all documents contained in or referenced in any such items, together with the raw and summarized data for any clinical studies (and where reasonably available, electronic copies thereof). In the event of failure to obtain assignment, subject to the Parties agreeing on commercially reasonable compensation for the right to access and reference, Celgene hereby consents and grants to Bluebird the right to access and reference (without any further action required on the part of Celgene, whose authorization to file this consent with any Regulatory Authority is hereby granted) any such item.

(e) *Licenses*. Subject to Bluebird paying (i) commercially reasonable compensation to Celgene for the licenses to be granted pursuant to subsection (A) of this Section 10.4(e) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 10.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this License Agreement is terminated by Bluebird pursuant to Section 10.2(a)), and (ii) amounts payable to Celgene's applicable licensors as set forth below, Celgene will grant to Bluebird and its Affiliates (A) a worldwide, perpetual and irrevocable, nontransferable (except in connection with a permitted assignment of this License Agreement in accordance with Section 11.12), exclusive license, with the right to grant sublicenses through multiple tiers (subject to Section 3.3(b), *mutatis mutandis*), under the Celgene Licensed Product IP, and (B) an exclusive sublicense under the Celgene Licensed Product In-Licensed IP, in each case ((A) and (B)) to the extent such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP are used in or Cover the Licensed Product as of the effective date of termination and to the extent such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP exist as of the effective date of such termination (including in each case any additions, divisions, continuations, continuations-in-part, invention certificates, substitutions, reissues, reexaminations, extensions, registrations, supplementary protection certificates and renewals of such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP) solely to the extent necessary to research, Develop, Manufacture and Commercialize the Elected Candidate and Licensed Product. With respect to grants of a sublicense under subsection (B) above, Bluebird will be responsible for all amounts payable to the applicable licensor, excluding maintenance fee payments, payments that are trigged by the grant of a sublicense (but including payments triggered by further grants of sublicenses by Bluebird or its sublicensees) and Patent Costs, that are attributable to Bluebird as a sublicensee thereunder under this License Agreement and Celgene will pay same and Bluebird will reimburse Celgene for [***] of such payments within thirty (30) days of receipt of Celgene's written invoice therefor. Celgene will provide Bluebird with copies of all applicable Celgene Licensed Product In-Licenses promptly following the effective date of the termination of this License Agreement. The Prosecution and Maintenance and enforcement and defense rights and obligations of the Parties with respect to any Patents licensed or sublicensed to Bluebird pursuant to this Section 10.4(e) will be discussed and agreed to by the Parties, with the understanding that such Prosecution and Maintenance and enforcement and defense rights and

obligations will be substantially similar to those set forth in Section 6, with the roles of Bluebird and Celgene reversed (and such other changes as are appropriate from the context, and taking into account any rights retained by a Third Party licensor of Celgene to Prosecute and Maintain or enforce and defend any Patent sublicensed to Bluebird under this Section 10.4(e)). Bluebird will abide, and will cause all its Affiliates and applicable sublicensees to abide, by all requirements of each Celgene Licensed Product In-License under which Bluebird is sublicensed under this Section 10.4(e) in all material respects (and in any case in all respects in the case that failure to so abide would result in a breach under the Celgene Licensed Product In-License), to the extent applicable to sublicensees thereunder and to the extent disclosed by Celgene to Bluebird, with the understanding that disclosure by Celgene of any Celgene Licensed Product In-License to Bluebird will be deemed disclosure of such requirements of such Celgene Licensed Product In-License to Bluebird.

(f) *Trademarks*. Subject to Bluebird paying commercially reasonable compensation to Celgene for the license to be granted pursuant to this Section 10.4(f) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 10.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this License Agreement is terminated by Bluebird pursuant to Section 10.2(a)), Celgene will exclusively license to Bluebird any registered or unregistered trademarks or internet domain names that are specific to and solely used for the Licensed Product worldwide (it being understood that the foregoing will not include any trademarks or internet domain names that contain the corporate or business name(s) of Celgene).

(g) *Commercially Reasonable Compensation.* If the Parties are unable to agree on the amount of commercially reasonable compensation payable by Bluebird to Celgene pursuant to Sections 10.4(d), 10.4(e) or 10.4(f) within ten (10) days of the effective date of termination of this License Agreement, [***].

(h) *Country Termination*. If this License Agreement is terminated only with respect to a specific country pursuant to Section 10.2(b), the provisions of this Section 10.4 will apply only with respect to such terminated country.

10.5 Survival. In addition to the termination consequences set forth in Section 10.4, the following provisions will survive termination or expiration of this License Agreement: Sections 1, 3.3 (mutatis mutandis with respect to licenses granted to Bluebird under Section 10.4), 3.6, 3.7, 4.4, 5, 8, 9.3, 9.4, 9.6, 9.7, 10.4, 10.5 and 11. Termination or expiration of this License Agreement will not relieve the Parties of any liability or obligation which accrued hereunder prior to the effective date of such termination or expiration nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any breach of this License Agreement nor prejudice either Party's right to obtain performance of any obligation. All other rights and obligations will terminate upon expiration of this License Agreement.

10.6 Right to Set-off. Notwithstanding anything to the contrary in this License Agreement, each Party has the right at all times to retain and set off against all amounts due and owing to the other Party as determined in a final judgment any damages recovered by such Party for any Losses incurred by such Party.

11. **General Provisions.**

11.1 Cumulative Remedies and Irreparable Harm. All rights and remedies of the Parties hereunder will be cumulative and in addition to all other rights and remedies provided hereunder or available by agreement, at law or otherwise. Each Party acknowledges and agrees that breach of any of the terms or conditions of this License Agreement would cause irreparable harm and damage to the other and that such damage may not be ascertainable in money damages and that as a result thereof the non-breaching Party would be entitled to seek from a court equitable or injunctive relief restraining any breach or future violation of the terms contained herein by the breaching Party without the necessity of proving actual damages or posting bond. Such right to equitable relief is in addition to whatever remedies either Party may be entitled to as a matter of law or equity, including money damages.

11.2 Business Combination and IP.

(a) *Bluebird Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this License Agreement, no Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Bluebird or any of its Affiliates prior to a Business Combination of Bluebird will be Controlled for purposes of this License Agreement after such Business Combination of Bluebird, other than (i) Applicable Bluebird In-Licenses to the extent in effect immediately prior to such Business Combination of Bluebird, (ii) Collaboration IP, and (iii) any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Bluebird will be Controlled thereafter no matter when such Patent is filed or issued.

(b) *Celgene Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this License Agreement, no Know-How, Materials, Patents Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Celgene or any of its Affiliates prior to a Business Combination of Celgene will be Controlled for purposes of this License Agreement after such Business Combination of Celgene, other than Collaboration IP, and except that any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Celgene will be Controlled thereafter no matter when such Patent is filed or issued.

11.3 Relationship of Parties. Nothing in this License Agreement is intended or will be deemed to constitute a partnership, agency, employer-employee or joint venture relationship between the Parties. No Party will incur any debts or make any commitments for the other, except to the extent, if at all, specifically provided therein. There are no express or implied third party beneficiaries hereunder (except for Bluebird Indemnitees and Celgene Indemnitees for purposes of Section 9.6).

11.4 Compliance with Law. Each Party will perform or cause to be performed any and all of its obligations or the exercise of any and all of its rights hereunder in good scientific manner and in compliance with all applicable Law. Without limiting the foregoing, Bluebird will comply with comply with all applicable Laws and regulations (including U.S. Foreign Corrupt Practices Act and any other applicable anti-bribery or anti-kickback laws or regulations).

11.5 Force Majeure. Neither Party will be liable to the other for failure of or delay in performing obligations set forth in this License Agreement (other than any obligation to pay monies when due), and neither will be deemed in breach of such obligations, if such failure or

delay is due to natural disasters or any causes reasonably beyond the control of such Party; provided that the Party affected will promptly notify the other of the force majeure condition and will exert reasonable efforts to eliminate, cure or overcome any such causes and to resume performance of its obligations as soon as possible.

11.6 Governing Law. This License Agreement will be governed by and construed in accordance with the Laws of the State of New York, without respect to its conflict of laws rules, provided that any dispute relating to the scope, validity, enforceability or infringement of any Patents or Know-How will be governed by, and construed and enforced in accordance with, the substantive Laws of the jurisdiction in which such Patents or Know-How apply.

11.7 Counterparts; Facsimiles. This License Agreement may be executed in one or more counterparts, each of which will be deemed an original, and all of which together will be deemed to be one and the same instrument. Facsimile or PDF execution and delivery of this License Agreement by either Party will constitute a legal, valid and binding execution and delivery of this License Agreement by such Party

11.8 Headings. All headings in this License Agreement are for convenience only and will not affect the meaning of any provision hereof.

11.9 Waiver of Rule of Construction. Each Party has had the opportunity to consult with counsel in connection with the review, drafting and negotiation of this License Agreement. Accordingly, the rule of construction that any ambiguity in this License Agreement will be construed against the drafting party will not apply.

11.10 Interpretation. Whenever any provision of this License Agreement uses the term "including" (or "includes"), such term will be deemed to mean "including without limitation" (or "includes without limitations"). "Herein," "hereby," "hereunder," "hereof" and other equivalent words refer to this License Agreement as an entirety and not solely to the particular portion of this License Agreement in which any such word is used. All definitions set forth herein will be deemed applicable whether the words defined are used herein in the singular or the plural. Unless otherwise provided, all references to Sections and Appendices in this License Agreement are to Sections and Appendices of this License Agreement. References to any Sections include Sections and subsections that are part of the related Section (e.g., a section numbered "Section 2.1" would be part of "Section 2", and references to "Section 2.1" would also refer to material contained in the subsection described as "Section 2.1(a)").

11.11 Binding Effect. This License Agreement will inure to the benefit of and be binding upon the Parties, their Affiliates, and their respective lawful successors and assigns.

11.12 Assignment. This License Agreement may not be assigned by either Party, nor may either Party delegate its obligations or otherwise transfer licenses or other rights created by this License Agreement, except as expressly permitted hereunder or otherwise without the prior written consent of the other Party, which consent will not be unreasonably withheld, delayed or conditioned; provided that without consent (a) Celgene may assign this License Agreement to (i) an Affiliate or (ii) its successor in connection with the merger, consolidation, or sale of all or substantially all of its assets, and (a) Bluebird may assign this License Agreement to (i) an Affiliate or (ii) its successor in connection with the merger, consolidation, or sale of all or substantially all

of its assets or that portion of its business pertaining to the subject matter of this License Agreement; provided further that, except in the case where a Party is involved in a merger or consolidation where it is the surviving entity and no assets of such Party that are subject to this License Agreement have been transferred as a result of such merger or consolidation, (A) such assigning Party provides the other Party to this License Agreement with at least thirty (30) business days advance written notice of such assignment(s) and the assigning Party agrees in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to remain fully liable for the performance of its obligations under this License Agreement by its assignee(s), (B) the assignee(s) agree in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to assume performance of all such assigned obligations, (C) in the case of any assignment by Bluebird, all Licensed IP licensed to Celgene under this License Agreement will be transferred to such assignee(s) effective as of such assignment(s), (D) all of the matters referred to in clauses (A), (B) and (C), as applicable, will be set forth in documentation reasonably acceptable to the non-assigning Party prior to any such assignment(s) (and with such reasonable acceptance not to be unreasonably withheld, conditioned or delayed) and in all cases will provide the non-assigning Party with the full benefits of its rights under this License Agreement (after taking into account all risks involving applicable counter-party performance and bankruptcy and insolvency risks, including those involving contractual rejection under 11 USC §365) as if no such assignment(s) had occurred, and (E) in the case of any assignment, the assigning Party will reimburse the non-assigning Party for all of the legal fees and expenses incurred by such non-assigning Party in connection with the matters set forth in clause (D) of this sentence in an aggregate amount not to exceed [***], and provided, further, that if Bluebird wishes to assign any Licensed IP to its Affiliates, it will be permitted to do so conditioned on each such Affiliate becoming a party to this License Agreement, in the form of an amendment to this License Agreement executed by Celgene, Bluebird and such Affiliate, pursuant to which such Affiliate would agree to assume all obligations hereunder, and grant to Celgene all rights hereunder, with respect to the Licensed IP. The terms of this License Agreement will be binding upon and will inure to the benefit of the successors, heirs, administrators and permitted assigns of the Parties. Any purported assignment in violation of this Section 11.12 will be null and void ab initio.

11.13 Notices. All notices, requests, demands and other communications required or permitted to be given pursuant to this License Agreement will be in writing and will be deemed to have been duly given upon the date of receipt if delivered by hand, recognized international overnight courier, confirmed facsimile transmission, or registered or certified mail, return receipt requested, postage prepaid to the applicable address or facsimile number set forth in Section 13.14 of the Master Collaboration Agreement. Either Party may change its designated address and facsimile number by notice to the other Party in the manner provided in this Section 11.13.

11.14 Amendment and Waiver. This License Agreement may be amended, supplemented, or otherwise modified only by means of a written instrument signed by both Parties; provided that any unilateral undertaking or waiver made by one Party in favor of the other will be enforceable if undertaken in a writing signed by the Party to be charged with the undertaking or waiver. Any waiver of any rights or failure to act in a specific instance will relate only to such instance and will not be construed as an agreement to waive any rights or fail to act in any other instance, whether or not similar.

11.15 Severability. In the event that any provision of this License Agreement will, for any reason, be held to be invalid or unenforceable in any respect, such invalidity or unenforceability will not affect any other provision hereof, and the Parties will negotiate in good faith to modify this License Agreement to preserve (to the extent possible) their original intent.

11.16 Entire Agreement. This License Agreement, together with the Master Collaboration Agreement, is the sole agreement with respect to the subject matter and supersedes all other agreements and understandings between the Parties with respect to same (including Confidential Agreement). In the event of any conflict between the terms of this License Agreement and the terms of the Master Collaboration Agreement, the terms of this License Agreement will control.

11.17 Force Majeure. Neither Celgene nor Bluebird will be liable for failure of or delay in performing obligations set forth in this License Agreement (other than any obligation to pay monies when due), and neither will be deemed in breach of such obligations, if such failure or delay is due to natural disasters or any causes reasonably beyond the control of Celgene or Bluebird and without the fault or negligence of the Party so failing or delaying; provided that the Party affected will promptly notify the other of the force majeure condition and will exert reasonable efforts to eliminate, cure or overcome any such causes and to resume performance of its obligations as soon as possible.

11.18 Celgene Parties. [***]

[*Remainder of this Page Intentionally Left Blank*]

IN WITNESS WHEREOF, the Parties have caused this License Agreement to be executed by their respective duly authorized officers as of the License Agreement Effective Date.

bluebird bio, Inc.

By:
(Signature)

Name:

Title:

Date:

Celgene Corporation

By:
(Signature)

Name:

Title:

Date:

Celgene European Investment Company LLC (CEICO)

By: Celgene International Sarl, the sole member of CEICO

By:_____

Print: _____

and

By:_____

Print:_____

Appendix A

Additional Defined Terms

"Elected Candidate"[1] means the following Optioned Candidate selected by Celgene under the Master Collaboration Agreement that specifically targets the Target Antigen: [_____].

---

1 20200 ***To be updated by the Parties to specifically identify the candidate that is the subject of the option election***.

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix B

Applicable New In-Licenses

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix C

Applicable Pre-Existing In-Licenses

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix D

Target Antigen

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix E

Press Release

Appendix F

Certain Patents within the Licensed IP Controlled by Bluebird as of the License Agreement Effective Date

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix G

Bluebird Agreements

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix H

Certain Manufacturing Definitions

[***]

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix I

Manufacturing and Supply Agreement Terms

[***]

Schedule 9.2

Exceptions to Bluebird's Representations and Warranties in Section 9.2

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Exhibit B

Amended and Restated Co-Development, Co-Promote and Profit Share Agreement

Amended and Restated Co-Development, Co-Promote and Profit Share Agreement

by and between

bluebird bio, Inc.

and

Celgene Corporation

and

Celgene European Investment Company LLC

[_____]

Table of Contents

List of Appendices

Amended and Restated Co-Development, Co-Promote and Profit Share Agreement

This Amended and Restated Co-Development, Co-Promote and Profit Share Agreement (this "CCPS Agreement"), dated as of [_____] (the "CCPS Agreement Effective Date"), is made by and between bluebird bio, Inc., a Delaware corporation ("Bluebird"), and Celgene Corporation, a Delaware corporation ("Celgene Corp"), with respect to all rights and obligations under this CCPS Agreement in the United States (subject to Section 18.18), and Celgene European Investment Company LLC, a Delaware limited liability company, with respect to all rights and obligations under this CCPS Agreement outside of the United States (subject to Section 18.18) ("Celgene Europe" and together with Celgene Corp, "Celgene"). Each of Bluebird and Celgene may be referred to herein as a "Party" or together as the "Parties."

WHEREAS, Bluebird has developed and owns or has rights to certain Patents and technology relating to developing innovative gene therapies for genetic disorders;

WHEREAS, Celgene is a biopharmaceutical company focused on acquiring, Developing and Commercializing innovative anti-cancer agents; and

WHEREAS, Bluebird and Celgene Corp are parties to that certain Master Collaboration Agreement, dated as of March 19, 2013, pursuant to which such Parties entered into a global strategic collaboration to research, develop and commercialize therapeutic products in the Field (the "Original MCA");

WHEREAS, the Parties entered into an Amended and Restated Collaboration Agreement, dated as of June 3, 2015 (the "Master Collaboration Agreement"), pursuant to which the Parties amended and restated the Original MCA in order to continue the research and development of the Product Candidates pursuant to the terms set forth therein;

WHEREAS, pursuant to the terms of the Master Collaboration Agreement, Celgene has exercised its option to select a Product Candidate to be an Optioned Candidate by delivering to Bluebird a Celgene Option Notice and payment of the applicable Initial Option Fee (such Optioned Candidate, as defined more fully in Appendix A, the "Elected Candidate");

WHEREAS, pursuant to Section 5.3 of the Master Collaboration Agreement, Bluebird has delivered a Bluebird Option Notice to co-promote and co-Develop the Optioned Candidate in the U.S.; and

WHEREAS, the Parties now wish to enter into an exclusive arrangement whereby Bluebird and Celgene will co-Develop Licensed Product and Commercialize Licensed Product in the U.S. as part of a profit share arrangement, and Celgene will have exclusive rights to Commercialize Licensed Product in the ROW, all on the terms and conditions set forth here.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the amount and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. **Definitions.**

The following terms and their correlatives will have the meanings set forth below. Capitalized terms used, but not defined, herein will have the meanings ascribed to such terms in the Master Collaboration Agreement.

1.1 "Applicable Bluebird In-Licenses" means the Applicable Pre-Existing In-Licenses, the Applicable New In-Licenses, and any Co-Co In-Licenses where Bluebird is a contracting party.

1.2 "Applicable New In-Licenses" means all New In-Licenses of Bluebird or its Affiliates necessary or useful for the research, Development and/or Commercialization of Elected Candidate and Licensed Product that Celgene has elected to list on Appendix B as of the CCPS Agreement Effective Date, plus any other New In-License of Bluebird or its Affiliates that Celgene has elected to include as an Applicable New In-License pursuant to Section 10.7(b).

1.3 "Applicable Pre-Existing In-Licenses" means all Pre-Existing In-Licenses necessary or useful for the research, Development and/or Commercialization of Elected Candidate and Licensed Product, and any extensions or expansions of the scope of such Pre-Existing In-Licenses, including those listed on Appendix C.

1.4 "Biosimilar Product" means, with respect to a Licensed Product in any country, any biosimilar product sold by a Third Party not authorized by or on behalf of Celgene, its Affiliates or Sublicensees, (a) that is a biosimilar biological product, as defined in 21 USC 379j-51 (or any successor or replacement thereof), a similar biological medicinal product, as defined in Annex I to Directive 2001/83/EC (or any successor or replacement thereof), or any similar biosimilar or generic product under the Laws of any country or jurisdiction, or (b) regarding which Regulatory Approval is obtained by referencing Regulatory Data of such Licensed Product.

1.5 "Bluebird In-Licensed IP" means all Patents, Materials and Know-How in-licensed by Bluebird pursuant to Applicable Bluebird In-Licenses, including any extensions or expansions of the scope thereof.

1.6 "Bluebird Licensed IP" means all (a) Patents, Materials and Know-How Controlled at any time by Bluebird or any of its Affiliates (including any applicable Collaboration IP and Bluebird Technology) other than pursuant to an Applicable Bluebird In-License and (b) Bluebird In-Licensed IP, in each case to the extent necessary or useful to Develop Elected Candidate and Develop and Commercialize Licensed Product. [***]

1.7 "Bluebird Regulatory Rights" means all Regulatory Data, Regulatory Filings and Regulatory Approvals for Elected Candidate and Licensed Product worldwide Controlled at any time by Bluebird or any of its Affiliates.

1.8 "Bluebird Technology" means all Bluebird Solely Owned IP and all of Bluebird's right, title and interest in and to Joint IP.

1.9 "Celgene Licensed IP" means (a) Celgene Licensed Product IP, and (b) Celgene Licensed Product In-Licensed IP.

1.10 "Celgene Licensed Product In-License" means any Applicable Celgene In-License pursuant to which Celgene or any of its Affiliates in-licenses any Know-How, Materials or Patents that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.11 "Celgene Licensed Product In-Licensed IP" means any Patents, Materials and Know-How Controlled at any time during the CCPS Agreement Term by Celgene or any of its Affiliates pursuant to a Celgene Licensed Product In-License or Celgene Other In-License that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.12 "Celgene Licensed Product IP" means (a) Celgene Technology, (b) Collaboration IP solely owned by Celgene and Celgene's interest in jointly owned Collaboration IP, and (c) Patents, Materials or Know-How (to the extent not included in subsection (a) or (b)) owned by Celgene or its Affiliates that are Controlled at any time during the CCPS Agreement Term by Celgene or any of its Affiliates, in each case that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.13 "Celgene Other In-License" means any agreement between Celgene or any of its Affiliates and a Third Party, other than Applicable Celgene In-Licenses and Celgene Co-Co In-Licenses, pursuant to which Celgene or any of its Affiliates in-licenses any Know-How, Materials or Patents that directly relate to or Cover the Elected Candidate and/or Licensed Product or its Manufacture or use.

1.14 "Celgene Regulatory Rights" means all Regulatory Data, Regulatory Filings and Regulatory Approvals for Elected Candidate and Licensed Product worldwide Controlled at any time by Celgene or any of its Affiliates.

1.15 "Celgene Technology" means all Celgene Solely Owned IP and all of Celgene's right, title and interest in and to Joint IP.

1.16 "Clinical Study" means any human clinical trial of a Product Candidate.

1.17 "Commercialization" means any and all activities directed to the Manufacturing, marketing, detailing, promotion and securing of reimbursement of a product after Regulatory Approval has been obtained (including making, having made, using, importing, selling and offering for sale such product), and will include post-approval clinical studies, post-launch marketing, promoting, detailing, marketing research, distributing, customer service, administering and commercially selling such product, importing, exporting or transporting such product for commercial sale, and all regulatory compliance with respect to the foregoing.

1.18 "Commercially Reasonable Efforts" means, with respect to the Development or Commercialization of Licensed Product by a Party, that level of efforts and resources that such Party would normally devote to the Development or Commercialization, as the case may be, of a product owned by it or to which it has rights of the type it has hereunder, which is of a similar commercial potential at a similar stage in its lifecycle, in each case taking into account issues of safety and efficacy, product profile, the proprietary position, the then current competitive environment for such product and the likely timing of such product's entry into the market, the pricing and launching strategy for the respective product, the regulatory environment and status of such product, and other relevant scientific, technical and commercial factors.

1.19 "Control" or "Controlled" means, with respect to any Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals, the possession (whether by ownership or license, other than by a license or sublicense granted pursuant to this CCPS Agreement) by a Party or its Affiliates of the ability to grant to the other Party a license or access as provided herein to such item, without violating the terms of any agreement or other arrangement with any Third Party or, other than under Applicable Bluebird In-Licenses, being obligated to pay any royalties or other consideration therefor ("Additional Payments"). For clarity, Other In-Licenses are not "Controlled" for purposes of this CCPS Agreement, unless and only after such Other In-License is converted into an Applicable New In-License pursuant to Section 10.7(b). Notwithstanding the foregoing, as provided in Section 10.7(a), if on or after the CCPS Agreement Effective Date and for such time as the other Party agrees to pay and does in fact pay all Additional Payments with respect to such Party's access or license to any Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals (other than that in-licensed by Bluebird pursuant to an Other In-License), such Know-How, Material, Patent, Regulatory Data, Regulatory Filings and Regulatory Approvals will be deemed to be included in the definition of "Control".

1.20 "Covers", with reference to (a) a Patent, means that the making, using, selling, offering for sale or importing of a product or practice of a method would infringe a Valid Claim of such Patent in the country in which such activity occurs, and (b) Materials or Know-How, means that the Manufacture, Development or Commercialization of a product incorporates, embodies or otherwise makes use of such Materials or Know-How.

1.21 "EU" means the organization of member states of the European Union as it may be constituted from time to time.

1.22 "EU Regulatory Event" means, with respect to a Licensed Product, the earlier to occur of [***].

1.23 "Field" means the targeting of the Target Antigen by use of (a) T-cells expressing a CAR (with or without other engineering to enhance functionality and/or safety), including virus specific genetically modified T-cells expressing a synthetic CAR, and (b) T-cells expressing native antigen receptors or engineered antigen receptors in which the T-cells are genetically modified to enhance their performance, persistence or safety, in each case under (a) and (b) for the treatment, modulation, palliation or prevention of cancer in humans.

1.24 "First Commercial Sale" means the first sale for use or consumption of any Licensed Product in a country after all required Regulatory Approvals for commercial sale of such Licensed Product have been obtained in such country.

1.25 "First Indication" means the first disease condition for which a particular Licensed Product has been approved by a Regulatory Authority.

1.26 "GAAP" means U.S. generally accepted accounting principles or International Financial Reporting Standards, consistently applied, as designated and used by the applicable Party.

1.27 "Gene Editing" means homing endonuclease (HE) and megaTAL gene editing technologies, including HE/megaTAL-mediated homology directed recombination and Bluebird's proprietary DARIC cell signaling technology.

1.28 "In-License Payments" means any amounts paid or payable under any Applicable Bluebird In-License that are incurred by Bluebird solely and directly as a result of the grant of a sublicense thereunder under this CCPS Agreement to Celgene, any of Celgene's contract Third Parties under Section 10.5, or any further Sublicensees of Celgene (including of Celgene's Affiliates that are granted sublicenses) under this CCPS Agreement. Any such payments will include (a) any amounts paid or payable under any Applicable Bluebird In-License solely and directly as a result of the grant of a sublicense (or an option thereto) by Bluebird to Celgene, [***].

1.29 "Licensed IP" means Bluebird Licensed IP and Celgene Licensed IP.

1.30 "Licensed Product" means any product that constitutes or incorporates an Elected Candidate (including all modified and improved versions thereof), in all forms, presentations, and formulations (including manner of delivery and dosage). A modified or improved version of an Elected Candidate constituted or incorporated in a product will be deemed a "Modified Licensed Product" for purposes of Section 11.2 if it is Covered by patentable technology Controlled by Bluebird that (a) is first discovered, created, conceived, developed or reduced to practice after the later of (i) the CCPS Agreement Effective Date and (ii) the end of the Collaboration Program Term, (b) requires the submission of a new BLA with respect to such modified or improved Elected Candidate, and (c) materially contributes to the Elected Candidate being approved for a new indication or new patient population. For clarity, "Modified Licensed Products" are Licensed Products hereunder for all purposes other than Section 11.2.

1.31 "Manufacturing" means the production, manufacture, processing, filling, finishing, packaging, labeling, shipping and holding of product or any intermediate thereof, including process development, process qualification and validation, scale-up, commercial manufacture and analytic development, product characterization, stability testing, quality assurance and quality control. With reference to Elected Candidate and Licensed Product, Manufacturing includes Vector and associated Payload supply.

1.32 "Net Sales" means [***].

1.33 "Pivotal Study" means (a) a Phase 3 Study that is intended by Celgene to be submitted (together with any other registration trials that are prospectively planned when such Phase 3 Study is initiated) for Regulatory Approval in the U.S. or the EU, or (b) any other clinical study that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which clinical study is a registration trial intended to be sufficient for filing an application for a Regulatory Approval for the Licensed Product in the U.S. or another country or some or all of an extra-national territory, solely as evidenced by the acceptance for filing for a Regulatory Approval for such product after completion of such study.

1.34 "Regulatory Exclusivity Period" means with respect to a Licensed Product in a country, the period of time during which (a) Celgene or any of its Affiliates or Sublicensees has been granted the exclusive legal right by a Regulatory Authority (or is otherwise entitled to the exclusive legal right by operation of Law) in such country to market and sell the Licensed Product, or (b) the data and information submitted by Celgene or any of its Affiliates or Sublicensees to the relevant Regulatory Authority in such country for purposes of obtaining Regulatory Approval may not be disclosed, referenced or relied upon in any way by such Regulatory Authority (including by relying upon the Regulatory Authority's previous findings regarding the safety or effectiveness of the Licensed Product) to support the Regulatory Approval or marketing of any product by a Third Party in such country.

1.35 "ROW" means the world other than the United States.

1.36 "ROW Administration" means administration of Licensed Product to a patient when located in the ROW.

1.37 "ROW Development & Commercialization Program" means the program under this CCPS Agreement for the Development of Elected Candidate and Licensed Product in the ROW, the Commercialization of Licensed Product in the ROW, and all Manufacturing (including Manufacturing of Vectors and associated Payloads) therefor.

1.38 "ROW Development Plan" means the Development plan for the Development of Elected Candidate and Licensed Product for ROW Administration during a given calendar year and the two (2) succeeding calendar years.

1.39 "Second Indication" means [***].

1.40 "Selling Party" means a Party and its Sublicensees (including such Party's Affiliates that are granted sublicenses pursuant to Section 10.3(c)).

1.41 "Sublicensee" means any person or entity (including Affiliates of the applicable Party) that is granted a sublicense as permitted by Section 10.3 (or an option to take such a sublicense), either directly by a Party or indirectly by any other Sublicensee hereunder.

1.42 "Target Antigen" means the antigen designated as B-cell maturation antigen (BCMA) as further set forth on Appendix D, and naturally occurring variants thereof.

1.43 "U.S. Administration" means administration of Licensed Product to a patient when located in the United States.

1.44 "U.S. Commercialization Budget" means the budget for conducting Commercialization in accordance with the U.S. Commercialization Plan during a given calendar year and the two (2) succeeding calendar years, as approved by the JGC in accordance with Section 5.3.

1.45 "U.S. Commercialization Plan" means that portion of the Worldwide Commercialization Plan that specifies the Commercialization plan for the Commercialization of Licensed Product for U.S. Administration during a given calendar year and the two (2) succeeding calendar years.

1.46 "U.S. Development Budget" means the budget for conducting Development of Elected Candidate and Licensed Product for U.S. Administration pursuant to the U.S. Development Plan during a given calendar year and the two (2) succeeding calendar years, as approved by the JGC in accordance with Section 4.3.

1.47 "U.S. Development Plan" means the Development plan for the Development of Elected Candidate and Licensed Product for U.S. Administration during a given calendar year and the two (2) succeeding calendar years, as approved by the JGC in accordance with Section 4.2.

1.48 "U.S. Development & Commercialization Program" means the program under this CCPS Agreement for the Development of Elected Candidate and Licensed Product in the United States, the Commercialization of Licensed Product in the United States, and all Manufacturing (including Manufacturing of Vectors and associated Payloads) therefor.

1.49 "Valid Claim" means, with respect to a particular country, (a) any claim of an issued and unexpired Patent in such country that (i) has not been held revoked, unenforceable or invalid by a decision of a court or governmental agency of competent jurisdiction, which decision is unappealable or unappealed within the time allowed for appeal and (ii) has not been abandoned, disclaimed, denied or admitted to be invalid or unenforceable through reissue or disclaimer or otherwise in such country, or (b) a claim of a pending Patent application that has not been finally abandoned or finally rejected or expired and which has been pending [***] from the date of filing of the earliest priority Patent application to which such pending Patent application is entitled to claim benefit.

1.50 "Vector Supplies" means supplies of Vectors and associated Payloads Manufactured for incorporation into Elected Candidate and Licensed Product for Development or Commercialization thereof.

1.51 "Worldwide Commercialization Plan" means the Commercialization Plan that specifies the Commercialization plan for the Commercialization of Licensed Product for U.S. Administration and ROW Administration during a given calendar year and the two (2) succeeding calendar years.

1.52 "Worldwide Manufacturing Plan" means the Manufacturing plan for the Elected Candidate and Licensed Product for Development for both U.S. Administration and ROW Administration.

Definitions for each of the following terms are found in the body of this CCPS Agreement or the Appendices hereto as indicated below:

Defined Terms	***Location***
Additional Bluebird IP	Section 10.7(a)
Additional Payments	Section 1.19
Allowable Expenses	Appendix F
Allocable Overhead	Appendix F
Applicable Bluebird In-License	Section 1.1
Applicable New In-License	Section 1.2
Applicable Pre-Existing In-License	Section 1.3
Biosimilar Application	Section 14.2(f)
Biosimilar Product	Section 1.4
Bluebird	Preamble
Bluebird In-Licensed IP	Section 1.5

Defined Terms	***Location***
Bluebird Development Cap	Section 4.3(c)(i)
Bluebird Indemnitees	Section 16.6(a)
Bluebird Licensed IP	Section 1.6
Bluebird Regulatory Rights	Section 1.7
Bluebird Technology	Section 1.8
Budgeted U.S. Development Costs	Section 4.3
Business Acquisition	Section 10.4
Business Party	Section 10.4
Business Program	Section 10.4
CCPS Agreement	Preamble
CCPS Agreement Effective Date	Preamble
CCPS Agreement Term	Section 17.1
Celgene	Preamble
Celgene Corp	Preamble
Celgene Europe	Preamble
Celgene Indemnitees	Section 16.6(b)
Celgene Licensed IP	Section 1.9
Celgene Licensed Product In-License	Section 1.10
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2. **Overview.**

2.1 General. During the CCPS Agreement Term, the Parties will conduct the Development and Commercialization of Elected Candidate and Licensed Product worldwide on the terms and conditions set forth in this CCPS Agreement.

2.2 Roles and Responsibilities; Diligence.

(a) The JGC will assign to each Party roles and responsibilities for performing the U.S. Development & Commercialization Program. Each Party, directly or through one or more of its Affiliates, Sublicensees or permitted subcontractors, will use Commercially Reasonable Efforts to perform the obligations assigned to such Party by the JGC under the U.S. Development & Commercialization Program. Each Party will reasonably cooperate with the other Party in performing such obligations.

(b) Celgene will assume sole responsibility for, and control of, Developing Elected Candidate and Licensed Product in the Field outside of the United States, and will establish a ROW Development & Commercialization Program for that purpose. Bluebird will reasonably cooperate with Celgene in such ROW Development & Commercialization Program.

2.3 Technical Assistance. During the Collaboration Program Term, Bluebird will reasonably cooperate with Celgene to provide all technical assistance, and to transfer to Celgene any additional Know-How licensed to Celgene under Section 10.1, requested by Celgene to facilitate the transfer of Development efforts related to Elected Candidate and Licensed Product. Such cooperation will include providing Celgene with reasonable access by teleconference or in-person at Bluebird's facilities to Bluebird personnel involved in the research and Development of Elected Candidate to provide Celgene with a reasonable level of technical assistance and consultation in connection with the transfer of such Know-How. Following the Collaboration Program Term, Bluebird will reasonably cooperate with Celgene to provide reasonable amounts of technical assistance, including to transfer to Celgene any additional Know-How licensed to Celgene under Section 10.1, with respect to Elected Candidate or Licensed Product as reasonably requested by Celgene with reasonable advance notice to Bluebird. Any dispute with respect to the amount and completeness of the technical assistance and cooperation to be provided by Bluebird under this Section 2.3 will be referred to and finally resolved by binding arbitration by a mutually agreeable, disinterested, conflict-of-interest-free individual not affiliated or consulting with either Party. Any such arbitration will be conducted under the then-current rules of the American Arbitration Association.

3. **Governance and Joint Governance Committee.**

3.1 Joint Governance Committee.

(a) *Governance Committee*. As soon as practicable following the CCPS Agreement Effective Date, the Parties will establish a Joint Governance Committee, comprised of three (3) representatives of Bluebird and three (3) representatives of Celgene (the "JGC"). Each Party may replace its representatives on the JGC or its Program Director at any time upon written notice to the other Party. With the consent of the other Party (such consent not to be unreasonably withheld, delayed or conditioned), each Party may

invite non-voting employees and consultants (including Dr. Malcolm K. Brenner) to attend meetings of the JGC, subject to their agreement to be bound to the same extent as a permitted subcontractor under Section 8.4.

(b) *Meetings*. While in existence, the JGC will meet each calendar quarter and, at a minimum, two (2) of such meetings each calendar year will be in person (which in-person meeting will be held at locations mutually agreed by the Parties). In addition, either Party can call a meeting of the JGC on five (5) business days prior written notice. Meetings of the JGC will be effective only if at least one (1) representative of each Party is present or participating. Each Party will be responsible for all of its own expenses of participating in the meetings. The Parties will endeavor to schedule the calendar quarterly meetings of the JGC at least six (6) months in advance. The Parties will alternate in preparing and circulating a meeting agenda prior to each such meeting. The Party that prepared the agenda (or called the meeting) will prepare written minutes of such meeting, and the preparing Party will circulate such minutes within fifteen (15) days after such meeting. The Parties will agree on the minutes of each meeting promptly, but in no event later than the next meeting of the JGC.

(c) *Responsibilities*. The JGC will supervise the overall performance of the Development and Commercialization of Elected Candidate and Licensed Product for U.S. Administration, and within such scope will:

(i) Make all decisions regarding the Parties' performance of the U.S. Development & Commercialization Program (except as otherwise expressly provided in this CCPS Agreement), including, subject to Section 2.2, which Party will have which responsibilities under the U.S. Development & Commercialization Program (taking into account each Party's reasonably available resources and expertise (either directly or through Third Party contracting));

(ii) Review and seek to coordinate the U.S. Development & Commercialization Program with the ROW Development & Commercialization Program;

(iii) Address all matters specifically delegated to the JGC pursuant to this CCPS Agreement;

(iv) Form such other committees as the JGC may deem appropriate, and require that such committees meet at such times and places, provided that such committees may make recommendations to the JGC but may not be delegated JGC decision-making authority;

(v) Address such other matters relating to the activities of the Parties under this CCPS Agreement as either Party may bring before the JGC, including any matters that are expressly for the JGC to decide as provided in this CCPS Agreement; and

(vi) Attempt to resolve any disputes on an informal basis.

(d) *Decision-making*. The three (3) JGC representatives of each Party will collectively have one (1) vote, and the JGC will make decisions only by unanimous consent of each Party with respect to its vote, and each Party will act reasonably in exercising its vote. [***]

(e) *Limits on JGC Authority*. Each Party will retain the rights, powers and discretion granted to it under this CCPS Agreement and no such rights, powers, or discretion will be delegated to or vested in the JGC unless such delegation or vesting of rights is expressly provided for in this CCPS Agreement or the Parties expressly so agree in writing. The JGC will not have the power to, nor will the Party having the tie-breaking vote in the JGC have the power to (i) amend, modify or waive compliance with this CCPS Agreement (other than as expressly permitted hereunder), (ii) alter, increase or expand the Parties' rights or obligations under this CCPS Agreement (other than as permitted by Section 2.2), (iii) determine that a Party has fulfilled any obligations under this CCPS Agreement or that a Party has breached any obligation

under this CCPS Agreement, (iv) make a decision that is expressly stated to require the mutual agreement of the Parties, or (v) determine that milestone events required for the payment of milestone payments have or have not occurred. For avoidance of doubt, the JGC will have no right to supervise or direct the Development and Commercialization of Elected Candidate or Licensed Product for ROW Administration, and Celgene will have sole decision making authority with respect to such Development and Commercialization, including with respect to the ROW Development & Commercialization Program.

(f) *Term*. The JGC will cease to exist upon the end of the CCPS Agreement Term, unless the Parties elect to extend the JGC upon termination of expiration of this CCPS Agreement.

4. **Development.**

4.1 Generally. As of and after the CCPS Agreement Effective Date, subject to the terms and conditions of this CCPS Agreement, the Parties will assume through the JGC joint responsibility for Development of Elected Candidate and Licensed Product for U.S. Administration, under the U.S. Development & Commercialization Program, and Celgene will assume responsibility for Development of Elected Candidate and Licensed Product for ROW Administration, under the ROW Development & Commercialization Program.

4.2 Development Plan. Promptly after the CCPS Agreement Effective Date, Celgene will prepare an initial U.S. Development Plan, and the JGC will review and approve such initial U.S. Development Plan, with the goal of coordinating and harmonizing the U.S. Development Plan with the ROW Development Plan. Thereafter, Celgene will update the U.S. Development Plan each calendar year, and the JGC will review and approve any such update or any other amendment to the U.S. Development Plan. In addition, either Party may request at any time that the JGC consider and approve other updates to the U.S. Development Plan. Promptly after the CCPS Agreement Effective Date, Celgene will prepare an initial ROW Development Plan and will provide it to the JGC for purposes of discussion and the goal of coordinating and harmonizing the U.S. Development Plan and the ROW Development Plan. Thereafter, Celgene will update the ROW Development Plan each year and submit it to the JGC for purposes of discussion and the goal of coordinating and harmonizing the U.S. Development Plan and ROW Development Plan. Notwithstanding anything in this CCPS Agreement to the contrary, the Parties acknowledge and agree that (i) Bluebird may decline to perform any Development activity proposed to be conducted by Bluebird in Worldwide Commercialization Plan (excluding Manufacturing of Vectors and associated Payloads), and (ii) the U.S. Development Plan will not include, and Bluebird will have no obligation to perform, any such Development activity that Bluebird has declined to perform (other than the Manufacture of Vectors and associated Payloads), provided that once Bluebird has agreed to perform a Development activity, it will be obligated to perform, and cannot decline to perform, such activity. Further:

(a) The JGC will set the required form and contents of the U.S. Development Plan. The JGC will seek to coordinate and harmonize the U.S. Development Plan and the ROW Development Plan.

(b) Neither Party (itself or by or through any others, including any Affiliates or Sublicensees) will take any material action regarding the Development of Elected Candidate or Licensed Product for U.S. Administration unless described in the U.S. Development Plan, provided that the foregoing will not restrict Celgene from taking any action regarding the Development of Elected Candidate or Licensed Product for ROW Administration.

(c) All Development of Elected Candidate and Licensed Product for U.S. Administration will be conducted under the supervision of the JGC and as part of the U.S. Development & Commercialization Program.

(d) All Development of Elected Candidate and Licensed Product for ROW Administration will be conducted under the sole control of Celgene and as part of the ROW Development & Commercialization Program. At each calendar quarter meeting of the JGC, Celgene will provide the JGC with an update on the Development of Elected Candidate and Licensed Product by Celgene for ROW Administration. During such meeting, Celgene will disclose to Bluebird all material information regarding such Development.

(e) Celgene will prepare and maintain, and will cause its Affiliates and Sublicensees to prepare and maintain, reasonably complete and accurate records regarding the Development of Elected Candidate and Licensed Product for ROW Administration. At each calendar quarter meeting of the JGC, Celgene will provide the JGC with a reasonably detailed report regarding such efforts. Such report will contain sufficient detail to enable Bluebird to assess Celgene's compliance with its Development and Commercialization obligations hereunder, including information with respect to the following: (i) the design, status and results of any animal studies and clinical trials for Licensed Product; and (ii) any regulatory milestones, and any Regulatory Approvals achieved, for Licensed Product. In addition to the foregoing, Celgene will provide Bluebird with such additional information regarding any such activities as Bluebird may reasonably request from time to time.

4.3 Development Budget and Costs. Promptly after the CCPS Agreement Effective Date, and concurrently with the preparation of the U.S. Development Plan, Celgene will prepare an initial U.S. Development Budget, which U.S. Development Budget will specify estimated U.S. Development Costs for each calendar year covered by such U.S. Development Budget (as updated pursuant to the following sentence, the "Budgeted U.S. Development Costs"), and the JGC will review and approve, where practicable, such initial U.S. Development Budget at least six (6) months in advance of such U.S. Development Costs being incurred. [***]

5. **Commercialization.**

5.1 Generally. Subject to the terms and conditions of this CCPS Agreement, (i) the Parties will assume through the JGC joint responsibility for Commercialization of Licensed Product for U.S. Administration under the U.S. Development & Commercialization Program, and (ii) Celgene will assume sole responsibility for Commercialization of Licensed Product for ROW Administration (including all costs and expenses arising therefrom).

5.2 Commercialization Plan. At such times as the JGC will deem appropriate, the JGC will direct the Parties to mutually prepare a Worldwide Commercialization Plan, and the JGC will review and approve such initial Worldwide Commercialization Plan. Thereafter, the JGC will have one or the other Party (or both) update the Worldwide Commercialization Plan each calendar year, and the JGC will review and approve any such update or any other amendment to the Worldwide Commercialization Plan. Notwithstanding anything in this CCPS Agreement to the contrary, the Parties acknowledge and agree that (i) Bluebird may decline to perform any Commercialization activity proposed to be conducted by Bluebird in the Worldwide Commercialization Plan (other than Manufacturing of Vectors and associated Payloads), and (ii) the Worldwide Commercialization Plan will not include, and Bluebird will have no obligation to perform, any such Commercialization activity that Bluebird has declined to perform, provided that once Bluebird has agreed to perform a Commercialization activity, it will be obligated to perform, and cannot decline to perform, such activity. In addition, either Party may request at any time that the JGC consider and approve other updates to the Worldwide Commercialization Plan. Further:

(a) The JGC will set the required form and contents of the Worldwide Commercialization Plan. The Worldwide Commercialization Plan will reflect a singular marketing and sales approach worldwide, and will specify, among other things, the number of sales reps in the U.S. for each Party, allocation of

regions in the U.S. for each Parties' sales force, creation of marketing materials, planning for conferences, and other marketing activities.

(b) Neither Party (itself or by or through any others, including any Affiliates or Sublicensees) will take any material action regarding the Commercialization of Licensed Product unless described in the Worldwide Commercialization Plan or approved by the JGC.

(c) All Commercialization of Licensed Product for U.S. Administration will be conducted under the supervision of the JGC and as part of the U.S. Development & Commercialization Program.

(d) Celgene will have final decision making authority for all Commercialization activities worldwide, including timing of launch and pricing and the Worldwide Development Plan.

5.3 U.S. Commercialization Budget. At such times as the JGC will deem appropriate, and concurrently with the preparation of the initial Worldwide Commercialization Plan, Celgene will prepare an initial U.S. Commercialization Budget, and the JGC will review and approve such initial U.S. Commercialization Budget. [***]

5.4 Commercialization in the ROW. Celgene, directly or through one or more of its Affiliates or Sublicensees, will use Commercially Reasonable Efforts, (i) to Develop Licensed Product in the Field for ROW Administration and to obtain Regulatory Approvals therefor; and (ii) to Commercialize Licensed Product in the Field for ROW Administration after obtaining such Regulatory Approval, in each country in the ROW where Commercializing Licensed Product would be warranted by using Commercially Reasonable Efforts.

5.5 Branding. Subject to further mutual written agreement of the Parties, to the extent permitted by applicable Law and applicable Regulatory Authorities, (i) all Licensed Product sold or distributed for U.S. Administration will have the corporate brands of each Party displayed on an equally prominent basis, and (ii) all Licensed Product sold or distributed for ROW Administration will have the corporate brand of Bluebird displayed on a reasonably prominent basis. At such time as the JGC will deem appropriate, the Parties will enter into appropriate trademark licensing agreements to achieve the foregoing.

5.6 Training; Details.

(a) Celgene will direct the training of both Parties' sales representatives and will prepare and implement, in consultation with Bluebird, a training program and training materials for such sales representatives. In addition, Celgene will specify the conduct and content of details (including detail scripts) for the Licensed Product. Bluebird will cause each of its sales representatives assigned to promote the Licensed Product to attend and complete the training program developed by Celgene for the Licensed Product in the United States to assure a consistent, focused promotional strategy and message as and to the extent consistent with applicable Law.

(b) Each Party will be solely responsible for recruiting, hiring and maintaining its sales force of sales representatives for promotion of the Licensed Product in accordance with its standard procedures and the requirements of this CCPS Agreement. Each Party will be responsible for the activities of its sales representatives, including compliance by its sales representatives with training and detailing requirements. In particular, each Party will provide its sales representatives assigned to promote the Licensed Product with the level of oversight, management, direction and sales support with respect to the promotion of Licensed Product necessary to effectively and efficiently promote the Licensed Product in accordance with the terms of this CCPS Agreement and applicable Law. If Celgene raises any concern with Bluebird regarding the performance or fitness of any Bluebird sales representative, Bluebird will address such concerns in a manner consistent with Celgene's instructions, including removal of such sales representative from the promotion of the Licensed Product.

(c) Each Party's sales representatives assigned to promote the Licensed Product will utilize only promotional materials that have been approved by the JGC. All detailing activities conducted by each Party's sales representatives will be consistent in all material respects with the promotional materials so approved. Each Party will train and instruct their respective sales representatives to make only those statements and claims regarding the Licensed Product, including as to efficacy and safety, that are consistent with the Licensed Product labeling and accompanying inserts and the approved promotional materials.

(d) Bluebird will have the right, but not the obligation, to provide [***] of the total sales representatives used by both Parties for promotion of Licensed Product. The Worldwide Commercialization Plan will set forth the precise number of Bluebird sales representatives consistent with the foregoing. If Bluebird is not at any particular time able to provide, for any reason, the number of sales representatives specified in the Worldwide Commercialization Plan, then Celgene will have the right to make up such shortfall using its sales representatives until such time as Bluebird is able to provide its agreed upon number of sales representatives. Bluebird will engage sales representatives having the minimum qualifications set forth in Schedule 5.6. [***]

(e) Each Party will provide the JGC with a report, as soon as practicable but in no event later than forty-five (45) days following the end of each calendar quarter during the Term, setting forth the number of details made by its sales representatives of Licensed Product in the United States during such calendar quarter. Costs and expenses for sales representatives will be charged to the Profit & Loss Share on an FTE basis.

(f) Each Party will maintain records and otherwise establish procedures to ensure compliance with all applicable Laws and professional requirements that apply to the promotion and marketing of the Licensed Product, including compliance with the PhRMA Code on Interactions with Healthcare Professionals.

(g) Celgene will have sole authority to execute medical and scientific affairs and programs, including professional symposia and other educational activities, and medical affairs studies based upon approved protocols. Celgene will have sole authority over all medical affairs activities relating to the Licensed Product, including medical information support and medical communications and publishing activities. The Parties acknowledge that each Party may receive requests for medical information concerning the Licensed Product from members of the medical professions and consumers. Celgene will have the exclusive right to respond to questions and requests for information about the Licensed Product received from such Persons that (i) warrant a response beyond the understanding of the sales representatives or (ii) are beyond the scope of the Licensed Product labels and inserts (each such request, an "Information Request"). If Information Requests are received by Bluebird, the request will be referred to Celgene's medical information department or appointed Third Party vendor to which Celgene has instructed Bluebird in writing to refer Information Requests.

6. **Regulatory.**

6.1 Generally. Subject to Section 6.2 and the last sentence of Section 4.1, as of and after the CCPS Agreement Effective Date, subject to the terms and conditions of this CCPS Agreement, the Parties will assume through the JGC joint responsibility for all regulatory matters regarding seeking Regulatory Approval for Elected Candidate and Licensed Product for U.S. Administration, including interacting with Regulatory Authorities in connection therewith, before and after Regulatory Approval of Licensed Product. Celgene will have sole responsibility for all regulatory matters regarding seeking Regulatory Approval for Elected Candidate and Licensed Product for ROW Administration, including interacting with Regulatory Authorities in connection therewith, before and after Regulatory Approval of Licensed Product. Further:

(a) Prior to Regulatory Approval of Licensed Product for U.S. Administration, any such regulatory activities for Elected Candidate and such Licensed Product will be included in and will be part of the U.S. Development Plan (and thus subject to Section 4.2(a)) and the U.S. Development & Commercialization Program.

(b) Prior to Regulatory Approval of Licensed Product for ROW Administration, any such regulatory activities for Elected Candidate and such Licensed Product will be included in and will be part of the ROW Development Plan and the ROW Development & Commercialization Program.

(c) After any such Regulatory Approval for such Licensed Product for U.S. Administration, any such regulatory activities for U.S. Administration will be included in and will be part of the Worldwide Commercialization Plan and the U.S. Development & Commercialization Program.

(d) After any such Regulatory Approval for such Licensed Product for ROW Administration, any such regulatory activities for ROW Administration will be included in and will be part of the Worldwide Commercialization Plan and the ROW Development & Commercialization Program.

(e) Neither Party (itself or by or through any others, including any Affiliates or Sublicensees) will take any material action regarding any such regulatory activities unless described in the U.S. Development Plan, ROW Development Plan or the U.S. Commercialization Plan.

(f) Celgene will deploy and administer any REMS or other safety monitoring activity implemented for the Licensed Product, and be responsible for all pharmacovigilance activities for the Licensed Product.

6.2 Roles. Subject to Section 6.1, Celgene will take the lead and have final authority with respect to any regulatory activities for seeking Regulatory Approval for Elected Candidate and Licensed Product worldwide. Bluebird will have the right (i) to review and provide comments on all Regulatory Data, Regulatory Filings and Regulatory Approvals for U.S. Administration regarding such activities, which comments will be included if reasonable, and (ii) participate in all meeting with any Regulatory Authorities in the United States regarding such activities.

6.3 Ownership. All Regulatory Filings for Elected Candidate and Licensed Product worldwide will be made by Celgene, in Celgene's name, and all Regulatory Filings and Regulatory Approvals for Elected Candidate and Licensed Product worldwide will be solely owned by Celgene.

7. **Manufacture and Supply.**

7.1 Generally. As of and after the CCPS Agreement Effective Date, subject to the terms and conditions of this CCPS Agreement, (i) the Parties will assume through the JGC joint responsibility for (1) Manufacture of Elected Candidate and Licensed Product for Development and (2) Manufacture of Licensed Product for Commercialization for U.S. Administration, each under the Development & U.S.

Commercialization Program, and (ii) Celgene will assume sole responsibility for Manufacturing Licensed Product for Commercialization for ROW Administration and, subject to Section 7.4, Celgene will purchase Vector Supply from Bluebird or its designee for such purpose.

7.2 Manufacturing for Development and Commercialization for U.S. Administration. Prior to Regulatory Approval of Licensed Product in any country, any Manufacturing activities for Development of Elected Candidate and such Licensed Product will be included in and will be part of the Worldwide Manufacturing Plan. After any such Regulatory Approval for such Licensed Product in the United States, any Manufacturing activities for Commercialization of Licensed Product for U.S. Administration will be included in and will be part of the U.S. Commercialization Plan and the U.S. Development and Commercialization Program. Neither Party (itself or by or through any others, including any Affiliates or Sublicensees) will take any material action regarding any such Manufacturing activities unless described in the Worldwide Manufacturing Plan or the U.S. Commercialization Plan, unless approved by the JGC.

7.3 Manufacturing for ROW Administration. Prior to Regulatory Approval of Licensed Product in any country in the ROW, Celgene will provide to the JGC a Manufacturing plan for the ROW in form and substance at least as detailed as the applicable section of the U.S. Commercialization Plan (including covering the applicable three-year time period) (the "ROW Post-Approval Manufacturing Plan"). Celgene (itself or by or through any others, including any Affiliates or Sublicensees) will not materially deviate from the then current ROW Post-Approval Manufacturing Plan when Manufacturing Licensed Product for Commercialization for ROW Administration without first notifying the JGC in writing and providing an updated ROW Post-Approval Manufacturing Plan.

7.4 Vector Manufacturing. Notwithstanding this Section 7:

(a) *Generally*. Bluebird will have the sole right to Manufacture Vector Supply for the Development and Commercialization of Elected Candidate and Licensed Product worldwide, and Celgene will have no rights with respect thereto except as provided in Section 7.4(b)(iv). Except as provided in Section 7.4(b)(iv) or in the Manufacturing and Supply Agreement, neither Celgene nor any Affiliate of Celgene (nor any others on behalf of or under license or sublicense from Celgene or any of its Affiliates) will Manufacture (i) any Vector and associated Payload for Licensed Product or (ii) Licensed Product, except for the Manufacture of Licensed Product using Vector Supply supplied by or on behalf of Bluebird. Except as provided in Section 7.4(b)(iv) or in the Manufacturing and Supply Agreement, Celgene and its Affiliates and Sublicensees will purchase all Vector Supply exclusively from Bluebird or its designee.

(b) *Vector Supply Terms*.

(i) Except as provided in this Section 7.4(b)(iv) or in the Manufacturing and Supply Agreement, Bluebird and its Affiliates will Manufacture, or cause a Third Party to Manufacture, all Vector Supply for all Elected Candidate and Licensed Product required for clinical Development and Commercialization in the Field worldwide, and will have the right to make all necessary decisions regarding arrangements with Third Party manufacturers, provided that Bluebird will reasonably consult with Celgene with respect to all such arrangements and obtain Celgene's prior written consent, which will not be unreasonably withheld, conditioned or delayed. [***]

(ii) The Parties will enter into a "Manufacturing and Supply Agreement," between each other or among the Parties and an Affiliate or a Third Party, covering Vector Supply as soon as reasonably practicable after the CCPS Agreement Effective Date, which agreement will be consistent with and supersede the terms of this Section 7.4(b) and will otherwise be subject in all respects to the terms and conditions of this CCPS Agreement.

(iii) The cost to Celgene of Vector Supply for Commercialization for ROW Administration

will equal [***], unless otherwise agreed by the Parties in writing. The cost of Vector Supply for Commercialization for U.S. Administration will be included in the Cost of Goods Sold. The cost of Vector Supply for Development will be included in the U.S. Development Costs, subject to adjustment as provided therein.

(iv) The Manufacturing and Supply Agreement will include the terms set forth in Appendix K, including terms permitting Celgene to establish "back-up" and/or "second source" rights for Vector Supply and license grants from Celgene to Bluebird under the Celgene Licensed IP to the extent necessary or useful for Bluebird to Manufacture Vector Supply. [***]

(v) At Celgene's request, Bluebird will cooperate with Celgene's reasonable requests, at Celgene's cost and expense, to engage in a technology transfer to allow Celgene, in accordance with Section 7.4(b), to Manufacture Vector Supply (through the first commercial batch of Vector Supply) itself or by through its designated Third Party manufacturer, by transferring all Know-How, Materials, technology and trade secrets Controlled by Bluebird or its Affiliates that are necessary to Manufacture Vector Supply, thereby enabling Celgene (or such Third Party) to Manufacture the Vector Supply.

(vi) Any purchase of Vector Supply from Bluebird or its designee will expressly not include any license rights to any Know-How or Patents, but instead all licenses (implied, by exhaustion or otherwise) will arise under Section 10.1, if and as applicable.

(vii) For the purpose of this CCPS Agreement, certain words and phrases (and their correlatives) relating to Manufacturing will have the meanings set forth on Appendix K.

8. **Supporting Provisions for Development and Commercialization.**

8.1 Co-Co Licenses. In the event that through the JGC the Parties identify Patents, Know-How or Materials of a Third Party that are necessary to Develop and Commercialize Elected Candidate and Licensed Product worldwide, upon JGC recommendation, one or the other Party (or both) will use commercially reasonable efforts to obtain a license or other rights to such Patents, Know-How or Materials for use in connection with the performance of such Development and Commercialization ("Co-Co In-Licenses"). Prior to entering into any Co-Co In-License, the contracting Party will provide a draft copy to the other Party and the other Party will have the right to review and provide comments to such proposed Co-Co In-License. Neither Party will enter into a Co-Co In-License without the prior approval of the JGC, provided that Celgene will be free to enter into any Co-Co In-License for ROW Administration notwithstanding this Section 8.1. If a Party enters into any Co-Co In-Licenses during the CCPS Agreement Term, Appendix E hereto will be updated accordingly to include such Co-Co In-Licenses.

8.2 Records. Each Party will maintain, or cause to be maintained, records of its activities under this CCPS Agreement (including the Development & U.S. Commercialization Program) in sufficient detail and in good manner appropriate for research. Development, Commercialization, scientific, Patent and regulatory purposes, that will properly reflect all work included in the Development & U.S. Commercialization Program and under this CCPS Agreement, for a period of at least ten (10) years after the creation of such records. Each Party will have the right to request a copy of any such records.

8.3 Materials.

(a) Each Party will, during the CCPS Agreement Term, as a matter of course under the U.S. Development & Commercialization Program or ROW Development & Commercialization Program (collectively the "Development & U.S. Commercialization Program") or upon the other Party's reasonable written request, furnish to each other samples of Materials that are in such Party's Control and are necessary for the other Party to carry out its responsibilities hereunder.

(b) Each Party will use such Materials only in accordance with the Development & U.S. Commercialization Program and otherwise in accordance with the terms and conditions of this CCPS Agreement and any instructions provided by the Party furnishing the Materials. Except with the prior written consent of the supplying Party (such consent not to be unreasonably withheld, delayed or conditioned), the Party receiving any Materials will not distribute or otherwise allow the release of Materials to any Affiliate (other than wholly-owned subsidiaries) or Third Party, except for subcontracting as permitted hereunder. All Materials delivered to the receiving Party will remain the sole property of the supplying Party and will be used in compliance with all applicable Law. The Materials supplied under this CCPS Agreement will be used with prudence and appropriate caution in any experimental work because not all of their characteristics may be known.

8.4 Permitted Subcontracting. Each Party may subcontract any of its activities to be performed under the Development & U.S. Commercialization Program to an Affiliate or Third Party, provided that any such Affiliate or Third Party will have entered into a written agreement with such Party that includes terms and conditions protecting and limiting use and disclosure of Confidential Information and Materials and Know-How at least to the same extent as under this CCPS Agreement, and requiring such Affiliate or Third Party and its personnel to assign to such Party all right, title and interest in and to any Patents, Know-How and Materials created, conceived or developed in connection with the performance of subcontracted activities to the extent required to research, Develop, Manufacture and Commercialize Elected Candidate and Licensed Product, provided that with respect to Third Parties that are academic or other non-commercial Persons, a Party will be required only to use commercially reasonable efforts to obtain such assignment. Any such subcontracting activities will be described in the reports for the Collaboration Program required by Section 8.5.

8.5 Reports. The Parties will prepare and provide to the other Party such reports regarding their activities under this CCPS Agreement as the JGC may reasonably require. In addition, each Party will disclose to the other Party information regarding those activities as such Party may reasonable request. Without limiting the foregoing, each Party will prepare and maintain, and will cause its Affiliates and Sublicensees to prepare and maintain, reasonably complete and accurate records regarding the Development of Elected Candidate and Licensed Product, and Commercialization of Licensed Product worldwide after Regulatory Approval therefor. Each Party will provide to the other Party a reasonably detailed report regarding such efforts at least once every calendar year (and more frequently if required by the JGC). Such report will contain sufficient detail to enable a Party to assess the other Party's compliance with its Development and Commercialization obligations hereunder (including under the Development & U.S. Commercialization Program), including information with respect to the following: (i) the design, status and results of any animal studies and clinical trials for Licensed Product; (ii) any regulatory milestones, and any Regulatory Approvals achieved, for Licensed Product; and (iii) activities with respect to selling, promoting, supporting, detailing and marketing of Licensed Product.

9. **In-Licenses.**

9.1 Applicable Bluebird In-Licenses and Other IP.

(a) *Maintenance of Applicable Bluebird In-Licenses*. Bluebird (i) will duly perform and observe all of its obligations under the Applicable Bluebird In-Licenses in all material respects and maintain in full force and effect the Applicable Bluebird In-Licenses, and (ii) will not, without Celgene's prior written consent (such consent not to be unreasonably withheld, conditioned or delayed), (1) amend, modify, restate, cancel, supplement or waive any provision of any Applicable Bluebird In-License, or grant any consent thereunder, or agree to do any of the foregoing, or (2) exercise any right to terminate any Applicable Bluebird In-License in each case ((1) and (2)) that would reasonably be expected to adversely affect in any respect the rights of Celgene under this CCPS Agreement, provided that Bluebird will provide prior written

notice to Celgene of all of the foregoing notwithstanding whether or not any of the foregoing would reasonably be expected to adversely affect in any respect the rights of Celgene under this CCPS Agreement. Bluebird will provide Celgene with written notice as promptly as practicable (and in any event within five (5) business days) after becoming aware of any of the following: (A) any material breach or default by Bluebird or any of its Affiliates of any covenant, agreement or other provision of any Applicable Bluebird In-License, (B) any notice or claim from the counterparty to any Applicable Bluebird In-License terminating or providing notice of termination of any Applicable Bluebird In-License, (C) any notice or claim alleging any breach of default under any Applicable Bluebird In-License, or (D) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events would reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate any Applicable Bluebird In-License. If Bluebird fails to pay any amounts due under any Applicable Bluebird In-License and if such nonpayment would permit the counterparty to such Applicable Bluebird In-License to terminate or suspend the same or any rights thereunder, Celgene will have the right, but not the obligation, in its sole discretion, to pay such amounts on Bluebird's behalf, and any amounts so paid by Celgene may be taken by Celgene as a credit against any amounts payable to Bluebird under this CCPS Agreement.

(b) *Maintenance of Co-Co In-Licenses*. The contracting Party to any Co-Co In-License (i) will duly perform and observe all of its obligations under the Co-Co In-License in all material respects and maintain in full force and effect the Co-Co In-License, and (ii) will not, without the other Party's prior written consent (such consent not to be unreasonably withheld, conditioned or delayed), (1) amend, modify, restate, cancel, supplement or waive any provision of any Co-Co In-License, or grant any consent thereunder, or agree to do any of the foregoing, or (2) exercise any right to terminate any Co-Co In-License in each case ((1) and (2)) that would reasonably be expected to adversely affect in any respect the rights of the non-contracting Party under this CCPS Agreement, provided that the contracting Party will provide prior written notice to the non-contracting Party of all of the foregoing notwithstanding whether or not any of the foregoing would reasonably be expected to adversely affect in any respect the rights of the non-contracting Party under this CCPS Agreement. The contracting Party to any Co-Co In-License will provide the other Party with written notice as promptly as practicable (and in any event within five (5) business days) after becoming aware of any of the following: (A) any material breach or default by such contracting Party or any of its Affiliates of any covenant, agreement or other provision of the Co-Co In-License, (B) any notice or claim from the counterparty to the Co-Co In-License terminating or providing notice of termination of the Co-Co In-License, (C) any notice or claim alleging any breach of default under the Co-Co In-License, or (D) the existence of any facts, circumstances or events which alone or together with other facts, circumstances or events would reasonably be expected (with or without the giving of notice or passage of time or both) to give rise to a breach of or default under or right to terminate the Co-Co In-License. If the contracting Party to a Co-Co In-License fails to pay any amounts due under such Co-Co In-License and if such nonpayment would permit the counterparty to such Co-Co In-License to terminate or suspend the same or any rights thereunder, the other Party will have the right, but not the obligation, in its sole discretion, to pay such amounts on the other Party's behalf, and any amounts so paid by such other Party may be taken by such other Party as a credit against any amounts payable to the other Party under this CCPS Agreement.

(c) [***]

(d) *Applicable Bluebird In-License Requirements*. Celgene will abide, and will cause all its Affiliates and applicable Sublicensees to abide, by all requirements of each Applicable Bluebird In-License in all material respects (and in any case in all respects in the case that failure to so abide would result in a breach under the Applicable Bluebird In-License), to the extent applicable to sublicensees thereunder and to the extent disclosed by Bluebird to Celgene, with the understanding that disclosure by Bluebird of any Applicable Bluebird In-License to Celgene will be deemed disclosure of such requirements of such

Applicable Bluebird In-License to Celgene. In the event of a termination of any Applicable Bluebird In-License, Bluebird agrees, to the extent requested by Celgene, to reasonably assist Celgene in securing a direct license from the applicable licensor under any Patents, Materials and Know-How that was licensed to Bluebird and sublicensed to Celgene hereunder prior to such termination. In addition, Bluebird agrees, if requested by Celgene, to reasonably assist Celgene in securing a standby license from the applicable licensor under any Patents, Materials and Know-How that are licensed to Bluebird and sublicensed to Celgene.

(e) *Applicable Co-Co In-License Requirements*. Each non-contracting Party to a Co-Co In-License will abide, and will cause all its Affiliates and applicable Sublicensees to abide, by all requirements of each such Co-Co In-License in all material respects (and in any case in all respects in the case that failure to so abide would result in a breach under the Co-Co In-License), to the extent applicable to sublicensees thereunder and to the extent disclosed by the contracting Party to the non-contracting Party, with the understanding that disclosure by the contracting Party of any Co-Co In-License to the non-contracting Party will be deemed disclosure of such requirements of such Co-Co In-License to the non-contracting Party. In the event of a termination of any Co-Co In-License, the contracting Party agrees, to the extent requested by the non-contracting Party, to reasonably assist the non-contracting Party in securing a direct license from the applicable licensor under any Patents, Materials and Know-How that was licensed to the contracting Party and sublicensed to the non-contracting Party hereunder prior to such termination. In addition, the contracting Party agrees, if requested by the non-contracting Party, to reasonably assist the non-contracting Party in securing a standby license from the applicable licensor under any Patents, Materials and Know-How that are licensed to the contracting Party and sublicensed to the non-contracting Party hereunder. [***]

10. **License Grants.**

10.1 Development and Commercialization Licenses by Bluebird. Subject to the terms and conditions of this CCPS Agreement, Bluebird hereby grants to Celgene:

(a) a co-exclusive (with Bluebird and its Affiliates) license, with the right to sublicense only as permitted by Section 10.3, under Bluebird Licensed IP and Bluebird Regulatory Rights, (i) to Develop (including for clarity Manufacture) Elected Candidate and Licensed Product for U.S. Administration and (ii) to Commercialize (including for clarity Manufacture) Licensed Product for U.S. Administration;

(b) a worldwide, exclusive (even as to Bluebird) license, with the right to sublicense only as permitted by Section 10.3, under Bluebird Licensed IP and Bluebird Regulatory Rights, (i) Develop (including for clarity Manufacture (other than Vectors)) Elected Candidate and Licensed Product for ROW Administration and (ii) to Commercialize (including for clarity Manufacture (other than Vectors)) Licensed Product for ROW Administration; and

(c) a worldwide, co-exclusive (with Bluebird and its Affiliates) license, with the right to sublicense only as permitted by Section 10.3, under Bluebird Licensed IP and Bluebird Regulatory Rights, to Manufacture Vectors and associated Payloads for Licensed Product for ROW Administration.

Further, (i) the foregoing licenses to Bluebird Regulatory Rights include the right to reference same, (ii) the licenses to Commercialize granted in this Section 10.1 will cover only the sale and offer for sale of Licensed Product in finished form and not the sale or offer for sale of Vectors and associated Payloads (other than as and to the extent incorporated in the Licensed Product), and (iii) rights to Manufacture Vectors and associated Payloads are included within the scope of the licenses granted to Celgene under this Section 10.1, which rights are subject to the terms and conditions of Section 7.4(b).

10.2 Development and Commercialization Covenant Not To Sue by Celgene.

(a) Subject to the terms and conditions of this CCPS Agreement, Celgene agrees that neither

it nor its Affiliates will sue, assert any claim against, or otherwise participate in any action or proceeding against Bluebird or any of its Affiliates, sublicensees, contractors (including suppliers and manufacturers) or agents, or cause or authorize any Person to do any of the foregoing, under the Celgene Licensed IP and Celgene Regulatory Rights, with respect to Bluebird's (i) Development (including for clarity Manufacture) of Elected Candidate and Licensed Product for U.S. Administration and (ii) Commercialization (including for clarity Manufacture) of Licensed Product for U.S. Administration, all as part of the Development & U.S. Commercialization Program; and (iii) Manufacture of Vectors and associated Payloads for Licensed Product for ROW Administration.

(b) Celgene will require that any Person that takes after the CCPS Agreement Effective Date any license or right in or to any Celgene Licensed IP and Celgene Regulatory Rights that is subject to the covenant not to sue in Section 10.2(a) is subject to the covenants not to sue set forth in this Section 10.2.

For clarity, (i) the foregoing covenants not to sue regarding Celgene Regulatory Rights includes the right to reference same, (ii) such covenants not to sue with respect to the Commercialization granted in this Section 10.2 will cover only the sale and offer for sale of Licensed Product in finished form, and (iii) Manufacture of Vectors and associated Payloads is included within the scope of the covenants not to sue granted to Bluebird under this Section 10.2.

10.3 Licensing and Sublicensing Rights.

(a) *Transfer*. The licenses and covenants granted in Sections 10.1 and 10.2 are transferable only upon a permitted assignment of this CCPS Agreement in accordance with Section 18.12.

(b) *Other Licenses*. Either Party can grant licenses to its own Licensed IP to its Affiliates and other Third Parties, subject to the terms of this CCPS Agreement (including the exclusivity and co-exclusivity provided for in the licenses granted in Sections 10.1 and 10.2).

(c) *Sublicenses*. The licenses and covenants granted in Sections 10.1 and 10.2 may be sublicensed, in full or in part, by the licensee Party by a written agreement to its Affiliates and Third Parties (with the right to sublicense through multiple tiers), provided, that as a condition precedent to and requirement of any such sublicense:

(i) Celgene will obtain Bluebird's written consent prior to granting to a Third Party any sublicense of the licenses granted by Bluebird in Section 10.1 with respect to the Development or Commercialization of Licensed Product for U.S. Administration (such consent not to be unreasonably withheld, delayed or conditioned).

(ii) Bluebird will obtain Celgene's written consent prior to granting to a Third Party any sublicense of the covenant not to sue granted by Celgene in Section 10.2, or any other right to license, with respect to the Development or Commercialization of Licensed Product for U.S. Administration (such consent not to be unreasonably withheld, delayed or conditioned).

(iii) The licensee Party will provide the licensor Party with a copy of any sublicense agreement with a non-Affiliated Sublicensee within thirty (30) days of execution thereof, and to the extent permitted under any Applicable Bluebird In-License, such sublicense agreement may be redacted as necessary to protect commercially sensitive information;

(iv) The licensor Party will be responsible for any and all obligations of such Sublicensee as if such Sublicensee were such licensee Party hereunder;

(v) Any such Sublicensee will agree in writing to be bound by substantially identical obligations as such licensee Party hereunder with respect to the activities of such Sublicensee hereunder (and not with respect to the activities of any other), including any Know-How disclosure obligations such

licensee Party has to the licensor Party hereunder with respect to the activities of such Sublicensee hereunder (but excluding payment obligations); and

(vi) The licensor Party will be made an express third-party beneficiary of any such Sublicensee's obligations under such sublicense agreement that relate to compliance with the terms and conditions of this CCPS Agreement.

10.4 Exclusivity.

(a) During the CCPS Agreement Term, neither Party nor its Affiliates (nor any others on behalf of or with, or under license (including a covenant not to sue) or sublicense from, such Party or any of its Affiliates) will research, Develop, Manufacture or Commercialize any actual or potential products (including Vectors and associated Payloads) to be used in the Field (which, for the purposes of this Section 10.4(a), will include all indications and will not be limited to cancer) that specifically target the Target Antigen, other than pursuant to this CCPS Agreement (which includes, for avoidance of doubt, research, Development, Manufacture and Commercialization of improved and modified versions of the Licensed Product by Celgene) or any other Development & U.S. Commercialization Agreement (which includes, for avoidance of doubt, research, Development, Manufacture and Commercialization of improved and modified versions of the Licensed Product pursuant to this CCPS Agreement).

(b) Notwithstanding Section 10.4(a), if (i) a Business Combination occurs with respect to either Party with a Third Party or (ii) a Party acquires a Third Party (including by a merger or consolidation) so that such Third Party becomes an Affiliate over which the acquiring Party has control (as defined in the definition of Affiliate), or (iii) a Party acquires all or substantially all of the assets of a Third Party (including any Subsidiaries or divisions thereof) (each of (i), (ii) and (iii), a "Business Acquisition"; such Party, the "Business Party"), and, in each case, the Third Party (or any of such Third Party's Affiliates or any successors or assigns of such Third Party or such Third Party's Affiliates, other than the Business Party and its Affiliates as of the Business Acquisition) (a) already has, or the acquired assets contain, as applicable, a program that existed prior to, or was planned prior to and is demonstrably to be implemented shortly after, the Business Acquisition or (b) initiates and pursues a new program following such Business Acquisition, in each case that would otherwise violate Section 10.4(a) (a "Business Program"), then such Third Party (or any of such Third Party's Affiliates or any successors or assigns of such Third Party or such Third Party's Affiliates, other than the Business Party and its Affiliates as of the Business Acquisition), as applicable, will be permitted to initiate, pursue and continue such Business Program after such Business Acquisition and such initiation, pursuit and continuation will not constitute a violation of Section 10.4(a); provided however that (A) none of the Bluebird Licensed IP or Celgene Licensed IP, as the case may be, or other Patents, Materials or Know-How Controlled by the other Party and, in each case, licensed to the Business Party will be used in the Business Program, and (B) the research or Development activities required under this CCPS Agreement will be conducted separately from any research or Development activities directed to such Business Program, including the maintenance of separate lab notebooks and records (password-protected to the extent kept on a computer network) and separate personnel working on each of the activities under this CCPS Agreement and the activities covered under such Business Program. [***]

10.5 Contract Manufacturers. Subject to the terms and conditions of this CCPS Agreement, either Party will have the right to appoint by a written agreement "contract manufacturers", meaning any Third Party or Affiliate of such Party that Manufactures Licensed Product (or components therefor, including for Bluebird, Vectors and associated Payloads) for re-sale, but who itself is not a "Sublicensee" hereunder and thereby exercises "have made" rights granted by the other Party hereunder, as applicable, as well as "contract research organizations" and other providers performing services on a Party's behalf, none of which will be deemed a "Sublicensee" hereunder. Such Party will be responsible for any such contract

manufacturer, contract research organization or service provider hereunder, and further will require any such contract manufacturer, contract research organization or service provider to agree in writing to comply with Sections 10.6 and 15.

10.6 No Implied Rights. No license, sublicense or other right is or will be created or granted hereunder by implication, estoppel or otherwise. Any licenses, sublicenses or rights will be granted only as expressly provided in this CCPS Agreement. Neither Party will practice or otherwise use any Licensed IP of the other Party other than in accordance with the licenses granted in Section 10.1 and Section 10.2, as applicable.

10.7 Additional IP; Other In-Licenses.

(a) *Additional IP*. Except as set forth in Section 10.7(b), Celgene may, on or after the CCPS Agreement Effective Date, elect to include within the scope of the Bluebird Licensed IP any Know-How, Material, Patent, Regulatory Data, Regulatory Filings or Regulatory Approvals ("Additional Bluebird IP"), that would be Controlled by Bluebird but for required payments of Additional Payments to a Third Party, by (i) providing notice to Bluebird of same and (ii) agreeing to pay and in fact paying all Additional Payments with respect to Celgene's access or license to such Additional Bluebird IP. Following Bluebird's receipt of such notice and subject to Celgene's performance of its obligations to pay any Additional Payments with respect to Celgene's access or license to such Additional Bluebird IP, such Additional Bluebird IP will be deemed Bluebird Licensed IP hereunder. For avoidance of doubt, this Section 10.7(a) does not apply to Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals licensed to Bluebird under the Applicable Bluebird In-Licenses, all of which are deemed Controlled by Bluebird notwithstanding the terms of this Section 10.7(a).

(b) *Other In-Licenses*. Celgene may, on or after the CCPS Agreement Effective Date, elect to convert any Other In-License to an Applicable New In-License by providing notice to Bluebird of same. Upon Bluebird's receipt of such notice, such Other In-License will be an Applicable New In-License hereunder, Appendix B will automatically be updated to include such New In-License and the provisions of this CCPS Agreement applicable to New In-Licenses, including Section 11.1, will apply with respect to such Other In-License.

10.8 Section 365(n) of the Bankruptcy Code. All rights and licenses granted pursuant to any section of this CCPS Agreement are, and will be deemed to be, rights and licenses to "intellectual property" (as defined in Section 101(35A) of title 11 of the United States Code and of any similar provisions of applicable Laws under any other jurisdiction (the "Bankruptcy Code")). Each Party agrees that the other Party, as a licensee of rights and licenses under this CCPS Agreement, will retain and may fully exercise all of its rights and elections under the Bankruptcy Code. The Parties further agree that, in the event of the commencement of a bankruptcy proceeding by or against a Party under the Bankruptcy Code or analogous provisions of applicable Law outside the United States, the other Party will be entitled to a complete duplicate of (or complete access to, as appropriate) any intellectual property licensed to it and all embodiments of such intellectual property, which, if not already in its possession, will be promptly delivered to it (a) upon any such commencement of a bankruptcy proceeding upon such other Party's written request therefor, unless the Party involved in the bankruptcy proceeding elects to continue to perform all of its obligations under this CCPS Agreement or (b) if not delivered under clause (a), following the rejection of this CCPS Agreement by the Party in the bankruptcy proceeding upon written request therefor by the other Party.

11. **Payments and Royalties.**

11.1 Payments for In-Licenses.

(a) *United States*. With respect to the Development and Commercialization of Elected Candidate and Licensed Product for U.S. Administration hereunder, if any payments become due under any Applicable Pre-Existing In-License, Applicable New In-Licenses, Co-Co In-Licenses or Celgene Licensed Product In-License during the CCPS Agreement Term, the contracting Party thereto will pay same and such payment will be treated as U.S. Development Expenses or Allowable Expenses, as appropriate, provided [***].

(b) *ROW*. With respect to the Development and Commercialization of Elected Candidate and Licensed Product for ROW Administration hereunder (including the Manufacture of Vectors and associated Payloads therefor pursuant to Section 7.2):

(i) *Applicable Pre-Existing In-Licenses*. If any In-License Payment becomes due under any Applicable Pre-Existing In-License during the CCPS Agreement Term, Bluebird will pay same, provided that Celgene will reimburse Bluebird for any such In-License Payment applicable to ROW Administration within thirty (30) days of Celgene's receipt of Bluebird's written invoice therefor, which In-License Payments (other than payments that are royalties) will not exceed [***], and subject to Section 13.1. Any such reimbursement by Celgene to Bluebird (1) is in addition to and not in lieu of the other payments required by this Section 11 and (2) will not be subject to Section 11.3(d).

(ii) *Applicable New In-Licenses*. Celgene may elect to take a sublicense under any New In-License of Bluebird or its Affiliates and upon such election, such New In-License will be an Applicable New In-License hereunder for all purposes. For the purposes of determining the Parties' respective payment obligations, all Applicable New In-Licenses as of and following the CCPS Agreement Effective Date will be listed on Appendix B. If any In-License Payment becomes due under any Applicable New In-License during the CCPS Agreement Term with respect to ROW Administration, Bluebird will pay same and, subject to Section 13.1, Celgene will reimburse Bluebird for (i) [***] of such payment that are royalties, which royalties will be subject to Section 11.3(d), and (ii) [***] of such payment that are not royalties, in each case ((i) and (ii)) within thirty (30) days of receipt of Bluebird's written invoice therefor. If Celgene elects to convert an Other In-License to an Applicable In-License pursuant to Section 10.7(b), Celgene will reimburse Bluebird for [***] of any In-License Payments that became due under such Applicable New In-License during the CCPS Agreement Term with respect to ROW Administration to the same extent as if such Applicable New In-License was designated as such as of the CCPS Agreement Effective Date, including with respect to applicable Patent Costs in accordance with Section 6.1, provided that Bluebird provides Celgene with a reasonable accounting of same. If any In-License Payments are royalties due under any Applicable New In-License during the CCPS Agreement Term with respect to Licensed Product for ROW Administration, such royalties will be subject to Section 11.3(d). To the extent that any grant of a sublicense by Celgene or any Sublicensees under an Applicable New In-License triggers a payment obligation under such Applicable New In-License, Bluebird will pay same and Celgene will reimburse Bluebird for [***] of such payment within thirty (30) days of receipt of Bluebird's written invoice therefor. To the extent that any grant of a sublicense by Bluebird or any Sublicensees under a Celgene Licensed Product In-License triggers a payment obligation under such Celgene Licensed Product In-License, Celgene will pay same and Bluebird will reimburse Celgene for [***] of such payment within thirty (30) days of receipt of Celgene's written invoice therefor.

(iii) If any payments become due under any Co-Co In-Licenses during the CCPS Agreement Term with respect to Licensed Product for ROW Administration, the contracting Party will pay same, and further if Bluebird is the contracting Party, Celgene will reimburse Bluebird for such payment

within thirty (30) days upon receipt of Bluebird's written invoice therefor, subject to Section 13.1. Any such reimbursement by Celgene to Bluebird (1) is in addition to and not in lieu of the other payments required by this Section 11 and (2) will not be subject to Section 11.3(d). If any payments are royalties due under any Co-Co In-License during the CCPS Agreement Term with respect to Licensed Product for ROW Administration, such royalties will be subject to Section 11.3(d).

(iv) If any payments become due under any Celgene Licensed Product In-License with respect to Licensed Product for ROW Administration, Bluebird will be responsible for [***] of such payments as provided in Section 4.1(e) of the Master Collaboration Agreement, provided that if any such payments are royalties with respect to Licensed Product for ROW Administration, such royalties will be subject to Section 11.3(d).

11.2 Milestone Payments.

(a) *Generally*. Celgene will make milestone payments (each, a "Milestone Payment") to Bluebird upon the occurrence of each of the milestones events (each, a "Milestone Event") as set forth below in this Section 11.2. Each of the Milestone Payments will be payable to Bluebird by Celgene within forty-five (45) days of the achievement of the specified Milestone Event, and such payments when owed or paid will be non-refundable and non-creditable, and not subject to set-off, except as otherwise set forth in Sections 4.3(c), 9.1(a), 9.1(b), 17.3(c) and 17.6 hereof or Sections 4.1(e), 4.3 and 10.6 of the Master Collaboration Agreement. Except with respect to Modified Licensed Products, each of the Milestone Payments are payable only once in total under this CCPS Agreement, whether achieved by one or more Licensed Products. Notwithstanding the foregoing, Bluebird will be entitled to receive [***] of the Milestone Payments below, other than the Milestone Payment for the first Milestone Event [***], for the [***] for each new Modified Licensed Product.

(b) *Development Milestones*.

[***]

11.3 Royalties for Licensed Product for ROW Administration.

(a) *Rates*. Subject to the remainder of this Section 11.3, Celgene will pay to Bluebird running royalties, on a Licensed Product-by-Licensed Product basis, based on the total aggregate annual Net Sales by Selling Parties of such Licensed Product for ROW Administration in a given calendar year based on the Royalty Rate in the table set forth below.

[***]

By way of example, in a given calendar year, if the aggregate annual Net Sales for a Licensed Product for ROW Administration is [***], the following royalty payment would be payable for those Net Sales under this Section 11.3(a): [***]

The Parties acknowledge and agree that for the purposes of calculating royalties under this Section 11.3(a), the country of sale for Licensed Product will be deemed to be the country in which such Licensed Product is administered to a patient.

(b) *Royalty Term*. Royalties under Section 11.3(a) will be payable, on a Licensed Product-by-Licensed Product and country-by-country basis, on the Net Sales of any Licensed Product for ROW Administration if at least one of the following two (2) conditions apply:

(i) if one or more Valid Claims within any of Patents included within the Bluebird Licensed IP Covers in such country such Licensed Product for ROW Administration [***].

(c) *Royalty Reduction*. If Licensed Product is royalty-bearing only on account of Section 11.3(b)(ii), then the royalty rates set forth in Section 11.3(a) with respect to Net Sales attributable to Licensed Product will be reduced by [***].

(d) *Third Party Royalty Payments – ROW Administration*. As provided in Section 11.1(b), if Celgene (or its Sublicensee) is required to pay to a Third Party under any New In-License or Co-Co License or any Celgene Licensed Product In-License, any royalties for Commercialization of Licensed Product for ROW Administration, or if Celgene or its Sublicensee, in its reasonable judgment, is required to obtain a license from any Third Party under any Patent Covering Licensed Product in order to Develop or Commercialize such Licensed Product for ROW Administration, and if Celgene (or its Sublicensee) is required to pay to such Third Party under such license any royalties, and the infringement of such Patent cannot reasonably be avoided by Celgene or its Sublicensee, or if Celgene (or its Sublicensee) is required by a court of competent jurisdiction to pay royalties or lost profits to a Third Party based on a Patent as a result of the such Commercialization (and the infringement of such Patent cannot reasonably be avoided by Celgene or its Sublicensee), then the amount of Celgene's royalty obligations under this Section 11.3 will be reduced by [***] of the amount of such royalties paid to such Third Party, provided however, that the royalties payable under Section 11.3(a) will not be reduced in any such event below [***] of the amounts set forth in Section 11.3(a) (but as may be further reduced pursuant to Section 11.3(c) or 11.3(e)) for each royalty tier. Any royalties payable under any Applicable Pre-Existing In-Licenses may not be deducted under this Section 11.3(d) from royalties owed to Bluebird. Any royalties payable under any Applicable New In-Licenses, Celgene Licensed Product In-Licenses and Co-Co Licenses may be deducted under this Section 11.3(d) from royalties owed to Bluebird. Celgene (or its Sublicensee) will use its commercially reasonable efforts to minimize the amount of any of the foregoing payments owed to Third Parties. Prior to Celgene or its Sublicensee exercising its reasonable judgment under this Section 11.3(d), Celgene will provide Bluebird with written notice of a potential need to obtain any license from Third Parties. The Parties will discuss the best course of action to resolve such potential license requirement(s). For clarity, the Parties acknowledge and agree that, notwithstanding anything in this CCPS Agreement to the contrary, no royalties or other amounts payable by Celgene (or its Sublicensee) to a Third Party with respect to Licensed Product for U.S. Administration may act to reduce the amount of Celgene's royalty obligations under this Section 11.3.

(e) [***]

(f) *Additional Royalty Provisions*. The royalties payable under Section 11.3(a) will be subject to the following:

(i) only one royalty will be payable hereunder with respect to each Licensed Product unit;

(ii) royalties when owed or paid hereunder will, except as provided in Section 11.3(b), be non-refundable and non-creditable and not subject to set-off, except as otherwise provided in 9.1(b), 17.3(d) and 17.6 hereof or Sections 4.1(e), 4.3 and 10.6 of the Master Collaboration Agreement; and

(iii) except as expressly set forth in Section 11.3(c), Section 11.3(d) and Section 11.3(e), no other royalty deductions are permitted hereunder

11.4 Profit & Loss Share for Licensed Product for U.S. Administration. The Parties will share in Operating Profit or Loss with respect to Licensed Product for U.S. Administration as follows: Bluebird will bear (and be entitled to) fifty percent (50%), and Celgene will bear (and be entitled to) fifty percent (50%) (the "Profit & Loss Share"). Procedures for calendar quarterly reporting of actual results and review and discussion of potential discrepancies, quarterly reconciliation, reasonable forecasting, and other finance and accounting matters, are set forth in Appendix F, and to the extent not set forth in Appendix F, will be established by the JGC, subject to Section 11.5(e).

11.5 Payment Terms for Milestones and Royalties Due Hereunder. [***]

11.6 *Mutual Convenience of the Parties*. The royalty and other payment obligations set forth hereunder have been agreed to by the Parties for the purpose of reflecting and advancing their mutual convenience, including the ease of calculating and paying royalties and other amounts to Bluebird.

12. **Ownership and Inventorship of IP.**

12.1 Solely-Owned IP. Subject to Section 12.2, as between the Parties, each Party will own and retain all right, title and interest in and to any and all Know-How and Patents arising therefrom that are discovered, created, conceived, developed or reduced to practice solely by or on behalf of such Party under or in connection with this CCPS Agreement, including as part of the Development & U.S. Commercialization Program ("Solely Owned IP"). Subject to the licenses hereunder and the other terms and conditions of this CCPS Agreement, each Party will be solely responsible for the Prosecution and Maintenance, and the enforcement and defense, of any Patents within its Solely Owned IP, and the other Party will have no rights with respect thereto.

12.2 Joint IP. The Parties will jointly own any and all Know-How and Patents arising therefrom that are discovered, created, conceived, developed or reduced to practice jointly by or on behalf of the Parties under or in connection with this CCPS Agreement, including as part of the Development & U.S. Commercialization Program ("Joint IP"). Each Party will have an undivided one-half interest in and to Joint IP. Each Party will exercise its ownership rights in and to such Joint IP, including the right to license and sublicense or otherwise to exploit, transfer or encumber its ownership interest, without an accounting or obligation to, or consent required from, the other Party, but subject to the licenses hereunder and the other terms and conditions of this CCPS Agreement, including Section 10.4. At the reasonable written request of a Party, the other Party will in writing grant such consents and confirm that no such accounting is required to effect the foregoing regarding Joint IP. Each Party, for itself and on behalf of its Affiliates, licensees and sublicenses, and employees, subcontractors, consultants and agents of any of the foregoing, hereby assigns (and to the extent such assignment can only be made in the future hereby agrees to assign), to the other Party a joint and undivided interest in and to all Joint IP. The Prosecution and Maintenance, and the enforcement and defense, of any Patents within Joint IP will be jointly managed by the Parties on mutually agreeable terms to be entered into by the Parties at the time any such Patents are first filed, provided that (i) all recoveries and Patent Costs arising from the enforcement or defense of any Patents within Joint IP, absent further agreement, will be shared by the Parties in accordance with Section 14.2 (provided that sufficient advance written notice of any such Patent Costs is given to the Party not incurring same) and (ii) Patent Costs incurred in connection with the Prosecution and Maintenance of Patents within Joint IP will be apportioned as set forth in Sections 13.1 and 13.3, provided that in each case ((i) and (ii)), and all recoveries and Patent Costs arising from those activities, absent further agreement, will be shared equally by the Parties (provided that sufficient advance written notice of any such Patent Costs is given to the Party not incurring same), provided that if either Party elects not to pay any such Patent Costs for any such Patent, the Parties will meet and agree upon an equitable way to treat such Patent.

12.3 Inventorship. Inventorship determination for all Patents worldwide arising from any Know-How discovered, created, conceived, developed or reduced to practice by or on behalf of the Parties under or in connection with this CCPS Agreement and thus the ownership thereof will be made in accordance with applicable United States patent Laws.

12.4 Allocation. Notwithstanding Sections 12.1 – 12.3, the Patent Committee may allocate ownership of a particular item of intellectual property to improve the prospects of obtaining patent protection with respect to such item of intellectual property, even if such allocation is not in accordance with the terms of Sections 12.1 – 12.3, so long as the Parties mutually agree to such allocation.

13. **Patent Prosecution and Maintenance.**

13.1 Generally. Subject to Sections 13.2 and 13.3, each Party will have the sole right to Prosecute and Maintain Patents within its respective Licensed IP. Bluebird will use commercially reasonable efforts to, where applicable and permitted under applicable Law and upon Celgene's reasonable request, separate parent Patent applications within the Bluebird Licensed IP into one or more separate Patent applications for Specific Patents, where doing so would not reasonably be expected to materially harm any Patent within the Bluebird Licensed IP or other Patents owned by Bluebird or its Affiliates, provided that the foregoing limitation will not apply to Bluebird Licensed IP that is Collaboration IP. [***]

13.2 Input. Each Party will regularly provide the other with copies of all applications for Patents within its respective Licensed IP, and all other material submissions and correspondence with any patent authorities regarding such Patents, in sufficient time to allow for review and comment by the other Party. In addition, each Party will provide the other Party and its counsel with an opportunity to consult with such Party and its counsel regarding Prosecution and Maintenance of any such Patents within the Field, and such Party will consider in good faith all such comments timely made by such other Party and its counsel. In the event of any disagreement between the Parties, the licensor Party will have the final decision-making authority with respect to the matter involved as long as the licensor Party acts in good faith.

13.3 Specific Patents. For any Patent within the Bluebird Licensed IP [***] (each "Specific Patent"), the following will apply: upon Celgene's written request, and provided that Bluebird reasonably agrees with Celgene that the following Prosecution and Maintenance activities would not materially harm any other Patent within the Bluebird Licensed IP or other Patents owned by Bluebird or its Affiliates (other than Collaboration IP), Celgene will control the Prosecution and Maintenance of the Specific Patents, and notwithstanding anything in Section 13.1 to the contrary, Celgene will be solely responsible for the payment of all related Patent Costs. In addition, Celgene will provide Bluebird and its counsel with an opportunity to consult with Celgene and its counsel regarding Prosecution and Maintenance of any such Specific Patents, and Celgene will include or reflect all reasonable comments timely made by Bluebird and its counsel. Celgene acknowledges and agrees that Bluebird may grant similar rights to other exclusive Third Party licensees under any Patent within the Bluebird Licensed IP that has claims Covering only a product that is not a Licensed Product (or its manufacture or use) and no other product (or its manufacture or use), other than Specific Patents. If the Parties cannot agree whether or not any Patent within the Bluebird Licensed IP is a Specific Patent, or if Bluebird claims that the foregoing Prosecution and Maintenance activities would materially harm any other Patent within the Bluebird Licensed IP or other Patents owned by Bluebird or any of its Affiliates, either of the Parties may refer such dispute to a mutually agreeable, disinterested, conflict-of-interest-free individual not affiliated or consulting with either Party and who has at least fifteen (15) years of patent prosecution experience in the pharmaceutical field. Any such arbitration will be conducted under the then-current rules of the American Arbitration Association, and the decision of the arbitrator will be final.

13.4 Election Not to Prosecute or Maintain or Pay Patent Costs. If a Party elects not (i) to Prosecute or Maintain any Patents within its respective Licensed IP in any particular country before the applicable filing deadline or continue such activities once filed in a particular country, or (ii) to pay the Patent Costs associated with Prosecution or Maintenance of any Patents within the Licensed IP as required by Section 13.1, then in each such case such first Party will so notify the other Party, promptly in writing and in good time to enable any deadlines by which an action must be taken to preserve such Patent in such country to be met. Upon receipt of each such notice by such first Party, such other Party will have the right, but not the obligation, to notify such first Party in writing on a timely basis that such other Party will continue the Prosecution or Maintenance of such Patent on terms the Parties shall mutually agree; it being understood that only U.S. Patents controlled by Celgene will be subject to this sentence. Notwithstanding

the foregoing, upon receipt of each such notice by Bluebird, Celgene will have the right, but not the obligation, to notify Bluebird in writing on a timely basis that Celgene will assume control of the Prosecution or Maintenance of such Patent within the Bluebird Licensed IP, and bear the Patent Costs thereafter incurred by Celgene with respect thereto. In addition, Celgene will provide Bluebird and its counsel with an opportunity to consult with Celgene and its counsel regarding Prosecution and Maintenance of any such Patents, and Celgene will include or reflect all reasonable comments timely made by Bluebird and its counsel. If after making such election, Celgene elects not to pay the Patent Costs associated with Prosecution or Maintenance of any such Patent, then in each such case Celgene will so notify Bluebird and on the ninetieth (90th) day after Bluebird's receipt of such notice such Patent will no longer be licensed to Celgene hereunder and will no longer be included within the "Bluebird Licensed IP" hereunder.

13.5 Third Party Rights. To the extent that a Third Party licensor of a Party has retained any right to Prosecute or Maintain any Patent within such Party's Licensed IP licensed to the other Party hereunder, or otherwise be involved in such activities, such Party will use commercially reasonable efforts to cause such Third Party licensor to take the actions specified by this Section 13 (including Sections 13.6 and 13.7) in a manner consistent with the in-license applicable thereto, but such Party will not be deemed to be in breach of its obligations under this Section 13 if, after using such commercially reasonable efforts, it is unable to comply with such obligations because of actions taken or not taken by such Third Party licensor.

13.6 Patent Extensions. Subject to the remainder of this Section 13.6, if any election for patent term restoration or extension, supplemental protection certificate or any of their equivalents may be made with respect to any Patent within the Licensed IP, after consultation through the JGC. If the Parties are not able to reach mutual agreement, (i) Celgene will have the sole right to make the final decision whether or not to seek such patent term restoration or extension, supplemental protection certificate or any of their equivalents with respect to Specific Patents and Patents within the Collaboration IP licensed to Celgene hereunder and the Celgene Licensed IP, and (ii) Bluebird will have the sole right to make the final decision whether or not to seek such patent term restoration or extension, supplemental protection certificate or any of their equivalents with respect to all other Patents within the Bluebird Licensed IP.

13.7 Regulatory Exclusivity Periods. With respect to any Patent listings required for any Regulatory Exclusivity Periods for Product, the Parties will mutually agree on which Patents within the Licensed IP to list, provided that if the Parties are not able to agree, Celgene will have the right to make the final decision, and provided further that the exercise of such right by Celgene will not increase or otherwise change the rights or obligations of the Parties hereunder.

13.8 Cooperation. Each Party will reasonably cooperate with the other Party in the Prosecution and Maintenance of Patents within the Licensed IP. Such cooperation includes promptly executing all documents, or requiring inventors, subcontractors, employees and consultants and agents of such Party and its Affiliates and Sublicensees to execute all documents, as reasonable and appropriate so as to enable the Prosecution and Maintenance of any such Patents in any country.

13.9 Patent Marking. For Licensed Product for U.S. Administration, the JGC will determine the Patent marking requirements in accordance with applicable Law. For Licensed Product for ROW Administration, Celgene will mark, and will cause all other Selling Parties to mark, Product with all Patents within the Bluebird Licensed IP in accordance with applicable Law, which marking obligation will continue for as long as (and only for as long as) required under applicable Law.

13.10 Common Interest Disclosures. With regard to any information or opinions disclosed pursuant to this CCPS Agreement by one Party to the other Party regarding Prosecution and Maintenance of Patent within the Licensed IP, or enforcement of intellectual property and/or technology by or against Third Parties, Bluebird and Celgene agree that they have a common legal interest in determining the ownership,

scope, validity and/or enforcement of the Licensed IP, and whether, and to what extent, Third Party intellectual property rights may affect the conduct of the Development and Commercialization of any Licensed Product, and have a further common legal interest in defending against any actual or prospective Third Party claims based on allegations of misuse or infringement of intellectual property rights relating to the Development or Commercialization of any Licensed Product. Accordingly, the Parties agree that all such information and materials obtained by the Parties from each other will be used solely for purposes of the Parties' common legal interests with respect to the conduct of the Agreement. All such information and materials will be treated as protected by the attorney-client privilege, the work product privilege, and any other privilege or immunity that may otherwise be applicable. By sharing any such information and materials, neither Party intends to waive or limit any privilege or immunity that may apply to the shared information and materials. Neither Party will have the authority to waive any privilege or immunity on behalf of the other Party without such other Party's prior written consent, nor will the waiver of privilege or immunity resulting from the conduct of one Party be deemed to apply against any other Party. This Section 13.10 will be subject to any right granted by either Party to any Third Party, provided that the grant of such right to such Third Party does not conflict with the other Party's rights or the first Party's obligations under this CCPS Agreement.

14. **Patent Enforcement and Defense.**

14.1 Notice. Each Party will promptly notify, in writing, the other Party upon learning of any actual or suspected Competitive Infringement of any Patents within the Licensed IP by a Third Party, or of any claim of invalidity, unenforceability, or non-infringement of any Patents within the Licensed IP, and will, along with such notice, supply the other Party with any evidence in its possession pertaining thereto. For purposes of this CCPS Agreement, "Competitive Infringement" means any allegedly infringing activity in the Field (which, for the purposes of this definition, will include all indications and will not be limited to cancer) with respect to a Patent within the Licensed IP, which activity (i) falls within the scope then in effect of the licenses granted by Bluebird to Celgene as set forth in Sections 10.1 and 10.2, (ii) is subject to Section 14.2(f), or (iii) would be competitive with a Licensed Product and targets the same Target Antigen as such Licensed Product.

14.2 Enforcement and Defense. [***]

15. **Confidentiality.**

The Parties acknowledge and agree that terms of this CCPS Agreement and all Materials, ideas and information of any kind, whether in written, oral, graphical, machine-readable or other form, whether or not marked as confidential or proprietary, which are transferred, disclosed or made available by a Party or at the request of a Party, including any of the foregoing of Third Parties, will be subject to the provisions of Section 10 of the Master Collaboration Agreement. The Parties agree to issue the joint press release on Appendix G promptly following the CCPS Agreement Effective Date. A redacted version of this CCPS Agreement will be agreed to by the Parties and shall be consistent with the corresponding redacted version of this CCPS Agreement in such manner as is provided in Section 8.3 of the Master Collaboration Agreement.

16. **Warranties; Limitations of Liability; Indemnification.**

16.1 Representations and Warranties. Each Party represents and warrants to the other as of the CCPS Agreement Effective Date that it has the legal right and power to enter into this CCPS Agreement, to extend the rights and licenses granted or to be granted to the other in this CCPS Agreement, and to fully perform its obligations hereunder.

16.2 Additional Representations and Warranties of Bluebird. Except as set forth in Schedule 16.2, Bluebird represents and warrants to Celgene that, as of the CCPS Agreement Effective Date:

(a) *Licensed IP*. Appendix H sets forth a complete and accurate list of all Patents included in the Bluebird Licensed IP, indicating the owner, licensor and/or co-owner(s), if applicable, and, for any Elected Candidate and Licensed Product-relevant subject matter or Materials, if no Patent is specifically licensed, a list of all subject matter or Materials that are included in the Bluebird Licensed IP, including those licensed under a materials use license or equivalent. Bluebird Controls the Patents listed on Appendix H and the Know-How within the Bluebird Licensed IP, and is entitled to grant the licenses specified herein. Bluebird has not granted to any Third Party any rights or licenses under such Patents or Know-How within the Bluebird Licensed IP that would conflict with the licenses granted to Celgene hereunder.

(b) *Third Party Agreements*. The Applicable Bluebird In-Licenses are valid and binding obligations of Bluebird and, to the Knowledge of Bluebird, the applicable licensor, enforceable against Bluebird and, to the Knowledge of Bluebird, the applicable licensor, in accordance with their terms, except as may be limited by general principles of equity (regardless of whether considered in a proceeding at law or in equity) and by applicable bankruptcy, insolvency, moratorium and other similar Laws of general application relating to or affecting creditors' rights generally. Neither Bluebird nor any of its Affiliates has received any notice of any counterparty's intention to terminate any Applicable Bluebird In-License in whole or in part or any notice requesting any amendment, alteration or modification of such Applicable Bluebird In-License or any sublicense or assignment thereunder. There is no breach or default, or event which upon notice or the passage of time, or both, would give rise to any breach or default, in the performance of any Applicable Bluebird In-License by Bluebird or any of its Affiliates or, to the Knowledge of Bluebird, the counterparty thereto, and Bluebird has not received any notice of any such breach, default or event. Except for the Applicable Bluebird In-Licenses, neither Bluebird nor any of its Affiliates is a party to any license, sublicense or other agreement pursuant to which Bluebird or such Affiliate has received a license or other rights relating to the Elected Candidate or Licensed Product. All Patents and Know-How licensed to Bluebird under the Applicable Bluebird In-Licenses are Controlled by Bluebird for purposes of the licenses granted to Celgene under this CCPS Agreement.

(c) *Patents*. To Bluebird's Knowledge, the Patents listed on Appendix H have been procured or are being procured from the respective patent offices in accordance with applicable Law. None of the Patents included in the Bluebird Licensed IP is or has been involved in any opposition, cancellation, interference, reissue or reexamination proceeding, and no Bluebird Licensed IP is the subject of any judicial, administrative or arbitral order, award, decree, injunction, lawsuit, proceeding or stipulation. Neither Bluebird nor any of its Affiliates has received any notice alleging that the Patents in the Bluebird Licensed IP are invalid or unenforceable, or challenging Bluebird's ownership of or right to use any such rights.

(d) *No Conflicts*. The execution, delivery and performance by Bluebird of this CCPS Agreement and the consummation of the transactions contemplated hereby will not result in any violation of, conflict with, result in a breach of or constitute a default under any understanding, contract or agreement to which Bluebird is a party or by which it is bound. Neither Bluebird nor any of its Affiliates has entered into any agreement or otherwise licensed, granted, assigned, transferred, conveyed or otherwise encumbered or disposed of any right, title or interest in or to any of its assets, including any intellectual property rights, that would in any way conflict with or impair the scope of any rights or licenses granted to Celgene hereunder.

(e) *Outlicenses*. Appendix I sets forth a complete and accurate list of all agreements relating to the licensing, sublicensing or other granting of rights by Bluebird to any Person with respect to the Bluebird Licensed IP and the Target Antigen, and Bluebird has provided complete and accurate copies of

all such agreements to Celgene. Except for the Applicable Bluebird In-Licenses, Bluebird and its Affiliates are not subject to any payment obligations to Third Parties as a result of the execution or performance of this CCPS Agreement. Neither Bluebird nor any of its Affiliates has granted any liens or security interests on the Bluebird Licensed IP and the Bluebird Licensed IP is free and clear of any mortgage, pledge, claim, security interest, covenant, easement, encumbrance, lien or charge of any kind.

(f) *No Proceedings*. There60 is no action, suit, proceeding or investigation pending or, to the Knowledge of Bluebird, currently threatened in writing against or affecting Bluebird that questions the validity of this CCPS Agreement or the right of Bluebird to enter into this CCPS Agreement or consummate the transactions contemplated hereby.

(g) *No Infringement*. Neither Bluebird nor any of its Affiliates has received any notice of any claim that any Patent, Know-How or other intellectual property Controlled by a Third Party would be infringed or misappropriated by the production, use, research, Development, Manufacture or Commercialization of the Elected Candidate or Licensed Product pursuant to this CCPS Agreement, and, to the Knowledge of Bluebird, there are no Patents, Know-How or other intellectual property owned by a Third Party and not included in the Bluebird Licensed IP or Bluebird In-Licensed IP that are necessary for the production, use, research, Development, Manufacture or Commercialization of Elected Candidate or Licensed Product.

16.3 Disclaimers. Without limiting the respective rights and obligations of the Parties expressly set forth herein, each Party specifically disclaims any guarantee that any Licensed Product will be successful, in whole or in part. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS CCPS AGREEMENT, THE PARTIES MAKE NO REPRESENTATIONS AND EXTEND NO WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO ANY PATENTS, KNOW-HOW, ELECTED CANDIDATE OR LICENSED PRODUCT, INCLUDING WARRANTIES OF VALIDITY OR ENFORCEABILITY OF ANY PATENT RIGHTS, TITLE, QUALITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR USE OR PURPOSE, PERFORMANCE, AND NONINFRINGEMENT OF ANY THIRD PARTY PATENTS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

16.4 [***]

16.5 Performance by Others. The Parties recognize that each Party may perform some or all of its obligations under this CCPS Agreement through Affiliates and permitted subcontractors provided, however, that each Party will remain responsible and liable for the performance by its Affiliates and permitted subcontractors and will cause its Affiliates and permitted subcontractors to comply with the provisions of this CCPS Agreement in connection therewith.

16.6 Indemnification.

(a) *Indemnification by Celgene*. Celgene will indemnify Bluebird, its Affiliates and their respective directors, officers, employees, Third Party licensors and agents, and their respective successors, heirs and assigns (collectively, "Bluebird Indemnitees"), and defend and save each of them harmless, from and against any and all losses, damages, liabilities, costs and expenses (including reasonable attorneys' fees and expenses) (collectively, "Losses") in connection with any and all suits, investigations, claims or demands of Third Parties (collectively, "Third Party Claims") against the Bluebird Indemnitees arising from or occurring as a result of: (i) the material breach by Celgene of any term of this CCPS Agreement; (ii) any gross negligence or willful misconduct on the part of Celgene in performing its obligations under this CCPS Agreement; (iii) the Development or Commercialization by or on behalf of Celgene or any of its Affiliates or Sublicensees of Elected Candidate or Licensed Product for ROW Administration, and (iv) [***], except in each case for those Losses for which Bluebird has an obligation to indemnify Celgene

pursuant to Section 16.6(b), as to which Losses each Party will indemnify the other to the extent of their respective liability; provided, however, that Celgene will not be obligated to indemnify Bluebird Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of an Bluebird Indemnitee.

(b) *Indemnification by Bluebird*. Bluebird will indemnify Celgene, its Affiliates and their respective directors, officers, employees and agents, and their respective successors, heirs and assigns (collectively, "Celgene Indemnitees"), and defend and save each of them harmless, from and against any and all Losses in connection with any and all Third Party Claims against the Celgene Indemnitees arising from or occurring as a result of: (i) the material breach by Bluebird of any term of this CCPS Agreement; (ii) any gross negligence or willful misconduct on the part of Bluebird in performing its obligations under this CCPS Agreement; or (iii) the Development by or on behalf of Bluebird or any of its Affiliates or Sublicensees of Elected Candidate or Licensed Product, except in each case for those Losses for which Celgene has an obligation to indemnify Bluebird pursuant to Section 16.6(a), as to which Losses each Party will indemnify the other to the extent of their respective liability for the Losses; provided, however, that Bluebird will not be obligated to indemnify Celgene Indemnitees for any Losses to the extent that such Losses arise as a result of gross negligence or willful misconduct on the part of a Celgene Indemnitee.

(c) *Notice of Claim*. All indemnification claims provided for in Sections 16.6(a) and 16.6(b) will be made solely by such Party to this CCPS Agreement (the "Indemnified Party"). The Indemnified Party will promptly notify the indemnifying Party (an "Indemnification Claim Notice") of any Losses or the discovery of any fact upon which the Indemnified Party intends to base a request for indemnification under Section 16.6(a) and 16.6(b), but in no event will the indemnifying Party be liable for any Losses that result from any delay in providing such notice. Each Indemnification Claim Notice must contain a description of the claim and the nature and estimated amount of such Loss (to the extent that the nature and amount of such Loss is known at such time). The Indemnified Party will furnish promptly to the indemnifying Party copies of all papers and official documents received in respect of any Losses and Third Party Claims.

(d) *Defense, Settlement, Cooperation and Expenses.*

(i) *Control of Defense*. At its option, the indemnifying Party may assume the defense of any Third Party Claim by giving written notice to the Indemnified Party within thirty (30) days after the indemnifying Party's receipt of an Indemnification Claim Notice, provided however that (A) the Third Party Claim solely seeks monetary damages and (B) the indemnifying Party expressly agrees in writing that as between the indemnifying Party and the Indemnified Party, the indemnifying Party will be solely obligated to satisfy and discharge the Third Party Claim in full and is able to reasonably demonstrate that it has sufficient financial resources (the matters described in (A) and (B), the "Litigation Conditions"). The assumption of the defense of a Third Party Claim by the indemnifying Party will not be construed as an acknowledgment that the indemnifying Party is liable to indemnify the Indemnified Party in respect of the Third Party Claim, nor will it constitute a waiver by the indemnifying Party of any defenses it may assert against the Indemnified Party's claim for indemnification. Upon assuming the defense of a Third Party Claim, the indemnifying Party may appoint as lead counsel in the defense of the Third Party Claim any legal counsel selected by the indemnifying Party (the indemnifying Party will consult with the Indemnified Party with respect to a possible conflict of interest of such counsel retained by the indemnifying Party). The Indemnified Party may, at any time, assume the defense of a Third Party Claim if at any time the Litigation Conditions are not satisfied with respect to such Claim. In the event the indemnifying Party assumes the defense of a Third Party Claim, the Indemnified Party will immediately deliver to the indemnifying Party all original notices and documents (including court papers) received by the Indemnified Party in connection with the Third Party Claim. Should the indemnifying Party assume the defense of a

Third Party Claim, except as provided in Section 16.6(d)(ii) the indemnifying Party will not be liable to the Indemnified Party for any legal costs or expenses subsequently incurred by such Indemnified Party in connection with the analysis, defense or settlement of the Third Party Claim. In the event that it is ultimately determined that the indemnifying Party is not obligated to indemnify, defend or hold harmless the Indemnified Party from and against the Third Party Claim, the Indemnified Party will reimburse the indemnifying Party for any and all costs and expenses (including attorneys' fees and costs of suit) and any Third Party Claims incurred by the indemnifying Party in its defense of the Third Party Claim.

(ii) *Right to Participate in Defense*. Without limiting Section 16.6(d)(i), any Indemnified Party will be entitled to participate in, but not control, the defense of such Third Party Claim and to employ counsel of its choice for such purpose; provided, however, that such employment will be at the Indemnified Party's own cost and expense unless (i) the employment thereof has been specifically authorized by the indemnifying Party in writing, (ii) the indemnifying Party has failed to assume the defense and employ counsel in accordance with Section 16.6(d)(i) (in which case the Indemnified Party will control the defense), (iii) the interests of the Indemnified Party and the indemnifying Party with respect to such Third Party Claim are sufficiently adverse to prohibit the representation by the same counsel of both Parties under applicable Law, ethical rules or equitable principles, or (iv) the indemnifying Party no longer satisfies the Litigation Conditions, in which case the indemnifying Party will assume [***] percent ([***]%) of any such costs and expenses of counsel for the Indemnified Party.

(iii) *Settlement.* With respect to any Third Party Claims that relate solely to the payment of money damages in connection with a Third Party Claim and that will not result in the Indemnified Party's becoming subject to injunctive or other relief or otherwise adversely affecting the business of the Indemnified Party in any manner, and as to which the indemnifying Party will have acknowledged in writing the obligation to indemnify the Indemnified Party hereunder, and subject to the Litigation Conditions being satisfied, the indemnifying Party will have the sole right to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss, on such terms as the indemnifying Party, in its sole discretion, will deem appropriate. With respect to all other Losses in connection with Third Party Claims, where the indemnifying Party has assumed the defense of the Third Party Claim in accordance with Section 16.6(d)(i), the indemnifying Party will have authority to agree to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss provided it obtains the prior written consent of the Indemnified Party (such consent not to be unreasonably withheld, delayed or conditioned). The indemnifying Party will not be liable for any settlement or other disposition of a Loss by an Indemnified Party that is reached without the prior written consent of the indemnifying Party. Regardless of whether the indemnifying Party chooses to defend or prosecute any Third Party Claim, no Indemnified Party will admit any liability with respect to or settle, compromise or discharge, any Third Party Claim without the prior written consent of the indemnifying Party, such consent not to be unreasonably withheld, delayed or conditioned.

(iv) *Cooperation*. If the indemnifying Party chooses to defend or prosecute any Third Party Claim, the Indemnified Party will, and will cause each other Indemnified Party to, cooperate in the defense or prosecution thereof and will furnish such records, information and testimony, provide such witnesses and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection therewith. Such cooperation will include access during normal business hours afforded to indemnifying Party to, and reasonable retention by the Indemnified Party of, records and information that are reasonably relevant to such Third Party Claim, and making Indemnified Parties and other employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder, and the indemnifying Party will reimburse the Indemnified Party for all its reasonable out-of-pocket costs and expenses in connection therewith.

(v) *Costs and Expenses*. Except as provided above in this Section 16.6(d), the costs and expenses, including attorneys' fees and expenses, incurred by the Indemnified Party in connection with any claim will be reimbursed on a calendar quarter basis by the indemnifying Party, without prejudice to the indemnifying Party's right to contest the Indemnified Party's right to indemnification and subject to refund in the event the indemnifying Party is ultimately held not to be obligated to indemnify the Indemnified Party.

16.7 Insurance. Each Party will maintain at its sole cost and expense, an adequate liability insurance or self-insurance program (including product liability insurance) to protect against potential liabilities and risk arising out of activities to be performed under this CCPS Agreement, and any agreement related hereto and upon such terms (including coverages, deductible limits and self-insured retentions) as are customary in the U.S. pharmaceutical industry for the activities to be conducted by such Party under this CCPS Agreement. Subject to the preceding sentence, such liability insurance or self-insurance program will insure against all types of liability, including personal injury, physical injury or property damage arising out of the manufacture, sale, use, distribution or marketing of Licensed Product. The coverage limits set forth herein will not create any limitation on a Party's liability to the other under this CCPS Agreement.

16.8 U.S. Administration Liabilities. In the event that either Party (i) incurs any Losses in connection with a Third Party Claim for personal injury or death caused by the use of Licensed Product for U.S. Administration, or (ii) is required to make payments to any Third Party in order to acquire a license or other rights under Patents or Know-How necessary for the Development, Manufacture or Commercialization of Licensed Product for U.S. Administration (collectively, "U.S. Administration Liabilities"), such U.S. Administrative Losses arising from or occurring as a result of the performance, in good faith, of the Development, Manufacture or Commercialization of Licensed Product for U.S. Administration in accordance with this CCPS Agreement will be charged to such Party's Operating Profit or Loss under the Profit & Loss Share, provided that Operating Profit or Loss will not include U.S. Administration Liabilities of a Party or its Affiliates: (1) that are caused by a breach of this CCPS Agreement by such Party or its Affiliates; (2) incurred with respect to or allocable to products other than Licensed Product for U.S. Administration; or (3) that are subject to indemnification by such Party pursuant to Section 16.6 (and for clarity, if a Third Party makes a Third Party Claim directly against Bluebird (or any of its Affiliates) or Celgene (or any of its Affiliates), respectively, that would otherwise be indemnified by Bluebird or Celgene, respectively, if such Third Party Claim had been made against the other Party (or any of its Affiliates), then U.S. Administration Liabilities incurred by Bluebird or Celgene in connection with such direct Third Party Claim will not be included in the calculation of Operating Profit or Loss).

17. **Term and Termination.**

17.1 Term. This CCPS Agreement will commence as of the CCPS Agreement Effective Date and, unless sooner terminated in accordance with the terms hereof or by mutual written consent, will continue on a country-by-country basis, until there are no more payments owed one or the other Party on Licensed Product in such country (the longest such period of time for any Licensed Product hereunder, the "CCPS Agreement Term"); for clarity, unless sooner terminated in accordance with the terms hereof or by mutual written consent, this CCPS Agreement Term will continue in all events until Licensed Product is no longer being Developed or Commercialized in the United States. Upon there being no more such payments hereunder for any such Licensed Product in such country (other than the United States), the licenses contained in Section 10.1 will become fully paid up and will remain exclusive with respect to such Licensed Product in such country.

17.2 Termination by Bluebird.

(a) *Breach*. Bluebird will have the right to terminate this CCPS Agreement in full upon delivery of written notice to Celgene in the event of any material breach by Celgene of any terms and conditions of this CCPS Agreement in a manner that fundamentally frustrates the transactions contemplated by this CCPS Agreement, provided that such termination will not be effective if such breach, has been cured within [***] after written notice thereof is given by Bluebird to Celgene specifying the nature of the alleged breach (or, if such default cannot be cured within such [***] after such notice if Celgene commences actions to cure such default within such [***] and thereafter diligently continues such actions, but fails to cure the default by the end of such [***]); provided, however, that to the extent such material breach involves the failure to make a payment when due, such breach must be cured within [***] after written notice thereof is given by Bluebird to Celgene.

(b) [***]

(c) *Termination of the Profit & Loss Share*. Bluebird will have the right to terminate the Profit & Loss Share by delivering written notice to Celgene, such termination to be effective [***] following the date of such notice. Promptly following such notice, the Parties will enter into a license agreement with respect to the United States and the ROW, which agreement will be substantially identical to the License Agreement, with such changes that the Parties may, acting reasonably, mutually agree are required in order to address any specific facts or circumstances existing at the time of such termination. The Parties will enter into such license agreement no later than the effective date of such termination and, if such license agreement is not entered into prior the expiration of such [***], upon execution, the effective date of such license agreement will be deemed to be the effective date of such termination. For clarity, (i) termination of the Profit & Loss Share pursuant to this Section 17.2(c) will not release Bluebird from any obligation or liability which, at the time of the effective date of such termination, has already accrued to Celgene or which is attributable to a period prior to the effective date of such termination, and (ii) any events that have already occurred before the effective date of such termination (such as achievement of any milestones) will not trigger any payment obligation by Celgene to Bluebird under such executed license agreement (other than, for clarity, the Milestone Payment based on the Pivotal Study if not already paid or accrued under this CCPS Agreement).

17.3 Termination by Celgene.

(a) *Breach*. Celgene will have the right to terminate this CCPS Agreement in full upon delivery of written notice to Bluebird in the event of any material breach by Bluebird of any terms and conditions of this CCPS Agreement in a manner that fundamentally frustrates the transactions contemplated by this CCPS Agreement, provided that such termination will not be effective if such breach has been cured within [***] after written notice thereof is given by Celgene to Bluebird specifying the nature of the alleged breach (or, if such default cannot be cured within such [***], within [***] after such notice if Bluebird commences actions to cure such default within such [***] period and thereafter diligently continues such actions, but fails to cure the default by the end of such [***].

(b) *Discretionary Termination*. Beginning with [***], Celgene will have the right to terminate this CCPS Agreement in full, at its discretion for any reason, by delivering written notice to Bluebird, such termination to be effective [***] following the date of such notice.

(c) [***]

(d) *Alternative to Termination Under Section 17.3(a).* If Celgene has the right to terminate this CCPS Agreement under Section 17.3(a) or 17.3(c) (including expiration of all applicable cure periods thereunder), in lieu of exercising such termination right, Celgene may elect once by written notice to

Bluebird before the end of such applicable cure period to have this CCPS Agreement continue in full force and effect and instead have, starting immediately after the end of such applicable cure period, any future Milestone Payments set forth in Section 11.2(b) and the royalty rates set forth in the table set forth in Section 11.3(a) be reduced by [***], provided that such reduction will not apply if such future Milestone Payments and royalty rates have already been reduced pursuant to Section 11.4(c) of the Master Collaboration Agreement.

17.4 Effects of Termination or Expiration. Upon termination (but not expiration pursuant to Section 17.1) of this CCPS Agreement for any reason:

(a) *Wind Down*. Celgene will responsibly wind-down, in accordance with accepted pharmaceutical industry norms and ethical practices, any on-going clinical studies for which it has responsibility hereunder in which patient dosing has commenced or, if reasonably practicable and requested by Bluebird, allow Celgene, its Affiliates or its Sublicensees to complete such trials. Celgene will be responsible for any costs associated with such wind-down. Bluebird will pay all costs incurred by either Party to complete such studies should Bluebird request that such studies be completed.

(b) *Sublicenses*. A termination of this CCPS Agreement will not automatically terminate any sublicense granted by Celgene pursuant to Section 10.3 for Commercialization rights with respect to a non-Affiliated Sublicensee, provided that (i) such Sublicensee is not then (a) in material breach of any provision of this CCPS Agreement or (b) in material breach of the applicable sublicense agreement or otherwise in breach of such sublicense agreement in a manner that would give rise to a right of termination on the part of Celgene, (ii) if Bluebird terminates this CCPS Agreement pursuant to Section 17.2(a) for Celgene's failure to fulfill its payment obligations hereunder, such Sublicensee agrees to and does pay to Bluebird all outstanding amounts that accrued as a result of such Sublicensee's activities under the sublicense, (iii) Bluebird will have the right to step into the role of Celgene as sublicensor under any such sublicense executed after the CCPS Agreement Effective Date, with all the rights that Celgene had under such sublicense, solely with respect to the Bluebird Licensed IP, prior to termination of this CCPS Agreement (including the right to receive any payments to Celgene by such Sublicensee that accrue from and after the date of the termination of this CCPS Agreement solely with respect to the Bluebird Licensed IP), (iv) such Sublicensee will pay to Bluebird all amounts that Celgene would have been obligated to pay to Bluebird hereunder with respect to such Sublicensee's activities had this CCPS Agreement not terminated (less any amounts received by Bluebird in clause (iii) above) and (v) the survival of such sublicense will not result in an imposition of any additional obligations on the part of Bluebird that are not included within the scope of this CCPS Agreement. Celgene will include in any sublicense agreement executed after the CCPS Agreement Effective Date that relates solely to the Bluebird Licensed IP a provision in which said Sublicensee acknowledges its obligations to Bluebird under this Section 17.4(b).

(c) *Cessation of Rights*. Except as otherwise expressly provided in this Section 17, all rights and licenses granted by Bluebird to Celgene in Section 10.1 will terminate, and all rights granted by Celgene to Bluebird in Section 10.2 will terminate, and Celgene and its Affiliates and Sublicensees will cease all use of Bluebird Licensed IP and all Development and Commercialization of Elected Candidate and Licensed Product.

(d) *Regulatory Approvals*. To the extent permitted by applicable Law, and subject to Bluebird paying commercially reasonable compensation to Celgene for the assets to be transferred pursuant to this Section 17.4(d) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 17.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this CCPS Agreement is terminated by Bluebird pursuant to Section 17.2(a)), all Regulatory Approvals and other regulatory filings and communications owned (in whole or in part) or otherwise Controlled by Celgene and its Affiliates and Sublicensees solely relating to

the Elected Candidate and/or Licensed Product, and all other documents solely relating to and necessary to further Develop and Commercialize Elected Candidate and Licensed Product, as such items exist as of the effective date of such termination (including all solely related completed and ongoing clinical studies) will be assigned to Bluebird, and Celgene will provide to Bluebird one (1) copy of the foregoing and all documents contained in or referenced in any such items, together with the raw and summarized data for any clinical studies (and where reasonably available, electronic copies thereof). In the event of failure to obtain assignment, subject to the Parties agreeing on commercially reasonable compensation for the right to access and reference, Celgene hereby consents and grants to Bluebird the right to access and reference (without any further action required on the part of Celgene, whose authorization to file this consent with any Regulatory Authority is hereby granted) any such item.

(e) *Licenses*. Subject to Bluebird paying (i) commercially reasonable compensation to Celgene for the licenses to be granted pursuant to subsection (1) of this Section 17.4(e) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 17.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this CCPS Agreement is terminated by Bluebird pursuant to Section 17.2(a)), and (ii) amounts payable to Celgene's licensors as set forth below, Celgene will grant to Bluebird and its Affiliates (1) a worldwide, perpetual and irrevocable, nontransferable (except in connection with a permitted assignment of this CCPS Agreement in accordance with Section 18.12), exclusive license, with the right to grant sublicenses through multiple tiers (subject to Section 10.3, *mutatis mutandis*), under Celgene Licensed Product IP, and (2) an exclusive sublicense under the Celgene Licensed Product In-Licensed IP, in each case ((1) and (2)) to the extent such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP are used in or Cover the Licensed Product as of the effective date of termination and to the extent such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP exist as of the effective date of such termination (including in each case any additions, divisions, continuations, continuations-in-part, invention certificates, substitutions, reissues, reexaminations, extensions, registrations, supplementary protection certificates and renewals of such Celgene Licensed Product IP and Celgene Licensed Product In-Licensed IP), solely to the extent necessary to research, Develop, Manufacture and Commercialize the Elected Candidate and Licensed Product. With respect to grants of a sublicense under subsection (2) above, Bluebird will be responsible for all amounts payable to the applicable licensor that are attributable to Bluebird as a sublicensee thereunder under this CCPS Agreement, and Celgene will pay same and Bluebird will reimburse Celgene for [***] percent [***]%) of such payments within thirty (30) days of receipt of Celgene's written invoice therefor. Celgene will provide Bluebird with copies of all applicable Celgene Licensed Product In-Licenses promptly following the effective date of the termination of this License Agreement. The Prosecution and Maintenance and enforcement and defense rights and obligations of the Parties with respect to any Patents licensed or sublicensed to Bluebird pursuant to this Section 17.4(e) will be discussed and agreed to by the Parties, with the understanding that such Prosecution and Maintenance and enforcement and defense rights and obligations will be substantially similar to those set forth in Section 13, with the roles of Bluebird and Celgene reversed (and such other changes as are appropriate from the context, and taking into account any rights retained by a Third Party licensor of Celgene to Prosecute and Maintain or enforce and defend any Patent sublicensed to Bluebird under this Section 17.4(e)).

(f) *Trademarks*. Subject to Bluebird paying commercially reasonable compensation to Celgene for the license to be granted pursuant to this Section 17.4(f) (such compensation to either be mutually agreed to or determined through arbitration as provided in Section 17.4(g) below, and such compensation to be reduced by [***] from what would be commercially reasonable compensation if this CCPS Agreement is terminated by Bluebird pursuant to Section 17.2(a)), Celgene will exclusively license to Bluebird any registered or unregistered trademarks or internet domain names that are specific to and

solely used for the Licensed Product worldwide (it being understood that the foregoing will not include any trademarks or internet domain names that contain the corporate or business name(s) of Celgene).

(g) *Commercially Reasonable Compensation*. If the Parties are unable to agree on the amount of commercially reasonable compensation payable by Bluebird to Celgene pursuant to Sections 17.4(d), 17.4(e) or 17.4(f) within ten (10) days of the effective date of termination of this CCPS Agreement, [***].

(h) *Country Termination*. If this CCPS Agreement is terminated only with respect to a specific country pursuant to Section 11.2(b) or Section 11.3(c), the provisions of this Section 17.4 will apply only with respect to such terminated country.

17.5 Survival. In addition to the termination consequences set forth in Section 17.4, the following provisions will survive termination or expiration of this CCPS Agreement: Sections 1, 4.3, 8.2, 8.3(b), 10.3(c) (*mutatis mutandis* with respect to licenses granted to Bluebird under Section 17.4, but excluding subsections (i) and (ii) of Section 10.3(c)) 10.6, 10.8, 11.5, 11.6, 12, 15, 16.3, 16.4, 16.6, 16.7, 16.8, 17.4, 17.5, 17.6 and 18, and Appendix F (to the extent required to provide for a true up of Operating Profit and Losses during the term of this CCPS Agreement following termination of this CCPS Agreement). Termination or expiration of this CCPS Agreement will not relieve the Parties of any liability or obligation which accrued hereunder prior to the effective date of such termination or expiration nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any breach of this CCPS Agreement nor prejudice either Party's right to obtain performance of any obligation. All other rights and obligations will terminate upon expiration of this CCPS Agreement.

17.6 Right to Set-off. Notwithstanding anything to the contrary in this CCPS Agreement, each Party has the right at all times to retain and set off against all amounts due and owing to the other Party as determined in a final judgment any damages recovered by such Party for any Losses incurred by such Party.

18. **General Provisions.**

18.1 Cumulative Remedies and Irreparable Harm. All rights and remedies of the Parties hereunder will be cumulative and in addition to all other rights and remedies provided hereunder or available by agreement, at law or otherwise. Each Party acknowledges and agrees that breach of any of the terms or conditions of this CCPS Agreement would cause irreparable harm and damage to the other and that such damage may not be ascertainable in money damages and that as a result thereof the non-breaching Party would be entitled to seek from a court equitable or injunctive relief restraining any breach or future violation of the terms contained herein by the breaching Party without the necessity of proving actual damages or posting bond. Such right to equitable relief is in addition to whatever remedies either Party may be entitled to as a matter of law or equity, including money damages.

18.2 Business Combination and IP.

(a) *Bluebird Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this CCPS Agreement, no Know-How, Materials, Patents, Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Bluebird or any of its Affiliates prior to a Business Combination of Bluebird will be Controlled for purposes of this CCPS Agreement after such Business Combination of Bluebird, other than (i) Applicable Bluebird In-Licenses to the extent in effect immediately prior to such Business Combination of Bluebird, (ii) Collaboration IP, and (iii) any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Bluebird will be Controlled thereafter no matter when such Patent is filed or issued.

(b) *Celgene Business Combination*. Notwithstanding anything to the contrary herein, for purposes of this CCPS Agreement, no Know-How, Materials, Patents Regulatory Data, Regulatory Filings or Regulatory Approvals not Controlled by Celgene or any of its Affiliates prior to a Business Combination

of Celgene will be Controlled for purposes of this CCPS Agreement after such Business Combination of Celgene, other than Collaboration IP, and except that any Patent that claims priority, directly or indirectly, to any other Patent first Controlled before such Business Combination of Celgene will be Controlled thereafter no matter when such Patent is filed or issued.

18.3 Relationship of Parties. Nothing in this CCPS Agreement is intended or will be deemed to constitute a partnership, agency, employer-employee or joint venture relationship between the Parties. No Party will incur any debts or make any commitments for the other, except to the extent, if at all, specifically provided therein. There are no express or implied Third Party beneficiaries hereunder (except as set forth in Section 10.2 and except for Bluebird Indemnitees and Celgene Indemnitees for purposes of Section 16.6).

18.4 Compliance with Law. Each Party will perform or cause to be performed any and all of its obligations or the exercise of any and all of its rights hereunder in good scientific manner and in compliance with all applicable Law. Without limiting the foregoing, Bluebird will comply with comply with all applicable Laws and regulations (including U.S. Foreign Corrupt Practices Act and any other applicable anti-bribery or anti-kickback laws or regulations).

18.5 Force Majeure. Neither Party will be liable to the other for failure of or delay in performing obligations set forth in this CCPS Agreement (other than any obligation to pay monies when due), and neither will be deemed in breach of such obligations, if such failure or delay is due to natural disasters or any causes reasonably beyond the control of such Party; provided that the Party affected will promptly notify the other of the force majeure condition and will exert reasonable efforts to eliminate, cure or overcome any such causes and to resume performance of its obligations as soon as possible.

18.6 Governing Law. This CCPS Agreement will be governed by and construed in accordance with the Laws of the State of New York, without respect to its conflict of laws rules, provided that any dispute relating to the scope, validity, enforceability or infringement of any Patents or Know-How will be governed by, and construed and enforced in accordance with, the substantive laws of the jurisdiction in which such Patents or Know-How apply.

18.7 Counterparts; Facsimiles. This CCPS Agreement may be executed in one or more counterparts, each of which will be deemed an original, and all of which together will be deemed to be one and the same instrument. Facsimile or PDF execution and delivery of this CCPS Agreement by either Party will constitute a legal, valid and binding execution and delivery of this CCPS Agreement by such Party

18.8 Headings. All headings in this CCPS Agreement are for convenience only and will not affect the meaning of any provision hereof.

18.9 Waiver of Rule of Construction. Each Party has had the opportunity to consult with counsel in connection with the review, drafting and negotiation of this CCPS Agreement. Accordingly, the rule of construction that any ambiguity in this CCPS Agreement will be construed against the drafting Party will not apply.

18.10 Interpretation. Whenever any provision of this CCPS Agreement uses the term "including" (or "includes"), such term will be deemed to mean "including without limitation" (or "includes without limitations"). "Herein," "hereby," "hereunder," "hereof" and other equivalent words refer to this CCPS Agreement as an entirety and not solely to the particular portion of this CCPS Agreement in which any such word is used. All definitions set forth herein will be deemed applicable whether the words defined are used herein in the singular or the plural. Unless otherwise provided, all references to Sections and Appendices in this CCPS Agreement are to Sections and Appendices of this CCPS Agreement. References to any Sections include Sections and subsections that are part of the related Section (*e.g.*, a section numbered

"Section 2.1" would be part of "Section 2", and references to "Section 2.1" would also refer to material contained in the subsection described as "Section 2.1(a)").

18.11 Binding Effect. This CCPS Agreement will inure to the benefit of and be binding upon the Parties, their Affiliates, and their respective lawful successors and assigns.

18.12 Assignment. This CCPS Agreement may not be assigned by either Party, nor may either Party delegate its obligations or otherwise transfer licenses or other rights created by this CCPS Agreement, except as expressly permitted hereunder or otherwise without the prior written consent of the other Party, which consent will not be unreasonably withheld, delayed or conditioned; provided that without consent (i) Celgene may assign this CCPS Agreement to (x) an Affiliate or (y) its successor in connection with the merger, consolidation, or sale of all or substantially all of its assets, and (ii) Bluebird may assign this CCPS Agreement to (x) an Affiliate or (y) its successor in connection with the merger, consolidation, or sale of all or substantially all of its assets or that portion of its business pertaining to the subject matter of this CCPS Agreement; provided further that, except in the case where a Party is involved in a merger or consolidation where it is the surviving entity and no assets of such Party that are subject to this CCPS Agreement have been transferred as a result of such merger or consolidation, (a) such assigning Party provides the other Party to this CCPS Agreement with at least thirty (30) business days advance written notice of such assignment(s) and the assigning Party agrees in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to remain fully liable for the performance of its obligations under this CCPS Agreement by its assignee(s), (b) the assignee(s) agree in a written agreement delivered prior to such assignment(s) to the non-assigning Party (and upon which such non-assigning Party may rely) to assume performance of all such assigned obligations, (c) in the case of any assignment(s) by Bluebird, all Bluebird Licensed IP licensed to Celgene under this CCPS Agreement will be transferred to such assignee(s) effective as of such assignment(s), (d) all of the matters referred to in clauses (a), (b) and (c), as applicable, will be set forth in documentation reasonably acceptable to the non-assigning Party prior to any such assignment(s) (and with such reasonable acceptance not to be unreasonably withheld, conditioned or delayed) and in all cases will provide the non-assigning Party with the full benefits of its rights under this CCPS Agreement (after taking into account all risks involving applicable counter-party performance and bankruptcy and insolvency risks, including those involving contractual rejection under 11 USC §365) as if no such assignment(s) had occurred, and (e) in the case of any assignment(s), the assigning Party will reimburse the non-assigning Party for all of the legal fees and expenses incurred by such non-assigning Party in connection with the matters set forth in clause (D) of this sentence in an aggregate amount not to exceed [***], and provided, further, that if Bluebird wishes to assign any Bluebird Licensed IP to its Affiliates, it will be permitted to do so conditioned on each such Affiliate becoming a party to this CCPS Agreement, in the form of an amendment to this CCPS Agreement executed by Celgene, Bluebird and such Affiliate, pursuant to which such Affiliate would agree to assume all obligations hereunder, and grant to Celgene all rights hereunder, with respect to the Bluebird Licensed IP. The terms of this CCPS Agreement will be binding upon and will inure to the benefit of the successors, heirs, administrators and permitted assigns of the Parties. Any purported assignment in violation of this Section 18.12 will be null and void *ab initio*.

18.13 Notices. All notices, requests, demands and other communications required or permitted to be given pursuant to this CCPS Agreement will be in writing and will be deemed to have been duly given upon the date of receipt if delivered by hand, recognized international overnight courier, confirmed facsimile transmission, or registered or certified mail, return receipt requested, postage prepaid to the applicable address or facsimile number in Section 13.14 in the Master Collaboration Agreement. Either Party may change its designated address and facsimile number by notice to the other Party in the manner provided in this Section 18.13.

18.14 Amendment and Waiver. This CCPS Agreement may be amended, supplemented, or otherwise modified only by means of a written instrument signed by both Parties; provided that any unilateral undertaking or waiver made by one Party in favor of the other will be enforceable if undertaken in a writing signed by the Party to be charged with the undertaking or waiver. Any waiver of any rights or failure to act in a specific instance will relate only to such instance and will not be construed as an agreement to waive any rights or fail to act in any other instance, whether or not similar.

18.15 Severability. In the event that any provision of this CCPS Agreement will, for any reason, be held to be invalid or unenforceable in any respect, such invalidity or unenforceability will not affect any other provision hereof, and the Parties will negotiate in good faith to modify this CCPS Agreement to preserve (to the extent possible) their original intent.

18.16 Entire Agreement. This CCPS Agreement, together with the Master Collaboration Agreement, is the sole agreement with respect to the subject matter and supersedes all other agreements and understandings between the Parties with respect to same (including Confidential Agreement). In the event of any conflict between the terms of this CCPS Agreement and the terms of the Master Collaboration Agreement, the terms of this CCPS Agreement will control.

18.17 Force Majeure. Neither Celgene nor Bluebird will be liable for failure of or delay in performing obligations set forth in this CCPS Agreement (other than any obligation to pay monies when due), and neither will be deemed in breach of such obligations, if such failure or delay is due to natural disasters or any causes reasonably beyond the control of Celgene or Bluebird and without the fault or negligence of the Party so failing or delaying; provided that the Party affected will promptly notify the other of the force majeure condition and will exert reasonable efforts to eliminate, cure or overcome any such causes and to resume performance of its obligations as soon as possible.

18.18 Celgene Parties. [***]

[*Remainder of this Page Intentionally Left Blank*]

IN WITNESS WHEREOF, the Parties have caused this Co-Development, Co-Promote and Profit Share Agreement to be executed by their respective duly authorized officers as of the CCPS Agreement Effective Date.

bluebird bio, Inc.

By:
(Signature)

Name:

Title:

Date:

Celgene Corporation

By:
(Signature)

Name:

Title:

Date:

Celgene European Investment Company LLC (CEICO)

By: Celgene International Sarl, the sole member of CEICO

By:_____

Print: _____

and

By:_____

Print:_____

Appendix A

Additional Defined Terms

"Elected Candidate"[2] means the following Optioned Candidate selected by Celgene under the Master Collaboration Agreement that specifically targets the Target Antigen: [_____].

[2] ***To be updated by the Parties to specifically identify the candidate that is the subject of the option election***.

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix B

Applicable New In-Licenses

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix C

Applicable Pre-Existing In-Licenses

Appendix D

Target Antigen

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix E

Co-Co In-Licenses

Appendix F

Profit & Loss Share

[***]

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix G

Press Release

Appendix H

Certain Patents within the Licensed IP Controlled by Bluebird as of the CCPS Agreement Effective Date

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix I

Bluebird Agreements

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Appendix J

Certain Manufacturing Definitions

[***]

CERTAIN CONFIDENTIAL PORTIONS OF THIS EXHIBIT WERE OMITTED AND REPLACED WITH "[***]". A COMPLETE VERSION OF THIS EXHIBIT HAS BEEN FILED SEPARATELY WITH THE SECRETARY OF THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO AN APPLICATION REQUESTING CONFIDENTIAL TREATMENT PURSUANT TO RULE 24B-2 PROMULGATED UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

[***]

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Schedule 4.3(b)

Cost Allocation

[***]

Schedule 5.6

Minimum Bluebird Sales Representative Qualifications

- BS in Business or Science; 5+ years sales experience in pharmaceutical/biotechnology industry with at least two years of related hematology/oncology sales strongly preferred (or proven success in medical field).

- May not be debarred or disqualified by the FDA (or subject to a similar sanction by any Regulatory Authority outside the United States), or the subject of an FDA debarment or disqualification investigation or proceeding (or similar proceeding by any Regulatory Authority outside the United States), or convicted, indicted or charged with any crime that would constitute grounds for FDA debarment or disqualification (or similar sanctions by any Regulatory Authority outside the United States).

- Proven track record that demonstrates top sales accomplishments.

- Demonstrated ability to understand and communicate technical clinical material clearly and effectively.

- Demonstrated ability to develop critical relationships with physicians, nurses and ancillary staff within academic hospitals, clinics, and private practice facilities.

- Demonstrated understanding of oncology therapeutic area, products and marketplace.

- Demonstrated knowledge of healthcare system processes including reimbursement.

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Schedule 16.2

Exceptions to Bluebird's Representations and Warranties in Section 16.2

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Exhibit C

Pre-Existing In-Licenses

[***]

Exhibit D

Additional Definitions

"**Target Antigen**" means:

B cell maturation antigen (BCMA, gene name TNFRSF17)

Approved symbol

TNFRSF17

Approved name

tumor necrosis factor receptor superfamily, member 17

HGNC ID

HGNC:11913

Previous symbols & names

BCMA

Synonyms

BCM, CD269, TNFRSF13A

Locus type

gene with protein product

Chromosomal location

16p13.1

Gene family

CD molecules

Tumor necrosis factor receptor superfamily

HCOP

Orthology Predictions for TNFRSF17

"**Lead Product Candidate**" means:

The anti-BCMA product candidate known as bb 2121

"**Next Generation Product Candidate**" means:

An anti-BCMA product candidate [***]

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Exhibit E

Collaboration Plan

[***]

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Exhibit F

Bluebird Collaboration In-Licenses

[***]

Exhibit G

Additional Celgene Option Information

Celgene will provide to Bluebird, along with the Option Exercise Notice:

- The clinical Development plan that Celgene is contemplating to achieve Regulatory Approval for such Optioned Candidate, together with the cost estimates for such a clinical program;
- The U.S. Development Budget, which for purposes of this Exhibit G will be for the first twelve (12) months of the Co-Development, Co-Promote and Profit Share Agreement. Celgene may update such U.S. Development Budget within ten (10) business days of first providing the same; and
- Such other supporting information related to the items listed in the foregoing bullet points as Bluebird may reasonably request, to the extent such information is in Celgene's possession (for clarity, without any obligation to create or generate new information.)

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Exhibit H

Press Release

Exhibit I-1

Bluebird Patents

[***]

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Exhibit J

Bluebird Agreements

[***]

Exhibit 10.21

EMPLOYMENT AGREEMENT

This Employment Agreement ("Agreement") is between bluebird bio, Inc., a Delaware corporation (the "Company"), and Dr. Philip Gregory (the "Executive") and is made effective as of May 30, 2015 (the "Effective Date").

WHEREAS, the Company desires to employ the Executive and the Executive desires to be employed by the Company on the terms and conditions contained herein.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. Employment.

(a) Term. The term of this Agreement shall commence on or before June 30, 2015, on a date to be mutually agreed to by Executive and the Company and shall continue until terminated in accordance with the provisions of Section 3 (the "Term"). The actual first day of Executive's employment shall be referred to as the "Start Date".

(b) Position and Duties. During the Term, the Executive shall serve as the Chief Scientific Officer of the Company, and shall have supervision and control over and responsibility for the day-to-day business and affairs of the Company and shall have such other powers and duties as may from time to time be prescribed by the Chairman of the Board of Directors of the Company (the "Board"), the Chief Executive Officer of the Company (the "CEO") or other authorized executive, provided that such duties are consistent with the Executive's position or other positions that he may hold from time to time. The Executive shall report to the CEO. The Executive shall devote his full working time and efforts to the business and affairs of the Company. Notwithstanding the foregoing, the Executive may serve on other boards of directors, with the approval of the Board, or engage in religious, charitable or other community activities as long as such services and activities are disclosed to the Board and do not materially interfere with the Executive's performance of his duties to the Company as provided in this Agreement.

2. Compensation and Related Matters.

(a) Base Salary. During the Term, the Executive's initial annual base salary shall be $365,000. The Executive's base salary shall be redetermined annually by the Board or the Compensation Committee. The annual base salary in effect at any given time is referred to herein as "Base Salary." The Base Salary shall be payable in a manner that is consistent with the Company's usual payroll practices for senior executives.

(b) Incentive Compensation. During the Term, the Executive shall be eligible to receive cash incentive compensation as determined by the Board or the Compensation

Committee from time to time. The Executive's target annual incentive compensation shall be thirty-five percent (35%) of his Base Salary. To earn incentive compensation, the Executive must be employed by the Company on the day such incentive compensation is paid.

(c) Signing Bonus. On the Company's first regular payroll date following the Start Date, the Company shall pay Executive a signing bonus of $75,000 less applicable deductions and withholdings (the "Signing Bonus"). On the Company's next regular payroll date following May 31, 2016, the Company shall pay Executive a bonus of $75,000, less applicable deductions and withholdings (the "Retention Bonus"). If within one year of the Start Date the Executive either (i) resigns from employment with the Company for any reason except for Good Reason, or (ii) is terminated by the Company for Cause, then the Executive agrees to repay the Signing Bonus to the Employer within thirty (30) days of the Date of Termination and, in either such event, will not be eligible for the Retention Bonus. Notwithstanding anything to the contrary, the Executive must be employed by the Company (i) on the date the Retention Bonus is paid eligible to receive the Retention Bonus.

(d) Relocation Payments. On the Company's first regular payroll date following the Start Date, the Company shall pay the Executive a one-time relocation payment in the amount of $50,000, less applicable deductions and withholdings (the "Initial Relocation Payment"). The Initial Relocation Payment shall be in lieu of any payment or reimbursement to the Executive in connection with the Executive's relocation or temporary living arrangements. In addition, if the Executive permanently relocated to the Cambridge, MA area within three (3) years from the Start Date (such permanent relocation date, as to be determined by the Company in good faith, the "Relocation Date"), on the Company's first regular payroll date following Relocation Date the Company shall pay the Executive an additional one-time relocation payment in the amount of $100,000, less applicable taxes (the "Additional Relocation Payment"). If Executive either (i) resigns from employment with the Company for any reason except for Good Reason, or (ii) is terminated by the Company for Cause, then the Executive agrees to repay to the Employer within sixty (60) days of the Date of Termination, the Initial Relocation Payment and the Additional Relocation Payment to the extent that either or both such payments were paid to the Executive within the one year period to the Date of Termination. Notwithstanding anything to the contrary, the Executive must be employed by the Company (i) on the date the Initial Relocation Payment is paid eligible to receive the Initial Relocation Payment; and (ii) on the date the Additional Relocation Payment is paid eligible to receive the Additional Relocation Payment.

(e) Equity. The Executive shall be awarded an option to purchase 50,000 shares of the Common Stock of the Company at an exercise price equal to the closing price of the Company's common stock on the NASDAQ Global Select Market on the first trading day of the first calendar month following the Executive's date of hire and to be memorialized in an Incentive Stock Option Agreement pursuant to the Company's 2013 Stock Option and Incentive Plan. On the Start Date, the Executive shall be awarded restricted stock units for 25,000 shares of the Common Stock of the Company to be memorialized in a Restricted Stock Unit Agreement pursuant to the Company's 2013 Stock Option and Incentive Plan.

(f) Expenses. The Executive shall be entitled to receive prompt reimbursement for all reasonable expenses incurred by him during the Term in performing

services hereunder, in accordance with the policies and procedures then in effect and established by the Company for its senior executive officers.

(g) Other Benefits. During the Term, the Executive shall be eligible to participate in or receive benefits under the Company's employee benefit plans in effect from time to time, subject to the terms of such plans.

(h) Vacations. During the Term, the Executive shall be entitled to accrue paid vacation in accordance with the Company's applicable policy.

3. Termination. During the Term, the Executive's employment hereunder may be terminated without any breach of this Agreement under the following circumstances:

(a) Death. The Executive's employment hereunder shall terminate upon his death.

(b) Disability. The Company may terminate the Executive's employment if he is disabled and unable to perform the essential functions of the Executive's then existing position or positions under this Agreement with or without reasonable accommodation for a period of 180 days (which need not be consecutive) in any 12-month period. If any question shall arise as to whether during any period the Executive is disabled so as to be unable to perform the essential functions of the Executive's then existing position or positions with or without reasonable accommodation, the Executive may, and at the request of the Company shall, submit to the Company a certification in reasonable detail by a physician selected by the Company to whom the Executive or the Executive's guardian has no reasonable objection as to whether the Executive is so disabled or how long such disability is expected to continue, and such certification shall for the purposes of this Agreement be conclusive of the issue. The Executive shall cooperate with any reasonable request of the physician in connection with such certification. If such question shall arise and the Executive shall fail to submit such certification, the Company's determination of such issue shall be binding on the Executive. Nothing in this Section 3(b) shall be construed to waive the Executive's rights, if any, under existing law including, without limitation, the Family and Medical Leave Act of 1993, 29 U.S.C. §2601 *et seq*. and the Americans with Disabilities Act, 42 U.S.C. §12101 *et seq*.

(c) Termination by Company for Cause. The Company may terminate the Executive's employment hereunder for Cause by a vote of the Board at a meeting of the Board called and held for such purpose. For purposes of this Agreement, "Cause" shall mean: (i) the Executive's dishonest statements or acts with respect to the Company, any affiliate of the Company or any of the Company's current or prospective customers, suppliers, vendors or other third parties with which such entity does business; (ii) the Executive's commission of a felony or any misdemeanor involving moral turpitude, deceit, dishonesty or fraud; (iii) the Executive's failure to perform his assigned duties to the reasonable satisfaction of the Company, which failure, if curable, continues, in the reasonable judgment of the Company, after written notice given to the Executive by the Company; (iv) the Executive's gross negligence, willful misconduct or insubordination with respect to the Company or any affiliate of the Company; or (v) the Executive's violation of any provision of any agreement(s) between the Executive and the Company relating to noncompetition, nondisclosure and/or assignment of inventions.

(d) Termination Without Cause. The Company may terminate the Executive's employment hereunder at any time without Cause. Any termination by the Company of the Executive's employment under this Agreement which does not constitute a termination for Cause under Section 3(c) and does not result from the death or disability of the Executive under Section 3(a) or (b) shall be deemed a termination without Cause.

(e) Termination by the Executive. The Executive may terminate his employment hereunder at any time for any reason, including but not limited to Good Reason. For purposes of this Agreement, "Good Reason" shall mean that the Executive has complied with the "Good Reason Process" (hereinafter defined) following the occurrence of any of the following events without the Executive's express written consent: (i) a material diminution in the Executive's responsibilities, authority and function; (ii) a material reduction in the Executive's Base Salary except pursuant to a salary reduction program affecting substantially all of the employees of the Company, provided, that it does not adversely affect the Executive to a greater extent than other similarly situated employees and, provided further, that any reduction in the Executive's Base Salary of more than ten percent (10%) shall constitute Good Reason; (iii) a material change of more than 30 miles in the geographic location at which the Executive must provide services to the Company (except for required travel on Company business to an extent substantially consistent with the Executive's usual business travel obligations); or (iv) the material breach by the Company of the Company's equity incentive plan or the stock option agreement governing the stock option granted to the Executive in connection with his hire (as described in the Offer Letter) or any other material agreement between the Executive and the Company, if any, concerning the terms and conditions of the Executive's employment, benefits or compensation. "Good Reason Process" shall mean that (i) the Executive reasonably determines in good faith that a "Good Reason" condition has occurred; (ii) the Executive notifies the Company in writing of the first occurrence of the Good Reason condition within 60 days of the first occurrence of such condition; (iii) the Executive cooperates in good faith with the Company's efforts, for a period not less than 30 days following such notice (the "Cure Period") to remedy the condition; (iv) notwithstanding such efforts, the Good Reason condition continues to exist; and (v) the Executive terminates his employment within 60 days after the end of the Cure Period. If the Company cures the Good Reason condition during the Cure Period, Good Reason shall be deemed not to have occurred.

(f) Notice of Termination. Except for termination as specified in Section 3(a), any termination of the Executive's employment by the Company or any such termination by the Executive shall be communicated by written Notice of Termination to the other party hereto. For purposes of this Agreement, a "Notice of Termination" shall mean a notice which shall indicate the specific termination provision in this Agreement relied upon.

(g) Date of Termination. "Date of Termination" shall mean: (i) if the Executive's employment is terminated by his death, the date of his death; (ii) if the Executive's employment is terminated on account of disability under Section 3(b) or by the Company for Cause under Section 3(c), the date on which Notice of Termination is given; (iii) if the Executive's employment is terminated by the Company under Section 3(d), the date on which a Notice of Termination is given; (iv) if the Executive's employment is terminated by the Executive under Section 3(e) without Good Reason, 30 days after the date on which a Notice of Termination is given, and (v) if the Executive's employment is terminated by the Executive

under Section 3(e) with Good Reason, the date on which a Notice of Termination is given after the end of the Cure Period. Notwithstanding the foregoing, (A) in the event that the Executive gives a Notice of Termination to the Company, the Company may unilaterally accelerate the Date of Termination and such acceleration shall not result in a termination by the Company for purposes of this Agreement, and (B) in the event that the Company terminates the Executive's employment without Cause under Section 3(d), the Company may unilaterally accelerate the Date of Termination to any earlier effective date provided that the Company continues to pay the Executive the Base Salary for the 30-day period immediately following the date on which a Notice of Termination is given to the Executive.

4. Compensation Upon Termination.

(a) Termination Generally. If the Executive's employment with the Company is terminated for any reason, the Company shall pay or provide to the Executive (or to his authorized representative or estate) (i) any Base Salary earned through the Date of Termination, unpaid expense reimbursements (subject to, and in accordance with, Section 2(c) of this Agreement) and unused vacation that accrued through the Date of Termination on or before the time required by law but in no event more than 30 days after the Executive's Date of Termination; and (ii) any vested benefits the Executive may have under any employee benefit plan of the Company through the Date of Termination, which vested benefits shall be paid and/or provided in accordance with the terms of such employee benefit plans (collectively, the "Accrued Benefit").

(b) Termination by the Company Without Cause or by the Executive with Good Reason. During the Term, if the Executive's employment is terminated by the Company without Cause as provided in Section 3(d), or the Executive terminates his employment for Good Reason as provided in Section 3(e), then the Company shall pay the Executive his Accrued Benefit. In addition, subject to the Executive signing a separation agreement containing, among other provisions, a general release of claims in favor of the Company and related persons and entities, confidentiality, return of property and non-disparagement, in a form and manner satisfactory to the Company (the "Separation Agreement and Release") and the Separation Agreement and Release becoming fully effective, all within the time frame set forth in the Separation Agreement and Release:

(i) the Company shall pay the Executive an amount equal to one times the Executive's Base Salary (the "Severance Amount"); and

(ii) if the Executive was participating in the Company's group health plan immediately prior to the Date of Termination and elects COBRA health continuation, then the Company shall pay to the Executive a monthly cash payment for 12 months or the Executive's COBRA health continuation period, whichever ends earlier, in an amount equal to the monthly employer contribution that the Company would have made to provide health insurance to the Executive if the Executive had remained employed by the Company; and

(iii) the amounts payable under this Section 4(b) shall be paid out in substantially equal installments in accordance with the Company's payroll practice over

12 months commencing within 60 days after the Date of Termination; provided, however, that if the 60-day period begins in one calendar year and ends in a second calendar year, the Severance Amount shall begin to be paid in the second calendar year by the last day of such 60-day period; provided, further, that the initial payment shall include a catch-up payment to cover amounts retroactive to the day immediately following the Date of Termination. Each payment pursuant to this Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2).

(iv) The receipt of any severance payments or benefits pursuant to Section 4 will be subject to Executive not violating the Restrictive Covenant Agreement referenced in Section 7 of this Agreement and attached hereto as Exhibit A, the terms of which are hereby incorporated by reference. In the event Executive breaches the Restrictive Covenant Agreement, in addition to all other legal and equitable remedies, the Company shall have the right to terminate or suspend all continuing payments and benefits to which Executive may otherwise be entitled pursuant to Section 4 without affecting the Executive's release or Executive's obligations under the Separation Agreement and Release.

5. Change in Control Payment. The provisions of this Section 5 set forth certain terms of an agreement reached between the Executive and the Company regarding the Executive's rights and obligations upon the occurrence of a Change in Control of the Company. These provisions are intended to assure and encourage in advance the Executive's continued attention and dedication to his assigned duties and his objectivity during the pendency and after the occurrence of any such event. These provisions shall apply in lieu of, and expressly supersede, the provisions of Section 4(b) regarding severance pay and benefits upon a termination of employment, if such termination of employment occurs within 12 months after the occurrence of the first event constituting a Change in Control. These provisions shall terminate and be of no further force or effect beginning 12 months after the occurrence of a Change in Control.

(a) Change in Control. During the Term, if within 12 months after a Change in Control, the Executive's employment is terminated by the Company without Cause as provided in Section 3(d) or the Executive terminates his employment for Good Reason as provided in Section 3(e), then, subject to the signing of the Separation Agreement and Release by the Executive and the Separation Agreement and Release becoming irrevocable, all within 60 days after the Date of Termination,

(i) the Company shall pay the Executive a lump sum in cash in an amount equal to one times the Executive's current Base Salary (or the Executive's Base Salary in effect immediately prior to the Change in Control, if higher); and

(ii) notwithstanding anything to the contrary in any applicable option agreement or stock-based award agreement, all stock options and other stock-based awards granted to the Executive after the date of this Agreement shall immediately accelerate and become fully exercisable or nonforfeitable as of the Date of Termination. The treatment of stock options and other stock-based awards held by the Executive as of

the date of this Agreement shall be governed by the terms of the applicable option agreement or other stock-based award agreement; and

(iii) if the Executive was participating in the Company's group health plan immediately prior to the Date of Termination and elects COBRA health continuation, then the Company shall pay to the Executive a monthly cash payment for 12 months or the Executive's COBRA health continuation period, whichever ends earlier, in an amount equal to the monthly employer contribution that the Company would have made to provide health insurance to the Executive if the Executive had remained employed by the Company; and

(iv) The amounts payable under this Section 5(a) shall be paid or commence to be paid within 60 days after the Date of Termination; provided, however, that if the 60-day period begins in one calendar year and ends in a second calendar year, such payment shall be paid or commence to be paid in the second calendar year by the last day of such 60-day period.

(b) Additional Limitation.

(i) Anything in this Agreement to the contrary notwithstanding, in the event that the amount of any compensation, payment or distribution by the Company to or for the benefit of the Executive, whether paid or payable or distributed or distributable pursuant to the terms of this Agreement or otherwise, calculated in a manner consistent with Section 280G of the Internal Revenue Code of 1986, as amended (the "Code") and the applicable regulations thereunder (the "Severance Payments"), would be subject to the excise tax imposed by Section 4999 of the Code, the following provisions shall apply:

(A) If the Severance Payments, reduced by the sum of (1) the Excise Tax and (2) the total of the federal, state, and local income and employment taxes payable by the Executive on the amount of the Severance Payments which are in excess of the Threshold Amount, are greater than or equal to the Threshold Amount, the Executive shall be entitled to the full benefits payable under this Agreement.

(B) If the Threshold Amount is less than (x) the Severance Payments, but greater than (y) the Severance Payments reduced by the sum of (1) the Excise Tax and (2) the total of the federal, state, and local income and employment taxes on the amount of the Severance Payments which are in excess of the Threshold Amount, then the Severance Payments shall be reduced (but not below zero) to the extent necessary so that the sum of all Severance Payments shall not exceed the Threshold Amount. In such event, the Severance Payments shall be reduced in the following order: (1) cash payments not subject to Section 409A of the Code; (2) cash payments subject to Section 409A of the Code; (3) equity-based payments and acceleration; and (4) non-cash forms of benefits. To the extent any payment is to be made over time (e.g., in installments, etc.), then the payments shall be reduced in reverse chronological order.

(ii) For the purposes of this Section 5(b), "Threshold Amount" shall mean three times the Executive's "base amount" within the meaning of Section 280G(b)(3) of the Code and the regulations promulgated thereunder less one dollar ($1.00); and "Excise Tax" shall mean the excise tax imposed by Section 4999 of the Code, and any interest or penalties incurred by the Executive with respect to such excise tax.

(iii) The determination as to which of the alternative provisions of Section 5(b)(i) shall apply to the Executive shall be made by a nationally recognized accounting firm selected by the Company (the "Accounting Firm"), which shall provide detailed supporting calculations both to the Company and the Executive within 15 business days of the Date of Termination, if applicable, or at such earlier time as is reasonably requested by the Company or the Executive. For purposes of determining which of the alternative provisions of Section 5(b)(i) shall apply, the Executive shall be deemed to pay federal income taxes at the highest marginal rate of federal income taxation applicable to individuals for the calendar year in which the determination is to be made, and state and local income taxes at the highest marginal rates of individual taxation in the state and locality of the Executive's residence on the Date of Termination, net of the maximum reduction in federal income taxes which could be obtained from deduction of such state and local taxes. Any determination by the Accounting Firm shall be binding upon the Company and the Executive.

(b) Definitions. For purposes of this Section 5, the following terms shall have the following meanings:

"Change in Control" shall mean "Sale Event," as such term is defined in the Company's 2013 Stock Option and Incentive Plan.

6. Section 409A.

(a) Anything in this Agreement to the contrary notwithstanding, if at the time of the Executive's separation from service within the meaning of Section 409A of the Code, the Company determines that the Executive is a "specified employee" within the meaning of Section 409A(a)(2)(B)(i) of the Code, then to the extent any payment or benefit that the Executive becomes entitled to under this Agreement on account of the Executive's separation from service would be considered deferred compensation otherwise subject to the 20 percent additional tax imposed pursuant to Section 409A(a) of the Code as a result of the application of Section 409A(a)(2)(B)(i) of the Code, such payment shall not be payable and such benefit shall not be provided until the date that is the earlier of (A) six months and one day after the Executive's separation from service, or (B) the Executive's death. If any such delayed cash payment is otherwise payable on an installment basis, the first payment shall include a catch-up payment covering amounts that would otherwise have been paid during the six-month period but for the application of this provision, and the balance of the installments shall be payable in accordance with their original schedule.

(b) All in-kind benefits provided and expenses eligible for reimbursement under this Agreement shall be provided by the Company or incurred by the Executive during the

time periods set forth in this Agreement. All reimbursements shall be paid as soon as administratively practicable, but in no event shall any reimbursement be paid after the last day of the taxable year following the taxable year in which the expense was incurred. The amount of in-kind benefits provided or reimbursable expenses incurred in one taxable year shall not affect the in-kind benefits to be provided or the expenses eligible for reimbursement in any other taxable year (except for any lifetime or other aggregate limitation applicable to medical expenses). Such right to reimbursement or in-kind benefits is not subject to liquidation or exchange for another benefit.

(c) To the extent that any payment or benefit described in this Agreement constitutes "non-qualified deferred compensation" under Section 409A of the Code, and to the extent that such payment or benefit is payable upon the Executive's termination of employment, then such payments or benefits shall be payable only upon the Executive's "separation from service." The determination of whether and when a separation from service has occurred shall be made in accordance with the presumptions set forth in Treasury Regulation Section 1.409A-1(h).

(d) The parties intend that this Agreement will be administered in accordance with Section 409A of the Code. To the extent that any provision of this Agreement is ambiguous as to its compliance with Section 409A of the Code, the provision shall be read in such a manner so that all payments hereunder comply with Section 409A of the Code. Each payment pursuant to this Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2). The parties agree that this Agreement may be amended, as reasonably requested by either party, and as may be necessary to fully comply with Section 409A of the Code and all related rules and regulations in order to preserve the payments and benefits provided hereunder without additional cost to either party.

(e) The Company makes no representation or warranty and shall have no liability to the Executive or any other person if any provisions of this Agreement are determined to constitute deferred compensation subject to Section 409A of the Code but do not satisfy an exemption from, or the conditions of, such Section.

7. Confidential Information, Noncompetition and Cooperation. The Executive agrees to terms of the Assignment of Invention, Nondisclosure and Noncompetition Agreement ("Restrictive Covenant Agreement") attached hereto as Exhibit A, the terms of which are hereby incorporated by reference as material terms of this Agreement.

8. Consent to Jurisdiction. The parties hereby consent to the jurisdiction of the Superior Court of the Commonwealth of Massachusetts and the United States District Court for the District of Massachusetts. Accordingly, with respect to any such court action, the Executive (a) submits to the personal jurisdiction of such courts; (b) consents to service of process; and (c) waives any other requirement (whether imposed by statute, rule of court, or otherwise) with respect to personal jurisdiction or service of process.

9. Integration. This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements between the parties concerning such subject matter.

10. Withholding. All payments made by the Company to the Executive under this Agreement shall be net of any tax or other amounts required to be withheld by the Company under applicable law.

11. Successor to the Executive. This Agreement shall inure to the benefit of and be enforceable by the Executive's personal representatives, executors, administrators, heirs, distributees, devisees and legatees. In the event of the Executive's death after his termination of employment but prior to the completion by the Company of all payments due him under this Agreement, the Company shall continue such payments to the Executive's beneficiary designated in writing to the Company prior to his death (or to his estate, if the Executive fails to make such designation).

12. Enforceability. If any portion or provision of this Agreement (including, without limitation, any portion or provision of any section of this Agreement) shall to any extent be declared illegal or unenforceable by a court of competent jurisdiction, then the remainder of this Agreement, or the application of such portion or provision in circumstances other than those as to which it is so declared illegal or unenforceable, shall not be affected thereby, and each portion and provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law.

13. Survival. The provisions of this Agreement shall survive the termination of this Agreement and/or the termination of the Executive's employment to the extent necessary to effectuate the terms contained herein.

14. Waiver. No waiver of any provision hereof shall be effective unless made in writing and signed by the waiving party. The failure of any party to require the performance of any term or obligation of this Agreement, or the waiver by any party of any breach of this Agreement, shall not prevent any subsequent enforcement of such term or obligation or be deemed a waiver of any subsequent breach.

15. Notices. Any notices, requests, demands and other communications provided for by this Agreement shall be sufficient if in writing and delivered in person or sent by a nationally recognized overnight courier service or by registered or certified mail, postage prepaid, return receipt requested, to the Executive at the last address the Executive has filed in writing with the Company or, in the case of the Company, at its main offices, attention of the Board.

16. Amendment. This Agreement may be amended or modified only by a written instrument signed by the Executive and by a duly authorized representative of the Company.

17. Governing Law. This is a Massachusetts contract and shall be construed under and be governed in all respects by the laws of the Commonwealth of Massachusetts, without giving effect to the conflict of laws principles of such Commonwealth. With respect to any disputes concerning federal law, such disputes shall be determined in accordance with the law as it would be interpreted and applied by the United States Court of Appeals for the First Circuit.

18. Counterparts. This Agreement may be executed in any number of counterparts, each of which when so executed and delivered shall be taken to be an original; but such counterparts shall together constitute one and the same document.

19. Successor to Company. The Company shall require any successor (whether direct or indirect, by purchase, merger, consolidation or otherwise) to all or substantially all of the business or assets of the Company expressly to assume and agree to perform this Agreement to the same extent that the Company would be required to perform it if no succession had taken place. Failure of the Company to obtain an assumption of this Agreement at or prior to the effectiveness of any succession shall be a material breach of this Agreement.

20. Gender Neutral. Wherever used herein, a pronoun in the masculine gender shall be considered as including the feminine gender unless the context clearly indicates otherwise.

IN WITNESS WHEREOF, the parties have executed this Agreement effective on the date and year first above written.

BLUEBIRD BIO, INC.

By: /s/ Nick Leschly
Its: Chief Executive Officer

/s/ Philip Gregory
Dr. Philip Gregory

[Signature Page to the Employment Agreement]

Exhibit A

Restrictive Covenant Agreement

LEASE AGREEMENT

THIS LEASE AGREEMENT (this "**Lease**") is made this 29th day of June, 2015, between **ARE-MA REGION NO. 38, LLC**, a Delaware limited liability company ("**Landlord**"), and **BLUEBIRD BIO, INC.**, a Delaware corporation ("**Tenant**").

BASIC LEASE PROVISIONS

Address:	215 First Street, Cambridge, MA 02142
Premises:	That portion of the third floor of the Building, containing approximately 15,120 rentable square feet in the Phase I Premises and 8,075 rentable square feet in the Phase II Premises, as determined by Landlord, as shown on **Exhibit A**.
Shared Conference Facility:	That portion of the Building depicted as the "Shared Conference Facility" on **Exhibit C** attached hereto, subject to adjustment and relocation by Landlord from time to time.
Project:	The real property on which the Building is located, together with all improvements thereon and appurtenances thereto as described on **Exhibit D**.
Building:	That building located on the Project and commonly known and numbered as 215 First Street, Cambridge, Massachusetts.
Base Rent:	$32.00 per rsf per annum, as adjusted pursuant to Section 4 hereof.
Rentable Area of Premises:	Approximately 23,195 rentable square feet.
Rentable Area of Project:	Approximately 366,723 rentable square feet.
Tenant's Share:	4.12% with respect to the Phase I Premises and 2.20% with respect to the Phase II Premises, for a total of 6.32% with respect to the entire Premises.
Rent Adjustment Percentage:	3%
Target Commencement Date:	July 13, 2015 with respect to the Phase I Premises and January 1, 2016 with respect to the Phase II Premises
Term:	Beginning on the Commencement Date and ending 60 months from the first day of the first full month commencing on or after the Commencement Date.
Permitted Use:	Office and related uses consistent with the character of the Project and otherwise in compliance with the provisions of Section 7 hereof.

Address for Rent Payment:	**Landlord's Notice Address:**	**Tenant's Notice Address:**
P.O. Box 975383 Dallas, TX 75397-5383	385 East Colorado Boulevard, Suite 299 Pasadena, CA 91101 Attention: Corporate Secretary Facsimile: 626-578-0770	150 Second Street First Floor Cambridge, MA 02141 Attention: General Counsel

The following Exhibits and Addenda are attached hereto and incorporated herein by this reference:

[X] **EXHIBIT A** - PREMISES DESCRIPTION
[X] **EXHIBIT B** - DESCRIPTION OF PROJECT
[X] **EXHIBIT C** - TENANT'S PROPERTY
[X] **EXHIBIT D** - COMMENCEMENT DATE
[X] **EXHIBIT E** - RULES AND REGULATIONS
[X] **EXHIBIT F** - SHARED CONFERENCE FACILITY
[X] **EXHIBIT G** - LICENSE AGREEMENT
[X] **EXHIBIT H** - ASBESTOS DISCLOSURE

1. **Lease of Premises; Right to Use Common Areas; License to Shared Conference Facility**.

(a) **Lease of Premises; Common Areas**. Upon and subject to all of the terms and conditions hereof, Landlord hereby leases the Premises to Tenant and Tenant hereby leases the Premises from Landlord. The portions of the Project that are for the non-exclusive use of tenants of the Project, including without limitation, public or common lobbies, common chases and conduits, mechanical and utility rooms, hallways, stairways, elevators and common walkways, the common toilets, corridors and elevator lobby of any multi-tenant floor, the access roads, driveways, parking areas, loading areas, pedestrian sidewalks, landscaped areas and trash enclosures, are collectively referred to herein as the "**Common Areas**." Tenant shall have the non-exclusive right to use the Common Areas of the Project, excluding the Shared Conference Facility to which Tenant's rights are as set forth in Section 1(b) below. Landlord reserves the right to modify, reconfigure and relocate the Common Areas, provided that such modifications, reconfigurations or relocations do not materially adversely affect Tenant's use of the Premises for the Permitted Use or Tenant's access to the Premises. Notwithstanding the foregoing, no interruption in Building Systems, services or Utilities, from any cause whatsoever, in connection with any work to effect any such modification, reconfiguration or relocation shall result in eviction or constructive eviction of Tenant, termination of this Lease or the abatement of Rent. Landlord reserves the right to change the form of ownership of the Project or any part thereof.

(b) **Shared Conference Facility**. Concurrently with the execution and delivery of this Lease by Tenant, Tenant shall execute and deliver to Landlord a license agreement in the form attached as **Exhibit G** attached hereto (the "**License Agreement**"). Tenant shall have the non-exclusive right to use the Shared Conference Facility pursuant to the terms and conditions of the License Agreement. Tenant shall have no right to use or access the Shared Conference Facility, except as provided in the License Agreement.

2. **Delivery; Acceptance of Premises; Commencement Date**. Landlord shall use reasonable efforts to deliver the Phase I Premises to Tenant on or before the Phase I Target Commencement Date ("**Delivery**" or "**Deliver**") and to Deliver the Phase II Premises to Tenant on or before the Phase II Target Commencement Date, in each case broom clean with all personal property and furnishings/furniture removed and with all existing construction improvements remaining in place. If Landlord fails to timely Deliver the Premises or the Phase I Premises or the Phase II Premises, except as provided herein, Landlord shall not be liable to Tenant for any loss or damage resulting therefrom and this Lease shall not be void or voidable.

Landlord and Tenant acknowledges that the Phase I Premises and Phase II Premises are currently occupied by another tenant, Le Cordon Bleu ("**LCB**"), and, as described below, Landlord intends to enter into an Amendment to Lease (the "**LCB Amendment**") providing for LCB to vacate and yield up the Phase I Premises by the Target Commencement Date for Phase I and to vacate and yield up the Phase II Premises by the Target Commencement Date for Phase II. The LCB Amendment provides that for each seven-day period commencing July 13, 2015 that LCB fails to so vacate and yield up the Phase I Premises, or portion thereof, LCB shall be obligated to pay an amount equal to its Base Rent on the Phase I Premises for a one month period ("**Delay Payment**"). (For example, if LCB vacates and yields up on July 19, 2015, LCB will be obligated to pay an amount equal to its Base Rent for a one month period. In addition, the LCB Amendment provides that for each seven-day period commencing January 15, 2016 that LCB fails to so vacate and yield up the Phase II Premises, or portion thereof, LCB shall be obligated to pay an amount equal to its Base Rent on the Phase II Premises for a one month period (also "Delay Payment"). If and to

the extent LCB is responsible for and actually makes Delay Payments, Landlord shall make such Delay Payments available to Tenant as a credit against Base Rent next coming due hereunder. Landlord agrees to use commercially reasonable efforts, excluding eviction of LCB from other space, to recover Delay Payments.

If Landlord does not Deliver the Phase I Premises to Tenant by September 1, 2015, Tenant may elect to terminate this Lease by written notice to Landlord within ten (10) business days after September 1, 2015. If Tenant does not void this Lease within such time period, this Lease shall continue in force and effect.

If Landlord does not Deliver the Phase II Premises to Tenant on or before January 31, 2016, Tenant may elect to delete the Phase II Premises from the Premises by written notice to Landlord within ten (10) business days after January 31, 2016. If Tenant makes such election, the Phase II Premises shall be deleted from the Premises, neither Landlord nor Tenant shall have any further rights, duties or obligations under this Lease with respect to the Phase II Premises, and this Lease shall continue in full force and effect with respect to the Phase I Premises. If Tenant does not make such election within such time period, this Lease shall continue in force and effect.

The "**Commencement Date**" shall be the date Landlord Delivers the Phase I Premises to Tenant. Upon request of Landlord, Tenant shall execute and deliver a written acknowledgment of the Commencement Date and the expiration date of the Term when such are established in the form of the "Acknowledgement of Commencement Date" attached to this Lease as **Exhibit D**; provided, however, Tenant's failure to execute and deliver such acknowledgment shall not affect Landlord's rights hereunder. The "**Term**" of this Lease shall be the Base Term, as defined above on the first page of this Lease.

Notwithstanding anything to the contrary contained in this Lease, Tenant and Landlord acknowledge and agree that the effectiveness of this Lease shall be subject to the following condition precedent ("**Condition Precedent**") having been satisfied: Landlord shall have entered into the LCB Amendment on or before June 30, 2015, with LCB which LCB Amendment shall be on terms and conditions acceptable to Landlord, in Landlord's sole and absolute discretion, including without limitation a requirement that the existing tenant construct the demising wall between the Phase II Space and space to be retained by LCB as shown on the Plan attached hereto as **Exhibit A** prior to the Delivery of the Phase II Premises. In the event that the Condition Precedent is not satisfied, either party shall have the right to terminate this Lease upon delivery of written notice to the other party, and if so terminated: (a) the Security Deposit, or any balance thereof (i.e., after deducting therefrom all amounts to which Landlord is entitled under the provisions of this Lease), shall be returned to Tenant, and (b) neither Landlord nor Tenant shall have any further rights, duties or obligations under this Lease, except with respect to provisions which expressly survive termination of this Lease. Landlord shall have no liability whatsoever to Tenant relating to or arising from Landlord's inability or failure to cause the Condition Precedent to be satisfied.

Except as otherwise set forth in this Lease: (i) Tenant shall accept the Premises in their condition as of the Commencement Date, subject to all applicable Legal Requirements (as defined in Section 7 hereof); (ii) Landlord shall have no obligation for any defects in the Premises; and (iii) Tenant's taking possession of the Premises shall be conclusive evidence that Tenant accepts the Premises and that the Premises were in good condition at the time possession was taken, subject to the terms and conditions of this Lease. Tenant agrees to construct such demising walls as are required and shown on the Plan attached on **Exhibit A-1** to demise the Phase I Space from the Phase II Space within 30 days after Delivery of the Phase I Premises.

Tenant agrees and acknowledges that neither Landlord nor any agent of Landlord has made any representation or warranty with respect to the condition of all or any portion of the Premises or the Project, and/or the suitability of the Premises or the Project for the conduct of Tenant's business, and Tenant waives any implied warranty that the Premises or the Project are suitable for the Permitted Use. This Lease constitutes the complete agreement of Landlord and Tenant with respect to the subject matter hereof and

supersedes any and all prior representations, inducements, promises, agreements, understandings and negotiations which are not contained herein. Landlord in executing this Lease does so in reliance upon Tenant's representations, warranties, acknowledgments and agreements contained herein.

3. **Rent**.

(a) **Base Rent**. The first month's Base Rent as to the Phase I Premises shall be due and payable on delivery of an executed copy of this Lease by Landlord and Tenant. Tenant shall pay to Landlord in advance, without demand, abatement, deduction or set-off, equal monthly installments of Base Rent on or before the first day of each calendar month during the Term hereof, commencing August 13, 2015, in lawful money of the United States of America, at the office of Landlord for payment of Rent set forth above, or to such other person or at such other place as Landlord may from time to time designate in writing. Payments of Base Rent for any fractional calendar month shall be prorated. Rent shall not be payable on the Phase II Premises until the Phase II Premises are delivered to Tenant. The obligation of Tenant to pay Base Rent and other sums to Landlord and the obligations of Landlord under this Lease are independent obligations. Tenant shall have no right at any time to abate, reduce, or set-off any Rent (as defined in Section 5) due hereunder except for any abatement as may be expressly provided in this Lease.

(b) **Additional Rent**. In addition to Base Rent, Tenant agrees to pay to Landlord as additional rent ("**Additional Rent**"): (i) Tenant's Share of "Operating Expenses" (as defined in Section 5), and (ii) any and all other amounts Tenant assumes or agrees to pay under the provisions of this Lease, including, without limitation, any and all other sums that may become due by reason of any default of Tenant or failure to comply with the agreements, terms, covenants and conditions of this Lease to be performed by Tenant, after any applicable notice and cure period.

4. **Base Rent**. Base Rent shall be increased on each annual anniversary of the first day of the first full month during the Term of this Lease (each an "**Adjustment Date**") by multiplying the Base Rent payable immediately before such Adjustment Date by the Rent Adjustment Percentage and adding the resulting amount to the Base Rent payable immediately before such Adjustment Date. Base Rent, as so adjusted, shall thereafter be due as provided herein. Base Rent adjustments for any fractional calendar month shall be prorated.

5. **Operating Expense Payments**. Landlord shall deliver to Tenant a written estimate of Operating Expenses for each calendar year during the Term (the "**Annual Estimate**"), which may be revised by Landlord from time to time during such calendar year. During each month of the Term, on the same date that Base Rent is due, Tenant shall pay Landlord an amount equal to 1/12th of Tenant's Share of the Annual Estimate. Payments for any fractional calendar month shall be prorated.

The term "**Operating Expenses**" means all costs and expenses of any kind or description whatsoever incurred or accrued each calendar year by Landlord with respect to the operation, cleaning, repair, maintenance and management of the Project (including, without duplication, Taxes (as defined in Section 9), Permitted Capital Repairs and Improvements amortized over the useful life of such capital items, and the costs of Landlord's third party property manager or, if there is no third party property manager, administration rent in the amount of 3.0% of Base Rent), the cost of causing the EZ Ride Shuttle Service of CRTMA (defined in Section 10) to service the Building, excluding only:

(a) the original construction costs of the Project and renovation prior to the date of the Lease and costs of correcting defects in such original construction or renovation;

(b) capital expenditures except for capital expenditures (i) which are required in order to comply with Legal Requirements first in effect after the date of this Lease; (ii) which are intended to realize a reduction in Operating Expenses or maintain or improve the utility, efficiency or capacity of the Building or any Building Systems, and/or (iii) which are intended to improve safety (collectively, "**Permitted Capital Repairs and Improvements**");

(c) interest, principal payments of Mortgage (as defined in Section 27) debts of Landlord, financing costs and amortization of funds borrowed by Landlord, whether secured or unsecured;

(d) depreciation of the Project (except for capital improvements, the cost of which are includable in Operating Expenses);

(e) advertising, legal and space planning expenses and leasing commissions and other costs and expenses incurred in procuring and leasing space to tenants for the Project, including any leasing office maintained in the Project, free rent and construction allowances for tenants;

(f) legal and other expenses incurred in the negotiation or enforcement of leases;

(g) completing, fixturing, improving, renovating, painting, redecorating or other work, which Landlord pays for or performs for other tenants within their premises, and costs of correcting defects in such work;

(h) costs to be reimbursed by other tenants of the Project or Taxes to be paid directly by Tenant or other tenants of the Project, whether or not actually paid;

(i) salaries, wages, benefits and other compensation paid to officers and employees of Landlord who are not assigned in whole or in part to the operation, management, maintenance or repair of the Project, except for one regional manager who is routinely and materially involved in asset management matters for the Building (the parties agreeing that costs associated with such regional manager shall be equitably allocated between the Building and the other properties with respect to which such regional manager provides services and that the compensation and benefits of employees below the level of the one regional manager who are assigned in part to the operation, management, maintenance or repair of the Project and other properties shall also be equitably allocated by Landlord between the Building and such other properties);

(j) all costs relating to maintaining Landlord‘s existence, either as a corporation, partnership, or other entity, including general corporate, legal and accounting expenses;

(k) costs (including attorneys’ fees and costs of settlement, judgments and payments in lieu thereof) incurred in connection with disputes with tenants, other occupants, or prospective tenants, and costs and expenses, including legal fees, incurred in connection with negotiations or disputes with employees, consultants, management agents, leasing agents, purchasers or mortgagees of the Building;

(l) costs incurred by Landlord due to the violation by Landlord, its employees, agents or contractors or any tenant of the terms and conditions of any lease of space in the Project or any Legal Requirement (as defined in Section 7);

(m) penalties, fines or interest incurred as a result of Landlord‘s inability or failure to make payment of Taxes and/or to file any tax or informational returns when due, or from Landlord‘s failure to make any payment of Taxes required to be made by Landlord hereunder before delinquency;

(n) overhead and profit increment paid to Landlord or to subsidiaries or affiliates of Landlord for goods and/or services in or to the Project to the extent the same exceeds the costs of such goods and/or services rendered by unaffiliated third parties on a competitive basis;

(o) costs of Landlord’s charitable or political contributions, or of fine art maintained at the Project;

(p) costs in connection with services (including electricity), items or other benefits of a type which are not standard for the Project and which are not available to Tenant without specific charges

therefor, but which are provided to another tenant or occupant of the Project, whether or not such other tenant or occupant is specifically charged therefor by Landlord;

(q) costs incurred in the sale or refinancing of the Project;

(r) net income taxes of Landlord or the owner of any interest in the Project, franchise, capital stock, gift, estate or inheritance taxes or any federal, state or local documentary taxes imposed against the Project or any portion thereof or interest therein; and

(s) any expenses otherwise includable within Operating Expenses to the extent actually reimbursed by persons other than tenants of the Project under leases for space in the Project.

Within 90 days after the end of each calendar year (or such longer period as may be reasonably required), Landlord shall furnish to Tenant a statement (an "**Annual Statement**") showing in reasonable detail: (a) the total and Tenant's Share of actual Operating Expenses for the previous calendar year, and (b) the total of Tenant's payments in respect of Operating Expenses for such year. If Tenant's Share of actual Operating Expenses for such year exceeds Tenant's payments of Operating Expenses for such year, the excess shall be due and payable by Tenant as Rent within 30 days after delivery of such Annual Statement to Tenant. If Tenant's payments of Operating Expenses for such year exceed Tenant's Share of actual Operating Expenses for such year Landlord shall pay the excess to Tenant within 30 days after delivery of such Annual Statement, except that after the expiration, or earlier termination of the Term or if Tenant is delinquent in its obligation to pay Rent, Landlord shall pay the excess to Tenant after deducting all other amounts due Landlord.

The Annual Statement shall be final and binding upon Tenant unless Tenant, within 90 days after Tenant's receipt thereof, shall contest any item therein by giving written notice to Landlord, specifying each item contested and the reason therefor. Notwithstanding anything set forth herein to the contrary, if the Project is not at least 95% occupied on average during any year of the Term, Tenant's Share of Operating Expenses for such year shall be computed as though the Project had been 95% occupied on average during such year. If, during such 90 day period, Tenant reasonably and in good faith questions or contests the accuracy of Landlord's statement of Tenant's Share of Operating Expenses, Landlord will provide Tenant with access to such information as Landlord reasonably determines to be responsive to Tenant's questions (the "**Expense Information**"). If after Tenant's review of such Expense Information, Landlord and Tenant cannot agree upon the amount of Tenant's Share of Operating Expenses, then Tenant shall have the right to have an independent public accounting firm selected by Tenant, working pursuant to a fee arrangement other than a contingent fee (at Tenant's sole cost and expense) and approved by Landlord (which approval shall not be unreasonably withheld or delayed), audit and/or review the Expense Information for the year in question (the "**Independent Review**"). The results of any such Independent Review shall be binding on Landlord and Tenant. If the Independent Review shows that the payments actually made by Tenant with respect to Operating Expenses for the calendar year in question exceeded Tenant's Share of Operating Expenses for such calendar year, Landlord shall at Landlord's option either (i) credit the excess amount to the next succeeding installments of estimated Operating Expenses or (ii) pay the excess to Tenant within 30 days after delivery of such statement, except that after the expiration or earlier termination of this Lease or if Tenant is delinquent in its obligation to pay Rent, Landlord shall pay the excess to Tenant after deducting all other amounts due Landlord. If the Independent Review shows that Tenant's payments with respect to Operating Expenses for such calendar year were less than Tenant's Share of Operating Expenses for the calendar year, Tenant shall pay the deficiency to Landlord within 30 days after delivery of such statement. If the Independent Review shows that Tenant has overpaid with respect to Operating Expenses by more than 5% then Landlord shall reimburse Tenant for all reasonable out-of-pocket costs incurred by Tenant for the Independent Review.

"**Tenant's Share**" shall be the percentage set forth on the first page of this Lease as Tenant's Share as reasonably adjusted by Landlord for changes in the physical size of the Premises or the Project. Landlord may equitably increase Tenant's Share for any item of expense or cost reimbursable by Tenant that relates to a repair, replacement, or service that benefits only the Premises or only a portion of the Project that

includes the Premises or that varies with occupancy or use. Base Rent, Tenant's Share of Operating Expenses and all other amounts payable by Tenant to Landlord hereunder are collectively referred to herein as "**Rent.**"

6. **Security Deposit**. Tenant shall deposit with Landlord, upon delivery of an executed copy of this Lease to Landlord, a security deposit (the "**Security Deposit**") for the performance of all of Tenant's obligations hereunder in the amount set forth on page 1 of this Lease, which Security Deposit shall be in the form of an unconditional and irrevocable letter of credit (the "**Letter of Credit**"): (i) in form and substance satisfactory to Landlord, (ii) naming Landlord as beneficiary, (iii) expressly allowing Landlord to draw upon it at any time from time to time by delivering to the issuer notice that Landlord is entitled to draw thereunder, (iv) issued by an FDIC-insured financial institution satisfactory to Landlord, and (v) redeemable by presentation of a sight draft in the state of Massachusetts or California. If Tenant does not provide Landlord with a substitute Letter of Credit complying with all of the requirements hereof at least 10 days before the stated expiration date of any then current Letter of Credit, Landlord shall have the right to draw the full amount of the current Letter of Credit and hold the funds drawn in cash without obligation for interest thereon as the Security Deposit. The Security Deposit shall be held by Landlord as security for the performance of Tenant's obligations under this Lease. The Security Deposit is not an advance rental deposit or a measure of Landlord's damages in case of Tenant's default. Upon each occurrence of a Default (as defined in Section 20), Landlord may use all or any part of the Security Deposit to pay delinquent payments due under this Lease, future rent damages and the cost of any damage, injury, expense or liability caused by such Default, without prejudice to any other remedy provided herein or provided by law. Landlord's right to use the Security Deposit under this Section 6 includes the right to use the Security Deposit to pay future rent damages following the termination of this Lease pursuant to Section 21(c) below. Upon any use of all or any portion of the Security Deposit, Tenant shall pay Landlord on demand the amount that will restore the Security Deposit to the amount set forth on Page 1 of this Lease. Tenant hereby waives the provisions of any law, now or hereafter in force which provide that Landlord may claim from a security deposit only those sums reasonably necessary to remedy defaults in the payment of Rent, to repair damage caused by Tenant or to clean the Premises, it being agreed that Landlord may, in addition, claim those sums reasonably necessary to compensate Landlord for any other loss or damage, foreseeable or unforeseeable, caused by the act or omission of Tenant or any officer, employee, agent or invitee of Tenant. Upon bankruptcy or other debtor-creditor proceedings against Tenant, the Security Deposit shall be deemed to be applied first to the payment of Rent and other charges due Landlord for periods prior to the filing of such proceedings. If Tenant shall fully perform every provision of this Lease to be performed by Tenant, the Security Deposit, or any balance thereof (i.e., after deducting therefrom all amounts to which Landlord is entitled under the provisions of this Lease), shall be returned to Tenant (or, at Landlord's option, to the last assignee of Tenant's interest hereunder) within 60 days after the expiration or earlier termination of this Lease.

If Landlord transfers its interest in the Project or this Lease, Landlord shall either (a) transfer any Security Deposit then held by Landlord to a person or entity assuming Landlord's obligations under this Section 6, or (b) return to Tenant any Security Deposit then held by Landlord and remaining after the deductions permitted herein. Upon such transfer to such transferee or the return of the Security Deposit to Tenant, Landlord shall have no further obligation with respect to the Security Deposit, and Tenant's right to the return of the Security Deposit shall apply solely against Landlord's transferee. The Security Deposit is not an advance rental deposit or a measure of Landlord's damages in case of Tenant's default. Landlord's obligation respecting the Security Deposit is that of a debtor, not a trustee, and no interest shall accrue thereon.

7. **Use**. The Premises shall be used solely for the Permitted Use set forth in the basic lease provisions on page 1 of this Lease, and in compliance with all laws, orders, judgments, ordinances, regulations, codes, directives, permits, licenses, covenants and restrictions now or hereafter applicable to the Premises, and to the use and occupancy thereof, including, without limitation, the Americans With Disabilities Act, 42 U.S.C. § 12101, et seq. (together with the regulations promulgated pursuant thereto, "**ADA**") (collectively, "**Legal Requirements**" and each, a "**Legal Requirement**"). Tenant shall, upon 5 days' written notice from Landlord, discontinue any use of the Premises which is declared by any Governmental Authority (as defined in Section 9) having jurisdiction to be a violation of a Legal Requirement. Tenant will

not use or permit the Premises to be used for any purpose or in any manner that would void Tenant's or Landlord's insurance, increase the insurance risk, or cause the disallowance of any sprinkler or other credits. Tenant shall not permit any part of the Premises to be used as a "place of public accommodation", as defined in the ADA or any similar legal requirement. Tenant shall reimburse Landlord promptly upon demand for any additional premium charged for any such insurance policy by reason of Tenant's failure to comply with the provisions of this Section or otherwise caused by Tenant's use and/or occupancy of the Premises. Tenant will use the Premises in a careful, safe and proper manner and will not commit or permit waste, overload the floor or structure of the Premises, subject the Premises to use that would damage the Premises or obstruct or interfere with the rights of Landlord or other tenants or occupants of the Project, including conducting or giving notice of any auction, liquidation, or going out of business sale on the Premises, or using or allowing the Premises to be used for any unlawful purpose. Tenant shall cause any equipment or machinery to be installed in the Premises so as to reasonably prevent sounds or vibrations from the Premises from extending into Common Areas, or other space in the Project. Tenant shall not place any machinery or equipment weighing 500 pounds or more in or upon the Premises or transport or move such items through the Common Areas of the Project or in the Project elevators without the prior written consent of Landlord. Tenant shall not, without the prior written consent of Landlord, use the Premises in any manner which will require ventilation, air exchange, heating, gas, steam, electricity or water beyond the existing capacity of the Project as proportionately allocated to the Premises based upon Tenant's Share as usually furnished for the Permitted Use.

Tenant, at its sole expense, shall make any alterations or modifications to the interior or the exterior of the Premises or the Project that are required by Legal Requirements (including, without limitation, compliance of the Premises with the ADA) related to Tenant's specific use or occupancy of the Premises. Notwithstanding any other provision herein to the contrary, and except to the extent resulting from Landlord Parties' negligence or willful misconduct, Tenant shall be responsible for any and all demands, claims, liabilities, losses, costs, expenses, actions, causes of action, damages or judgments, and all reasonable expenses incurred in investigating or resisting the same (including, without limitation, reasonable attorneys' fees, charges and disbursements and costs of suit) (collectively, "**Claims**") arising out of or in connection with Legal Requirements, and Tenant shall indemnify, defend, hold and save Landlord harmless from and against any and all Claims arising out of or in connection with any failure of the Premises to comply with any Legal Requirement to the extent such Claims arise out of Tenant's particular use and occupancy of the Premises.

8. **Holding Over**. If, with Landlord's express written consent, Tenant retains possession of the Premises after the termination of the Term, (i) unless otherwise agreed in such written consent, such possession shall be subject to immediate termination by Landlord at any time, (ii) all of the other terms and provisions of this Lease (including, without limitation, the adjustment of Base Rent pursuant to Section 4 hereof) shall remain in full force and effect (excluding any expansion or renewal option or other similar right or option) during such holdover period, (iii) Tenant shall continue to pay Base Rent in the amount payable upon the date of the expiration or earlier termination of this Lease or such other amount as Landlord may indicate, in Landlord's sole and absolute discretion, in such written consent, and (iv) all other payments shall continue under the terms of this Lease. If Tenant remains in possession of the Premises after the expiration or earlier termination of the Term without the express written consent of Landlord, (A) Tenant shall become a tenant at sufferance upon the terms of this Lease except that the monthly rental shall be equal to 150% of Rent in effect during the last 30 days of the Term, and (B) Tenant shall be responsible for all damages suffered by Landlord resulting from or occasioned by Tenant's holding over, including consequential damages if such occupancy shall continue for more than thirty (30) days. No holding over by Tenant, whether with or without consent of Landlord, shall operate to extend this Lease except as otherwise expressly provided, and this Section 8 shall not be construed as consent for Tenant to retain possession of the Premises. Acceptance by Landlord of Rent after the expiration of the Term or earlier termination of this Lease shall not result in a renewal or reinstatement of this Lease.

9. **Taxes**. Landlord shall pay, as part of Operating Expenses, all taxes, levies, fees, assessments and governmental charges of any kind, existing as of the Commencement Date or thereafter enacted (collectively referred to as "**Taxes**"), imposed on the Project by any federal, state, regional,

municipal, local or other governmental authority or agency, including, without limitation, quasi-public agencies (collectively, "**Governmental Authority**") during the Term. Taxes shall not include any net income taxes imposed on Landlord, franchise, capital stock, gift, estate or inheritance taxes or any federal, state or local documentary taxes imposed against the Project or any portion thereof or interest therein.

Notwithstanding anything to the contrary contained herein, Tenant shall pay, prior to delinquency, any and all Taxes levied or assessed against any personal property or trade fixtures placed by Tenant in the Premises, whether levied or assessed against Landlord or Tenant. If any Taxes on Tenant's personal property or trade fixtures are levied against Landlord or Landlord's property, or if the assessed valuation of the Project is increased by a value attributed by the taxing authority to improvements in or alterations to the Premises, whether owned by Landlord or Tenant and whether or not affixed to the real property so as to become a part thereof, higher than the base valuation on which Landlord from time-to-time allocates Taxes to all tenants in the Project, Landlord shall have the right, but not the obligation, to pay such Taxes. Landlord's determination of any excess assessed valuation shall be binding and conclusive, absent manifest error. The amount of any such payment by Landlord shall constitute Additional Rent due from Tenant to Landlord immediately upon demand.

10. **Parking**. (a) Subject to all matters of record, Force Majeure, a casualty or Taking (as defined in Section 19 below) and the exercise by Landlord of its rights hereunder, Landlord shall make available to Tenant, at then-current market rates from time to time, 15 parking spaces after the Phase I Premises are delivered, and an additional 8 parking spaces after the Phase II Premises are delivered in a parking lot or garage at an offsite location within a 10-minute walk of the Building, all of such parking spaces to be on a non-reserved basis. As of the Commencement Date, such parking spaces shall be located in the parking garage serving the 303 3rd Square Apartments. Parking spaces may, at Landlord's discretion and upon reasonable prior written notice to Tenant of not less than seven (7) days, become available for use during the Term in the parking garage serving 50-60 Binney Street (the "**Binney Parking Garage**"). As of the Commencement Date, the market parking rate for the parking spaces is $275 per parking space per month. Tenant shall also pay, commencing on the date that the Binney Parking Garage becomes available for use by Tenant and thereafter on the first day of each month of the Term (and in additional to the parking charges provided for in the immediately preceding sentence), Tenant's pro rata share of the operating expenses (as reasonably determined by the owner of Binney Parking Garage) incurred by such owner of the Binney Parking Garage with respect to the Binney Parking Garage. Tenant's pro rata share of the Binney Parking Garage shall be a percentage described as the number of spaces licensed by Tenant divided by 899 (i.e. if Tenant licenses 27 spaces, the percentage shall be 3%). Tenant shall notify Landlord prior to the Commencement Date as to how many parking spaces (not to exceed the product of the number of rentable square feet in the Premises from time to time and .9) (the "Parking Maximum")) that Tenant will license hereunder. If Tenant does not elect to license all of the parking spaces to which it is entitled pursuant to this Section 10 as of the Commencement Date, Tenant shall give Landlord 30 days' notice if it wishes to license additional spaces during the Term, not to exceed the Parking Maximum in the aggregate hereunder. If Landlord determines that any additional spaces are available for use by Tenant, Landlord shall notify Tenant in writing and Tenant shall commence using and paying for the additional spaces licensed by Tenant on the date that is 30 days after Tenant's delivery of notice to Landlord. Landlord shall not be responsible for enforcing Tenant's parking rights against any third parties, including without limitation other tenants of the Project, but at Tenant's request Landlord will direct the applicable parking garage manager to do so.

(b) PTDM Matters. Tenant shall, at Tenant's sole expense, for so long as the Parking and Traffic Demand Management Plan dated February 9, 2010 (revised April 15, 2010), as approved by the City of Cambridge on April 22, 2010, including the conditions set forth in such approval (as amended from time to time, the "PTDM"), remains applicable to the Project, comply with the PTDM as applicable to the Project, including without limitation, (i) offer to subsidize mass transit monthly passes for all of its employees who work in the Premises in accordance with the terms set forth in the PTDM; (ii) implement a Commuter Choice Program and the MBTA's Corporate Pass Plan; (iii) discourage single-occupant vehicle ("SOV") use by its employees; (iv) promote alternative modes of transportation and use of alternative work hours; (v) at Landlord's request, meet with Landlord and/or its representatives no more frequently

than quarterly to discuss transportation programs and initiatives; (vi) participate in annual surveys, monitoring transportation programs and initiatives at the Campus, and, without limitation, achieve a sixty (60%) percent response rate for patron surveys; (vii) cooperate with Landlord in connection with transportation programs and initiatives promulgated pursuant to the PTDM; (viii) provide alternative work programs (such as telecommuting, flex-time and compressed work weeks) to its employees in order to reduce traffic impacts in Cambridge during peak commuter hours; (ix) offer an emergency ride home ("ERH") through the Charles River Transportation Management Association ("CRTMA"), or have its own ERH program, for all employees who commute by non-SOV mode at least 3 days a week and who are eligible to park in Tenant's Share of Garage Spaces; (x) cooperate with the Cambridge Office of Workforce Development to expand employment opportunities for Cambridge residents; (xi) in the event that the single occupancy vehicle and traffic generation modal split limits of the PTDM are exceeded, charge each user of a parking space the market rate for parking in Kendall Square/East Cambridge therefor; (xii) comply with the requirements of any other Parking and Traffic Demand Management Plan to which Tenant may be a party from time to time; (xiii) designate an employee transportation coordinator for the Building; and (xiii) otherwise cooperate with Landlord in encouraging employees to seek alternate modes of transportation.

11. **Utilities, Services**. Landlord shall provide, subject to the terms of this Section 11, water, electricity, HVAC (including, without limitation, light, power, sewer, and other utilities (including gas and fire sprinklers to the extent the Project is plumbed for such services), and, with respect to the Common Areas, refuse and trash collection and janitorial services (collectively, "**Utilities**"). Landlord shall pay, as part of Operating Expenses or subject to Tenant's reimbursement obligation below, for all Utilities used on the Premises, all maintenance charges for Utilities, and any storm sewer charges or other similar charges for Utilities imposed by any Governmental Authority or Utility provider, and any taxes, penalties, surcharges or similar charges thereon. The Premises and adjacent space is submetered to measure Tenant's usage of electricity for lights and plugs in the Premises. Tenant shall pay Landlord for electricity costs for lights and plugs consumed on the Premises based on such submeter and Tenant's pro rata share of the separately metered space (based on square footage), without markup by Landlord at Landlord's cost (rather than as part of Operating Expenses). Landlord may cause, at Landlord's expense, any other Utilities (other than electricity for lights and plugs) to be separately metered or charged directly to Tenant by the provider (in which case such separately metered utilities shall not be includable as Operating Expenses). Tenant shall pay directly to the Utility provider, prior to delinquency, any separately metered Utilities and services which may be furnished to Tenant or the Premises during the Term. Tenant shall pay, as part of Operating Expenses, its share of all charges for jointly metered Utilities based upon pro rata square footage. No interruption or failure of Utilities, from any cause whatsoever, shall result in eviction or constructive eviction of Tenant, termination of this Lease or the abatement of Rent. Unless Tenant delivers Landlord written notice that it has elected to retain a third party to provide janitorial services to the Premises pursuant to the immediately following sentence, Landlord shall provide janitorial services to the Premises and Landlord shall charge Tenant directly for such janitorial services. Upon written notice to Landlord, Tenant may elect, at any time during the Term, to retain a third party reasonably acceptable to Landlord to provide janitorial services to the Premises, in which case Tenant shall pay such third party directly for such janitorial services (and Tenant shall not have to pay Landlord directly or as part of Operating Expenses for janitorial services to the Premises with respect to which Tenant has retained a third party). Tenant agrees to limit use of water and sewer with respect to Common Areas to normal restroom use.

Notwithstanding anything contained in this Lease to the contrary, if (i) as a result of the negligence or willful misconduct of Landlord, an interruption or curtailment, suspension or stoppage of a service that Landlord is obligated to provide to Tenant under this Lease that is necessary for Tenant's use and occupancy of or access to the Premises, or any portion thereof, for the Permitted Use (an "**Essential Service**") shall occur, except any of the same due to any act or neglect of Tenant or Tenant's agents, employees, contractors or invitees or any person claiming by, through or under Tenant (any such interruption of an Essential Service being hereinafter referred to as a "**Service Interruption**"), and (ii) such Service Interruption occurs or continues as a result of conditions that affect exclusively the Project as distinguished from conditions that affect an area that extends beyond the Project, and (iii) such Service Interruption continues for more than five (5) business days after Landlord shall have received notice thereof

from Tenant, and (iv) as a result of such Service Interruption, the conduct of Tenant's normal operations in the Premises are materially and adversely affected, then there shall be an abatement of one day's Rent for each day during which such Service Interruption continues after such [three (3) day period]. In any event, Landlord agrees to use commercially reasonable efforts to restore such Essential Service and cure such Service Interruption, including, without limitation, use of overtime labor.

12. **Alterations**. Any alterations, additions, or improvements made to the Premises by or on behalf of Tenant, including additional locks or bolts of any kind or nature upon any doors or windows in the Premises, but excluding installation, removal or realignment of furniture systems (other than removal of furniture systems owned or paid for by Landlord) not involving any modifications to the structure or connections (other than by ordinary plugs or jacks) to Building Systems (as defined in Section 13) ("**Alterations**") shall be subject to Landlord's prior written consent, which may be given or withheld in Landlord's sole discretion if any such Alteration affects the structure or Building Systems and shall not be otherwise unreasonably withheld, conditioned or delayed. Tenant may construct nonstructural Alterations that will not affect the Building Systems or otherwise interfere with the occupants of the Project in the Premises without Landlord's prior approval if the aggregate cost of all such work does not exceed $50,000 (a "**Notice-Only Alteration**"), provided Tenant notifies Landlord in writing of such intended Notice-Only Alteration, and such notice shall be accompanied by plans, specifications, work contracts and such other information concerning the nature and cost of the Notice-Only Alteration as may be reasonably requested by Landlord, which notice and accompanying materials shall be delivered to Landlord not less than 10 days in advance of any proposed construction. Notwithstanding anything to the contrary contained herein, Landlord hereby approves those initial improvements to the Phase I Premises (the "Initial Phase I Improvements") as are identified on **Exhibit A-1** attached hereto**,** and no additional notice to Landlord of the Initial Phase I Improvements shall be required, provided the dame shall be performed in accordance with tis Section 12.

If Landlord approves any Alterations, Landlord may impose such conditions on Tenant in connection with the commencement, performance and completion of such Alterations as Landlord may deem appropriate in Landlord's sole and absolute discretion. Any request for approval shall be in writing, delivered not less than 15 days in advance of any proposed construction, and accompanied by plans, specifications, bid proposals, work contracts and such other information concerning the nature and cost of the alterations as may be reasonably requested by Landlord, including the identities and mailing addresses of all persons performing work or supplying materials. Landlord's right to review plans and specifications and to monitor construction shall be solely for its own benefit, and Landlord shall have no duty to ensure that such plans and specifications or construction comply with applicable Legal Requirements. Tenant shall cause, at its sole cost and expense, all Alterations to comply with insurance requirements and with Legal Requirements and shall implement at its sole cost and expense any alteration or modification required by Legal Requirements as a result of any Alterations. Tenant shall pay to Landlord, as Additional Rent, within thirty (30) days, any out of pocket expenses for plan review, coordination, scheduling and supervision incurred by Landlord. Before Tenant begins any Alteration, Landlord may post on and about the Premises notices of non-responsibility pursuant to applicable law. Tenant shall reimburse Landlord for, and indemnify and hold Landlord harmless from, any expense incurred by Landlord by reason of faulty work done by Tenant or its contractors, delays caused by such work, or inadequate cleanup.

Tenant shall provide (and cause each contractor or subcontractor to provide) certificates of insurance for workers' compensation and other coverage in amounts and from an insurance company satisfactory to Landlord protecting Landlord against liability for personal injury or property damage during construction. Upon completion of any Alterations, Tenant shall deliver to Landlord: (i) sworn statements setting forth the names of all contractors and subcontractors who did the work and final lien waivers from all such contractors and subcontractors; and (ii) "as built" plans for any such Alteration.

Except for Removable Installations (as hereinafter defined), all Installations (as hereinafter defined) shall be and shall remain the property of Landlord during the Term and following the expiration or earlier termination of the Term, shall not be removed by Tenant at any time during the Term, and shall remain upon and be surrendered with the Premises as a part thereof. Notwithstanding the foregoing, Landlord

may, at the time its approval of any such Installation is requested, notify Tenant that Landlord requires that Tenant remove such Installation upon the expiration or earlier termination of the Term, in which event Tenant shall remove such Installation in accordance with the immediately succeeding sentence. Upon the expiration or earlier termination of the Term, Tenant shall remove (i) all wires, cables or similar equipment which Tenant has installed in the Premises or in the risers or plenums of the Building, (ii) any Installations for which Landlord has given Tenant notice of removal in accordance with the immediately preceding sentence, and (iii) all of Tenant's Property (as hereinafter defined), and Tenant shall restore and repair any damage caused by or occasioned as a result of such removal, including, without limitation, capping off all such connections behind the walls of the Premises and repairing any holes. During any restoration period beyond the expiration or earlier termination of the Term, Tenant shall pay Rent to Landlord as provided herein as if said space were otherwise occupied by Tenant. If Landlord is requested by Tenant or any lender, lessor or other person or entity claiming an interest in any of Tenant's Property to waive any lien Landlord may have against any of Tenant's Property, and Landlord consents to such waiver, then Landlord shall be entitled to be paid as administrative rent a fee of $1,000 per occurrence for its time and effort in preparing and negotiating such a waiver of lien.

For purposes of this Lease, (x) "**Removable Installations**" means any items listed on **Exhibit C** attached hereto and any items agreed by Landlord in writing to be included on **Exhibit C** in the future, (y) "**Tenant's Property**" means Removable Installations and, other than Installations, any personal property or equipment of Tenant that may be removed without material damage to the Premises, and (z) "**Installations**" means all property of any kind paid for by Landlord, all Alterations, all fixtures, and all partitions, hardware, built-in machinery, built-in casework and cabinets and other similar additions, equipment, property and improvements built into the Premises so as to become an integral part of the Premises, including, without limitation, built-in plumbing, electrical and mechanical equipment and systems. In no event shall Tenant be required to remove the demising wall between the Phase II Premises and the space to be retained by LCB to be installed by LCB pursuant to Section 2.

13. **Landlord's Repairs**. Landlord, as an Operating Expense, shall maintain all of the structural, exterior, parking and other Common Areas of the Project, including HVAC, plumbing, fire sprinklers, elevators and all other building systems serving the Premises and other portions of the Project ("**Building Systems**"), in good operating order and repair, reasonable wear and tear and uninsured losses and damages caused by Tenant, or by any of Tenant's agents, servants, employees, invitees and contractors (collectively, "**Tenant Parties**") excluded. Losses and damages caused by Tenant or any Tenant Party shall be repaired by Landlord, to the extent not covered by insurance, at Tenant's sole cost and expense. Landlord reserves the right to stop Building Systems services when necessary (i) by reason of accident or emergency, or (ii) for planned repairs, alterations or improvements, which are, in the judgment of Landlord, desirable or necessary to be made, until said repairs, alterations or improvements shall have been completed. Landlord shall have no responsibility or liability for failure to supply Building Systems services during any such period of interruption; provided, however, that Landlord shall, except in case of emergency, coordinate such interruption with Tenant for a time that does not materially adversely affect Tenant's use of the Premises and give Tenant at least 48 hours advance notice of any planned stoppage of Building Systems services for routine maintenance, repairs, alterations or improvements. Tenant shall promptly give Landlord written notice of any repair required by Landlord pursuant to this Section, after which Landlord shall make a commercially reasonable effort to effect such repair in a timely manner. Landlord shall not be liable for any failure to make any repairs or to perform any maintenance unless such failure shall persist for an unreasonable time after Tenant's written notice of the need for such repairs or maintenance. Tenant waives its rights under any state or local law to terminate this Lease or to make such repairs at Landlord's expense and agrees that the parties' respective rights with respect to such matters shall be solely as set forth herein. Repairs required as the result of fire, earthquake, flood, vandalism, war, or similar cause of damage or destruction shall be controlled by Section 18.

14. **Tenant's Repairs**. Subject to Section 13 hereof, Tenant, at its expense, shall repair, replace and maintain in good condition all portions of the Premises, including, without limitation, entries, doors, ceilings, interior windows, interior walls, and the interior side of demising walls. Such repair and replacement may include capital expenditures and repairs whose benefit may extend beyond the Term.

Should Tenant fail to make any such repair or replacement or fail to maintain the Premises, Landlord shall give Tenant notice of such failure. If Tenant fails to commence cure of such failure within 10 days of Landlord's notice, and thereafter diligently prosecute such cure to completion, Landlord may perform such work and shall be reimbursed by Tenant within 10 days after demand therefor; provided, however, that if such failure by Tenant creates an emergency, Landlord may immediately commence cure of such failure and shall thereafter be entitled to recover the costs of such cure from Tenant. Subject to Sections 17 and 18, Tenant shall bear the full uninsured cost of any repair or replacement to any part of the Project that results from damage caused by Tenant or any Tenant Party and any repair that benefits only the Premises.

15. **Mechanic's Liens**. Tenant shall discharge, by bond or otherwise, any mechanic's lien filed against the Premises or against the Project for work claimed to have been done for, or materials claimed to have been furnished to, Tenant within 10 business days after written notice of the filing thereof, at Tenant's sole cost and shall otherwise keep the Premises and the Project free from any liens arising out of work performed, materials furnished or obligations incurred by Tenant. Should Tenant fail to discharge any lien described herein, Landlord shall have the right, but not the obligation, to pay such claim or post a bond or otherwise provide security to eliminate the lien as a claim against title to the Project and the cost thereof shall be immediately due from Tenant as Additional Rent. If Tenant shall lease or finance the acquisition of office equipment, furnishings, or other personal property of a removable nature utilized by Tenant in the operation of Tenant's business, Tenant warrants that any Uniform Commercial Code Financing Statement filed as a matter of public record by any lessor or creditor of Tenant will upon its face or by exhibit thereto indicate that such Financing Statement is applicable only to removable personal property of Tenant located within the Premises. In no event shall the address of the Project be furnished on the statement without qualifying language as to applicability of the lien only to removable personal property, located in an identified suite held by Tenant.

16. **Indemnification**. Tenant hereby indemnifies and agrees to defend, save and hold Landlord harmless from and against any and all claims for injury or death to persons or damage to property (i) occurring within the Premises and arising directly or indirectly out of use or occupancy of the Premises, unless caused by the willful misconduct or negligence of Landlord, (ii) occurring outside of the Premises (including without limitation in the Shared Conference Facility) and arising directly or indirectly out of an act or omission of Tenant, or (iii) arising directly or indirectly out of or a breach or default by Tenant in the performance of any of its obligations hereunder or under the License Agreement. Landlord shall not be liable to Tenant for, and Tenant assumes all risk of damage to, personal property (including, without limitation, loss of records kept within the Premises or any part of the Project). Tenant further waives any and all claims for injury to Tenant's business or loss of income relating to any such damage or destruction of personal property (including, without limitation, any loss of records). Landlord shall not be liable for any damages arising from any act, omission or neglect of any tenant in the Project or of any other third party.

17. **Insurance**. Landlord shall maintain such insurance covering the Project as Landlord shall determine, provided that Landlord agrees to maintain all risk property and, if applicable, sprinkler damage insurance covering the full replacement cost of the Building or such lesser coverage amount as Landlord may elect provided such coverage amount is not less than coverage amounts for similar buildings in the area of the Building and in any event not less than 90% of such full replacement cost. Landlord shall further procure and maintain commercial general liability insurance with a single loss limit of not less than $2,000,000 for bodily injury and property damage with respect to the Project. Tenant, at its sole cost and expense, shall maintain during the Term: all risk property insurance with business interruption and extra expense coverage, covering the full replacement cost of all property and improvements installed or placed in the Premises by Tenant at Tenant's expense, workers' compensation insurance with no less than the minimum limits required by law; employer's liability insurance with such limits as required by law; and commercial general liability insurance, with a minimum limit of not less than $2,000,000 per occurrence for bodily injury and property damage with respect to the Premises and the Shared Conference Facility. The commercial general liability insurance policies maintained by Tenant shall name Alexandria Real Estate Equities, Inc., and Landlord, its officers, directors, employees, managers and agents (collectively, "**Landlord Parties**"), as additional insureds. The commercial general liability insurance shall insure on an occurrence and not a claims-made basis; be issued by insurance companies which have a rating of not

less than policyholder rating of A and financial category rating of at least Class X in "Best's Insurance Guide"; shall not be cancelable for nonpayment of premium unless 30 days prior written notice shall have been given to Landlord from the insurer; shall cover hostile fire and contractual liability; and provide primary coverage to Landlord (any policy issued to Landlord providing duplicate or similar coverage shall be deemed excess over Tenant's policies). Copies of such policies (if requested by Landlord), or certificates of insurance showing the limits of coverage required hereunder and showing Landlord as an additional insured, along with reasonable evidence of the payment of premiums for the applicable period, shall be delivered to Landlord by Tenant upon commencement of the Term and with respect to any renewal of said insurance policy, no later than 5 days prior to the expiration of such policy. Tenant's policy may be a "blanket policy" with an aggregate per location endorsement which specifically provides that the amount of insurance shall not be prejudiced by other losses covered by the policy. Tenant shall, at least 5 days prior to the expiration of such policies, furnish Landlord with renewal certificates.

The property insurance obtained by Landlord and Tenant shall include a waiver of subrogation by the insurers and all rights based upon an assignment from its insured, against Landlord or Tenant, and their respective officers, directors, employees, managers, agents, invitees and contractors ("**Related Parties**"), in connection with any loss or damage thereby insured against. Neither party nor its respective Related Parties shall be liable to the other for loss or damage caused by any risk insured against under property insurance required to be maintained hereunder, and each party waives any claims against the other party, and its respective Related Parties, for such loss or damage. The failure of a party to insure its property shall not void this waiver. Landlord and its respective Related Parties shall not be liable for, and Tenant hereby waives all claims against such parties for, business interruption and losses occasioned thereby sustained by Tenant or any person claiming through Tenant resulting from any accident or occurrence in or upon the Premises or the Project from any cause whatsoever. If the foregoing waivers shall contravene any law with respect to exculpatory agreements, the liability of Landlord or Tenant shall be deemed not released but shall be secondary to the other's insurer.

Landlord may require insurance policy limits to be raised to conform with requirements of Landlord's lender.

18. **Restoration**. If, at any time during the Term, the Building or the Premises are damaged or destroyed by a fire or other insured casualty, Landlord shall notify Tenant within 60 days after discovery of such damage as to the amount of time Landlord reasonably estimates it will take to restore the Project or the Premises, as applicable (the "**Restoration Period**"). If the Restoration Period is estimated to exceed 9 months (the "**Maximum Restoration Period**"), Landlord may, in such notice, elect to terminate this Lease as of the date that is 75 days after the date of discovery of such damage or destruction; provided, however, that notwithstanding Landlord's election to restore, Tenant may elect to terminate this Lease by written notice to Landlord delivered within 5 business days of receipt of a notice from Landlord estimating a Restoration Period for the Premises longer than the Maximum Restoration Period. Unless either Landlord or Tenant so elects to terminate this Lease, Landlord shall, subject to receipt of sufficient insurance proceeds (with any deductible to be treated as a current Operating Expense), promptly restore the Premises (excluding the improvements installed by Tenant or by Landlord and paid for by Tenant), subject to delays arising from the collection of insurance proceeds or from Force Majeure events; provided, however, that if repair or restoration of the Premises is not substantially complete as of the end of the Maximum Restoration Period or, if longer, the Restoration Period, Landlord may, in its sole and absolute discretion, elect not to proceed with such repair and restoration, or Tenant may by written notice to Landlord delivered within 5 business days of the expiration of the Maximum Restoration Period or, if longer, the Restoration Period, elect to terminate this Lease, in which event Landlord shall be relieved of its obligation to make such repairs or restoration and this Lease shall terminate as of the date that is 75 days after the discovery of such damage or destruction

Tenant, at its expense, shall promptly perform, subject to delays arising from the collection of insurance proceeds, from Force Majeure (as defined in Section 34) events or to obtain Hazardous Material Clearances, all repairs or restoration not required to be done by Landlord and shall promptly re-enter the Premises and commence doing business in accordance with this Lease. Notwithstanding the foregoing,

either Landlord or Tenant may terminate this Lease upon written notice to the other if the Premises are damaged during the last year of the Term and Landlord reasonably estimates that it will take more than 2 months to repair such damage; provided, however, that such notice is delivered within 10 business days after the date that Landlord provides Tenant with written notice of the estimated Restoration Period. Landlord shall also have the right to terminate this Lease if insurance proceeds are not available for such restoration. Rent shall be abated from the date of discovery of the damage or destruction. Such abatement shall be the sole remedy of Tenant, and except as provided in this Section 18, Tenant waives any right to terminate the Lease by reason of damage or casualty loss.

The provisions of this Lease, including this Section 18, constitute an express agreement between Landlord and Tenant with respect to any and all damage to, or destruction of, all or any part of the Premises, or any other portion of the Project, and any statute or regulation which is now or may hereafter be in effect shall have no application to this Lease or any damage or destruction to all or any part of the Premises or any other portion of the Project, the parties hereto expressly agreeing that this Section 18 sets forth their entire understanding and agreement with respect to such matters.

19. **Condemnation**. If the whole or any material part of the Premises or the Project is taken for any public or quasi-public use under governmental law, ordinance, or regulation, or by right of eminent domain, or by private purchase in lieu thereof (a "**Taking**" or "**Taken**"), and the Taking would in Landlord's reasonable judgment, materially interfere with or impair Landlord's ownership or operation of the Project or would in the reasonable judgment of Landlord and Tenant either prevent or materially interfere with Tenant's use of the Premises (as resolved, if the parties are unable to agree, by arbitration by a single arbitrator with the qualifications and experience appropriate to resolve the matter and appointed pursuant to and acting in accordance with the rules of the American Arbitration Association), then upon written notice by Landlord this Lease shall terminate and Rent shall be apportioned as of said date. If part of the Premises shall be Taken, and this Lease is not terminated as provided above, Landlord shall promptly restore the Premises and the Project as nearly as is commercially reasonable under the circumstances to their condition prior to such partial Taking and the rentable square footage of the Building, the rentable square footage of the Premises, Tenant's Share of Operating Expenses and the Rent payable hereunder during the unexpired Term shall be reduced to such extent as may be fair and reasonable under the circumstances. Upon any such Taking, Landlord shall be entitled to receive the entire price or award from any such Taking without any payment to Tenant, and Tenant hereby assigns to Landlord Tenant's interest, if any, in such award. Tenant shall have the right, to the extent that same shall not diminish Landlord's award, to make a separate claim against the condemning authority (but not Landlord) for such compensation as may be separately awarded or recoverable by Tenant for moving expenses and damage to Tenant's trade fixtures, if a separate award for such items is made to Tenant. Tenant hereby waives any and all rights it might otherwise have pursuant to any provision of state law to terminate this Lease upon a partial Taking of the Premises or the Project.

20. **Events of Default**. Each of the following events shall be a default ("**Default**") by Tenant under this Lease:

(a) **Payment Defaults**. Tenant shall fail to pay any installment of Rent or any other payment hereunder when due; provided, however, that Landlord will give Tenant notice and an opportunity to cure any failure to pay Rent within 5 business days of any such notice not more than twice in any 12 month period and Tenant agrees that such notice shall be in lieu of and not in addition to, or shall be deemed to be, any notice required by law.

(b) **Insurance**. Any insurance required to be maintained by Tenant pursuant to this Lease shall be canceled or terminated or shall expire or shall be reduced or materially changed, or Landlord shall receive a notice of nonrenewal of any such insurance and Tenant shall fail to obtain replacement insurance at least 20 days before the expiration of the current coverage.

(c) **Abandonment**. Tenant shall abandon the Premises.

(d) **Improper Transfer**. Tenant shall assign, sublease or otherwise transfer or attempt to transfer all or any portion of Tenant's interest in this Lease or the Premises except as expressly permitted herein, or Tenant's interest in this Lease shall be attached, executed upon, or otherwise judicially seized and such action is not released within 90 days of the action.

(e) **Liens**. Tenant shall fail to discharge or otherwise obtain the release of any lien placed upon the Premises in violation of this Lease within the time period set forth in Section 15.

(f) **Insolvency Events**. Tenant or any guarantor or surety of Tenant's obligations hereunder shall: (A) make a general assignment for the benefit of creditors; (B) commence any case, proceeding or other action seeking to have an order for relief entered on its behalf as a debtor or to adjudicate it a bankrupt or insolvent, or seeking reorganization, arrangement, adjustment, liquidation, dissolution or composition of it or its debts or seeking appointment of a receiver, trustee, custodian or other similar official for it or for all or of any substantial part of its property (collectively a "**Proceeding for Relief**"); (C) become the subject of any Proceeding for Relief which is not dismissed within 90 days of its filing or entry; or (D) die or suffer a legal disability (if Tenant, guarantor, or surety is an individual) or be dissolved or otherwise fail to maintain its legal existence (if Tenant, guarantor or surety is a corporation, partnership or other entity).

(g) **Estoppel Certificate or Subordination Agreement**. Tenant fails to execute any document required from Tenant under Sections 23 or 27 within 5 days after a second notice requesting such document.

(h) **Other Defaults**. Tenant shall fail to comply with any provision of this Lease other than those specifically referred to in this Section 20, and, except as otherwise expressly provided herein, such failure shall continue for a period of 30 days after written notice thereof from Landlord to Tenant.

Any notice given under Section 20(h) hereof shall: (i) specify the alleged default, (ii) demand that Tenant cure such default, (iii) be in lieu of, and not in addition to, or shall be deemed to be, any notice required under any provision of applicable law, and (iv) not be deemed a forfeiture or a termination of this Lease unless Landlord elects otherwise in such notice; provided that if the nature of Tenant's default pursuant to Section 20(h) is such that it cannot be cured by the payment of money and reasonably requires more than 30 days to cure, then Tenant shall not be deemed to be in default if Tenant commences such cure within said 30 day period and thereafter diligently prosecutes the same to completion; provided, however, that such cure shall be completed no later than 60 days from the date of Landlord's notice.

21. **Landlord's Remedies**.

(a) **Payment By Landlord; Interest**. Upon a Default by Tenant hereunder, Landlord may, without waiving or releasing any obligation of Tenant hereunder, make such payment or perform such act. All sums so paid or incurred by Landlord, together with interest thereon, from the date such sums were paid or incurred, at the annual rate equal to 12% per annum or the highest rate permitted by law (the "**Default Rate**"), whichever is less, shall be payable to Landlord on demand as Additional Rent. Nothing herein shall be construed to create or impose a duty on Landlord to mitigate any damages resulting from Tenant's Default hereunder.

(b) **Late Payment Rent**. Late payment by Tenant to Landlord of Rent and other sums due will cause Landlord to incur costs not contemplated by this Lease, the exact amount of which will be extremely difficult and impracticable to ascertain. Such costs include, but are not limited to, processing and accounting charges and late charges which may be imposed on Landlord under any Mortgage covering the Premises. Therefore, if any installment of Rent due from Tenant is not received by Landlord within 5 days after the date such payment is due, Tenant shall pay to Landlord an additional sum equal to 5% of the overdue Rent as a late charge, provide, however, that Landlord will give Tenant notice and an opportunity to cure any late payment of Rent within 5 business days of such notice not more than once in any 12 month period before Landlord shall impose such late charge. The parties agree that this late charge represents a fair and reasonable estimate of the costs Landlord will incur by reason of late payment by Tenant. In

addition to the late charge, Rent not paid when due shall bear interest at the Default Rate from the 5th day after the date due until paid.

(c) **Remedies**. Upon the occurrence of a Default, Landlord, at its option, without further notice or demand to Tenant, shall have in addition to all other rights and remedies provided in this Lease, at law or in equity, the option to pursue any one or more of the following remedies, each and all of which shall be cumulative and nonexclusive, without any notice or demand whatsoever. No cure in whole or in part of such Default by Tenant after Landlord has taken any action beyond giving Tenant notice of such Default to pursue any remedy provided for herein (including retaining counsel to file an action or otherwise pursue any remedies) shall in any way affect Landlord's right to pursue such remedy or any other remedy provided Landlord herein or under law or in equity, unless Landlord, in its sole discretion, elects to waive such Default.

(i) This Lease and the Term and estate hereby granted are subject to the limitation that whenever a Default shall have happened and be continuing, Landlord shall have the right, at its election, then or thereafter while any such Default shall continue and notwithstanding the fact that Landlord may have some other remedy hereunder or at law or in equity, to give Tenant written notice of Landlord's intention to terminate this Lease on a date specified in such notice, which date shall be not less than 5 days after the giving of such notice, and upon the date so specified, this Lease and the estate hereby granted shall expire and terminate with the same force and effect as if the date specified in such notice were the date hereinbefore fixed for the expiration of this Lease, and all right of Tenant hereunder shall expire and terminate, and Tenant shall be liable as hereinafter in this Section 21(c) provided. If any such notice is given, Landlord shall have, on such date so specified, the right of re-entry and possession of the Premises and the right to remove all persons and property therefrom and to store such property in a warehouse or elsewhere at the risk and expense, and for the account, of Tenant. Should Landlord elect to re-enter as herein provided or should Landlord take possession pursuant to legal proceedings or pursuant to any notice provided for by law, Landlord may from time to time re-let the Premises or any part thereof for such term or terms and at such rental or rentals and upon such terms and conditions as Landlord may deem advisable, with the right to make commercially reasonable alterations in and repairs to the Premises.

(ii) In the event of any termination of this Lease as in this Section 21 provided or as required or permitted by law or in equity, Tenant shall forthwith quit and surrender the Premises to Landlord, and Landlord may, without further notice, enter upon, re-enter, possess and repossess the same by summary proceedings, ejectment or otherwise, and again have, repossess and enjoy the same as if this Lease had not been made, and in any such event Tenant and no person claiming through or under Tenant by virtue of any law or an order of any court shall be entitled to possession or to remain in possession of the Premises. Landlord, at its option, notwithstanding any other provision of this Lease, shall be entitled to recover from Tenant, as and for liquidated damages, the sum of:

(A) all Base Rent, Additional Rent and other amounts payable by Tenant hereunder then due or accrued and unpaid: and

(B) the amount equal to the aggregate of all unpaid Base Rent and Additional Rent which would have been payable if this Lease had not been terminated prior to the end of the Term then in effect, discounted to its then present value in accordance with accepted financial practice using a rate of 5% per annum, for loss of the bargain; and

(C) all other damages and expenses (including reasonable attorneys' fees and expenses), if any, which Landlord shall have sustained by reason of the breach of any provision of this Lease; less

(D) the net proceeds of any re-letting actually received by Landlord and the amount of damages which Tenant proves could have been avoided had Landlord taken reasonable steps to mitigate its damages.

(iii) Nothing herein contained shall limit or prejudice the right of Landlord, in any bankruptcy or insolvency proceeding, to prove for and obtain as liquidated damages by reason of such termination an amount equal to the maximum allowed by any bankruptcy or insolvency proceedings, or to prove for and obtain as liquidated damages by reason of such termination, an amount equal to the maximum allowed by any statute or rule of law, but in each case not more than the amount to which Landlord would otherwise be entitled under this Section 21.

(iv) Nothing in this Section 21 shall be deemed to affect the right of either party to indemnifications pursuant to this Lease.

(v) If Landlord terminates this Lease upon the occurrence of a Default, Tenant will quit and surrender the Premises to Landlord or its agents, and Landlord may, without further notice, enter upon, re-enter and repossess the Premises by summary proceedings, ejectment or otherwise. The words “enter”, “re-enter”, and “re-entry” are not restricted to their technical legal meanings.

(vi) If either party shall be in default in the observance or performance of any provision of this Lease, and an action shall be brought for the enforcement thereof, the non-prevailing party shall pay to the prevailing party all fees, costs and other expenses which may become payable as a result thereof or in connection therewith, including reasonable attorneys’ fees and expenses.

(vii) If Tenant shall default in the keeping, observance or performance of any covenant, agreement, term, provision or condition herein contained, Landlord, without thereby waiving such default, may perform the same for the account and at the expense of Tenant (a) immediately or at any time thereafter and without notice in the case of emergency or in case such default will result in a violation of any legal or insurance requirements, or in the imposition of any lien against all or any portion of the Premises (but only after Tenant has failed to respond to such lien as permitted by Section 15 within the time period provided in Section 15), and (b) in any other case if such default continues after any applicable notice and cure period provided in Section 20. All reasonable costs and expenses incurred by Landlord in connection with any such performance by it for the account of Tenant and also all reasonable costs and expenses, including reasonable attorneys’ fees and disbursements incurred by Landlord in any action or proceeding (including any summary dispossess proceeding) brought by Landlord to enforce any obligation of Tenant under this Lease and/or right of Landlord in or to the Premises, shall be paid by Tenant to Landlord within 10 days after demand.

(viii)Independent of the exercise of any other remedy of Landlord hereunder or under applicable law, Landlord may conduct an environmental test of the Premises as generally described in Section 30(c), at Tenant’s expense, to the extent provided in Section 30(c).

(ix) In the event that Tenant is in breach or Default under this Lease, whether or not Landlord exercises its right to terminate or any other remedy, Tenant shall reimburse Landlord within fifteen (15) days of demand for any costs and expenses that Landlord may incur in connection with any such breach or Default, as provided in this Section 21(c). Such costs shall include reasonable legal fees and costs incurred for the negotiation of a settlement, enforcement of rights or otherwise. Tenant shall also indemnify Landlord against and hold Landlord harmless from all costs, expenses, demands and liability, including without limitation, reasonable legal fees and costs Landlord shall incur if Landlord shall become or be made a party to any claim or action instituted by Tenant against any third party, or by any third party against Tenant, or by or against any person holding any interest under or using the Premises by license of or agreement with Tenant.

Except as otherwise provided in this Section 21, no right or remedy herein conferred upon or reserved to Landlord is intended to be exclusive of any other right or remedy, and every right and remedy shall be cumulative and in addition to any other legal or equitable right or remedy given hereunder, or now or hereafter existing. No waiver of any provision of this Lease shall be deemed to have been made unless expressly so made in writing. Landlord shall be entitled, to the extent permitted by law, to seek injunctive relief in case of the violation, or attempted or threatened violation, of any provision of this Lease, or to seek a decree compelling observance or performance of any provision of this Lease, or to seek any other legal or equitable remedy.

22. **Assignment and Subletting**.

(a) **General Prohibition**. Without Landlord's prior written consent, which consent shall not be unreasonably withheld, conditioned or delayed, subject to and on the conditions described in this Section 22, Tenant shall not, directly or indirectly, voluntarily or by operation of law, assign this Lease or sublease the Premises or any part thereof or mortgage, pledge, or hypothecate its leasehold interest or grant any concession or license within the Premises, and any attempt to do any of the foregoing shall be void and of no effect. If Tenant is at any time a corporation, partnership or limited liability company, the shares or other ownership interests thereof which are not actively traded upon a stock exchange or in the over-the-counter market, a transfer or series of transfers whereby 50% or more of the issued and outstanding shares or other ownership interests of such corporation are, or voting control is, transferred (but excepting transfers upon deaths of individual owners) from a person or persons or entity or entities which were owners thereof at time of execution of this Lease to persons or entities who were not owners of shares or other ownership interests of the corporation, partnership or limited liability company at time of execution of this Lease, shall be deemed an assignment of this Lease requiring the consent of Landlord as provided in this Section 22.

(b) **Permitted Transfers**. If Tenant desires to assign, sublease, hypothecate or otherwise transfer this Lease or sublet the Premises other than pursuant to a Permitted Assignment (as defined below), then at least 15 days, but not more than 45 business days, before the date Tenant desires the assignment or sublease to be effective (the "**Assignment Date**"), Tenant shall give Landlord a notice (the "**Assignment Notice**") containing such information about the proposed assignee or sublessee, including the proposed use of the Premises and any Hazardous Materials proposed to be used, stored handled, treated, generated in or released or disposed of from the Premises, the Assignment Date, any relationship between Tenant and the proposed assignee or sublessee, and all material terms and conditions of the proposed assignment or sublease, including a copy of any proposed assignment or sublease in its final form, and such other information as Landlord may deem reasonably necessary or appropriate to its consideration whether to grant its consent. Landlord may, by giving written notice to Tenant within 15 days after receipt of the Assignment Notice: (i) grant such consent, (ii) refuse such consent, in its reasonable discretion; or (iii) terminate this Lease with respect to the space described in the Assignment Notice as of the Assignment Date (an "**Assignment Termination**"). Among other reasons, it shall be reasonable for Landlord to withhold its consent in any of these instances: (1) the proposed assignee or subtenant is a governmental agency; (2) in Landlord's reasonable judgment, the use of the Premises by the proposed assignee or subtenant would entail any alterations that would lessen the value of the leasehold improvements in the Premises, or would require increased services by Landlord; (3) in Landlord's reasonable judgment, the proposed assignee or subtenant; lacks the creditworthiness to support the financial obligations it will incur under the proposed assignment or sublease; (4) in Landlord's reasonable judgment, the character, reputation, or business of the proposed assignee or subtenant is inconsistent with the desired tenant-mix or the quality of other tenancies in the Project or is inconsistent with the type and quality of the nature of the Building; (5) Landlord has experienced previous defaults by or is in litigation with the proposed assignee or subtenant; (6) the use of the Premises by the proposed assignee or subtenant will violate any applicable Legal Requirement; (7) the proposed assignee or subtenant, or any entity that, directly or indirectly, controls, is controlled by, or is under common control with the proposed assignee or subtenant, is then an occupant of the Project; (8) the proposed assignee or subtenant is an entity with whom Landlord is then currently negotiating to lease space in the Project; or (9) the assignment or sublease is prohibited by Landlord's lender. If Landlord delivers notice of its election to exercise an Assignment Termination, Tenant shall have the right to withdraw such Assignment Notice by written notice to Landlord

of such election within 5 business days after Landlord's notice electing to exercise the Assignment Termination. If Tenant withdraws such Assignment Notice, this Lease shall continue in full force and effect. If Tenant does not withdraw such Assignment Notice, this Lease, and the term and estate herein granted, shall terminate as of the Assignment Date with respect to the space described in such Assignment Notice. No failure of Landlord to exercise any such option to terminate this Lease, or to deliver a timely notice in response to the Assignment Notice, shall be deemed to be Landlord's consent to the proposed assignment, sublease or other transfer. Tenant shall reimburse Landlord for all of Landlord's reasonable out of pocket expenses in connection with its consideration of any Assignment Notice and/or its preparation or review of any consent documents.

Notwithstanding the foregoing, Landlord's consent to an assignment of this Lease or a subletting of any portion of the Premises to any entity controlling, controlled by or under common control with Tenant (a "**Control Permitted Assignment**") shall not be required, provided that Landlord shall have the right to approve the form of any such sublease or assignment. In addition, Tenant shall have the right to assign this Lease, upon 30 days prior written notice to Landlord but without obtaining Landlord's prior written consent, to a corporation or other entity which is a successor-in-interest to Tenant, by way of merger, consolidation or corporate reorganization, or by the purchase of all or substantially all of the assets or the ownership interests of Tenant provided that (i) such merger or consolidation, or such acquisition or assumption, as the case may be, is for a good business purpose and not principally for the purpose of transferring the Lease, and (ii) the net worth (as determined in accordance with generally accepted accounting principles ("**GAAP**")) of the assignee is not less than the greater of the net worth (as determined in accordance with GAAP) of Tenant as of (A) the Commencement Date, or (B) as of the date of Tenant's most current quarterly or annual financial statements, and (iii) such assignee shall agree in writing to assume all of the terms, covenants and conditions of this Lease (a **Corporate Permitted Assignment**"). Control Permitted Assignments and Corporate Permitted Assignments are hereinafter referred to as "**Permitted Assignments**."

(c) **Additional Conditions**. As a condition to any such assignment or subletting, whether or not Landlord's consent is required, Landlord may require that any assignee or subtenant agree, in writing at the time of such assignment or subletting, that if Landlord gives such party notice that Tenant is in default under this Lease, such party shall thereafter make all payments otherwise due Tenant directly to Landlord, which payments will be received by Landlord without any liability except to credit such payment against those due under the Lease, and any such third party shall agree to attorn to Landlord or its successors and assigns should this Lease be terminated for any reason; provided, however, in no event shall Landlord or its successors or assigns be obligated to accept such attornment.

(d) **No Release of Tenant, Sharing of Excess Rents**. Notwithstanding any assignment or subletting, Tenant and any guarantor or surety of Tenant's obligations under this Lease shall at all times remain fully and primarily responsible and liable for the payment of Rent and for compliance with all of Tenant's other obligations under this Lease. If the Rent due and payable by a sublessee or assignee (or a combination of the rental payable under such sublease or assignment plus any bonus or other consideration therefor or incident thereto in any form), excluding Permitted Assignments, exceeds the rental payable under this Lease, (excluding however, any Rent payable under this Section) plus any actual and reasonable brokerage commissions, attorney's fees, design and construction fees directly related to and required pursuant to the terms of such sublease, free rent, improvement allowance, and the unamortized cost of any Alterations in the Premises made by Tenant ("**Excess Rent**"), then Tenant shall be bound and obligated to pay Landlord as Additional Rent hereunder 50% of such Excess Rent within 10 days following receipt thereof by Tenant. If Tenant shall sublet the Premises or any part thereof, Tenant hereby immediately and irrevocably assigns to Landlord, as security for Tenant's obligations under this Lease, all rent from any such subletting, and Landlord as assignee for Tenant, or a receiver for Tenant appointed on Landlord's application, may collect such rent and apply it toward Tenant's obligations under this Lease; except that, until the occurrence of a Default, Tenant shall have the right to collect such rent.

(e) **No Waiver**. The consent by Landlord to an assignment or subletting shall not relieve Tenant or any assignees of this Lease or any sublessees of the Premises from obtaining the consent of

Landlord to any further assignment or subletting nor shall it release Tenant or any assignee or sublessee of Tenant from full and primary liability under the Lease. The acceptance of Rent hereunder, or the acceptance of performance of any other term, covenant, or condition thereof, from any other person or entity shall not be deemed to be a waiver of any of the provisions of this Lease or a consent to any subletting, assignment or other transfer of the Premises.

23. **Estoppel Certificate**. Tenant shall, within 10 business days of written notice from Landlord, execute, acknowledge and deliver a statement in writing in any form reasonably requested by a proposed lender or purchaser, (i) certifying that this Lease is unmodified and in full force and effect (or, if modified, stating the nature of such modification and certifying that this Lease as so modified is in full force and effect) and the dates to which the rental and other charges are paid in advance, if any, (ii) acknowledging that there are not any uncured defaults on the part of Landlord hereunder, or specifying such defaults if any are claimed, and (iii) setting forth such further information with respect to the status of this Lease or the Premises as may be requested thereon. Any such statement may be relied upon by any prospective purchaser or encumbrancer of all or any portion of the real property of which the Premises are a part. Tenant's failure to deliver such statement within such time shall, at the option of Landlord, constitute a Default under this Lease, and, in any event, shall be conclusive upon Tenant that the Lease is in full force and effect and without modification except as may be represented by Landlord in any certificate prepared by Landlord and delivered to Tenant for execution.

24. **Quiet Enjoyment**. So long as Tenant is not in Default under this Lease, Tenant shall, subject to the terms of this Lease, at all times during the Term, have peaceful and quiet enjoyment of the Premises against any person claiming by, through or under Landlord.

25. **Prorations**. All prorations required or permitted to be made hereunder shall be made on the basis of a 360 day year and 30 day months.

26. **Rules and Regulations**. Tenant shall, at all times during the Term and any extension thereof, comply with all reasonable rules and regulations at any time or from time to time established by Landlord covering use of the Premises and the Project. The current rules and regulations are attached hereto as **Exhibit E**. If there is any conflict between said rules and regulations and other provisions of this Lease, the terms and provisions of this Lease shall control. Landlord shall not have any liability or obligation for the breach of any rules or regulations by other tenants in the Project and shall not enforce such rules and regulations in a discriminatory manner.

27. **Subordination**. This Lease and Tenant's interest and rights hereunder are hereby made and shall be subject and subordinate at all times to the lien of any Mortgage now existing or hereafter created on or against the Project or the Premises, and all amendments, restatements, renewals, modifications, consolidations, refinancing, assignments and extensions thereof, without the necessity of any further instrument or act on the part of Tenant; provided, however that so long as there is no Default hereunder, Tenant's right to possession of the Premises shall not be disturbed by the Holder of any such Mortgage. Tenant agrees to attorn to any such Holder. Tenant agrees upon demand to execute, acknowledge and deliver such reasonable instruments, confirming such subordination, and such instruments of attornment as shall be requested by any such Holder, provided any such instruments contain appropriate non-disturbance provisions assuring Tenant's quiet enjoyment of the Premises as set forth in Section 24 hereof. Notwithstanding the foregoing, any such Holder may at any time subordinate its Mortgage to this Lease, without Tenant's consent, by notice in writing to Tenant, and thereupon this Lease shall be deemed prior to such Mortgage without regard to their respective dates of execution, delivery or recording and in that event such Holder shall have the same rights with respect to this Lease as though this Lease had been executed prior to the execution, delivery and recording of such Mortgage and had been assigned to such Holder. The term "**Mortgage**" whenever used in this Lease shall be deemed to include deeds of trust, security assignments and any other encumbrances, and any reference to the "**Holder**" of a Mortgage shall be deemed to include the beneficiary under a deed of trust.

28. **Surrender**. Upon the expiration of the Term or earlier termination of Tenant's right of possession, Tenant shall surrender the Premises to Landlord in the same condition as received, subject to any Alterations or Installations permitted by Landlord to remain in the Premises, free of Hazardous Materials brought upon, kept, used, stored, handled, treated, generated in, or released or disposed of from, the Premises by Tenant or Tenant's agents, employees and invitees (collectively, "**Tenant HazMat Operations**") and released of all Hazardous Materials Clearances, broom clean, ordinary wear and tear and casualty loss and condemnation covered by Sections 18 and 19 excepted.

Tenant shall immediately return to Landlord all keys and/or access cards to parking, the Project, restrooms or all or any portion of the Premises furnished to or otherwise procured by Tenant. If any such access card or key is lost, Tenant shall pay to Landlord, at Landlord's election, either the cost of replacing such lost access card or key or the cost of reprogramming the access security system in which such access card was used or changing the lock or locks opened by such lost key. Any Tenant's Property, Alterations and property not so removed by Tenant as permitted or required herein shall be deemed abandoned and may be stored, removed, and disposed of by Landlord at Tenant's expense, and Tenant waives all claims against Landlord for any damages resulting from Landlord's retention and/or disposition of such property. All obligations of Tenant hereunder not fully performed as of the termination of the Term, including the obligations of Tenant under Section 30 hereof, shall survive the expiration or earlier termination of the Term, including, without limitation, indemnity obligations, payment obligations with respect to Rent and obligations concerning the condition and repair of the Premises.

29. **Waiver of Jury Trial**. TO THE EXTENT PERMITTED BY LAW, TENANT AND LANDLORD WAIVE ANY RIGHT TO TRIAL BY JURY OR TO HAVE A JURY PARTICIPATE IN RESOLVING ANY DISPUTE, WHETHER SOUNDING IN CONTRACT, TORT, OR OTHERWISE, BETWEEN LANDLORD AND TENANT ARISING OUT OF THIS LEASE OR ANY OTHER INSTRUMENT, DOCUMENT, OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH OR THE TRANSACTIONS RELATED HERETO.

30. **Environmental Requirements**.

(a) **Generally**. Except for Hazardous Material contained in products customarily used by tenants in de minimis quantities for ordinary cleaning and office purposes, Tenant shall not permit or cause any party to bring any Hazardous Material upon the Premises or the Project or use, store, handle, treat, generate, manufacture, transport, release or dispose of any Hazardous Material in, on or from the Premises or the Project without Landlord's prior written consent which may be withheld in Landlord's sole discretion. Tenant, at its sole cost and expense, shall operate its business in the Premises in strict compliance with all Environmental Requirements and shall remove or remediate in a manner satisfactory to Landlord any Hazardous Materials released on or from the Project by Tenant or any Tenant Party. Tenant shall complete and certify disclosure statements as requested by Landlord from time to time relating to Tenant's use, storage, handling, treatment, generation, manufacture, transportation, release or disposal of Hazardous Materials on or from the Premises. The term "**Environmental Requirements**" means all applicable present and future statutes, regulations, ordinances, rules, codes, judgments, orders or other similar enactments of any Governmental Authority regulating or relating to health, safety, or environmental conditions on, under, or about the Premises or the Project, or the environment, including without limitation, the following: the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; and all state and local counterparts thereto, and any regulations or policies promulgated or issued thereunder. The term "**Hazardous Materials**" means and includes any substance, material, waste, pollutant, or contaminant listed or defined as hazardous or toxic, or regulated by reason of its impact or potential impact on humans, animals and/or the environment under any Environmental Requirements, asbestos and petroleum, including crude oil or any fraction thereof, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). As defined in Environmental Requirements, Tenant is and shall be deemed to be the "**operator**" of Tenant's "**facility**" and the "**owner**" of all Hazardous Materials brought on the Premises by Tenant or any Tenant Party, and the wastes, by-products, or residues generated, resulting, or produced therefrom.

(b) **Indemnity**. Tenant hereby indemnifies and shall defend and hold Landlord, its officers, directors, employees, agents and contractors harmless from any and all actions (including, without limitation, remedial or enforcement actions of any kind, administrative or judicial proceedings, and orders or judgments arising out of or resulting therefrom), costs, claims, damages (including, without limitation, punitive damages and damages based upon diminution in value of the Premises or the Project, or the loss of, or restriction on, use of the Premises or any portion of the Project), expenses (including, without limitation, attorneys', consultants' and experts' fees, court costs and amounts paid in settlement of any claims or actions), fines, forfeitures or other civil, administrative or criminal penalties, injunctive or other relief (whether or not based upon personal injury, property damage, or contamination of, or adverse effects upon, the environment, water tables or natural resources), liabilities or losses (collectively, "**Environmental Claims**") which arise during or after the Term as a result of such contamination. This indemnification of Landlord by Tenant includes, without limitation, costs incurred in connection with any investigation of site conditions or any cleanup, remedial, removal, or restoration work required by any federal, state or local Governmental Authority because of Hazardous Materials present in the air, soil or ground water above, on, or under the Premises. Without limiting the foregoing, if the presence of any Hazardous Materials on the Premises, the Project or any adjacent property caused or permitted by Tenant or any Tenant Party results in any contamination of the Premises, the Project or any adjacent property, Tenant shall promptly take all actions at its sole expense and in accordance with applicable law as are necessary to return the Premises, the Project or any adjacent property to the condition existing prior to the time of such contamination, provided that Landlord's approval of such action shall first be obtained, which approval shall not unreasonably be withheld so long as such actions would not potentially have any material adverse long-term or short-term effect on the Premises or the Project. Notwithstanding anything to the contrary contained in this Section 30, Tenant shall not be responsible for, and the indemnification and hold harmless obligation set forth in this paragraph shall not apply to (i) contamination in the Premises which Tenant demonstrates existed in the Premises immediately prior to the Commencement Date, or (ii) the presence of any Hazardous Materials which Tenant demonstrates in the Premises which migrated which Tenant demonstrates from outside of the Premises into the Premises, or (iii) contamination which Tenant demonstrates was caused by Landlord or any of Landlord's employees, agents and contractors unless in each case, the presence of such Hazardous Materials (x) is the result of a breach by Tenant of any of its obligations under this Lease, or (y) was caused, contributed or exacerbated by Tenant or any Tenant Party.

(c) **Landlord's Tests**. Landlord shall have access to, and a right to perform inspections and tests of, the Premises to determine Tenant's compliance with Environmental Requirements, its obligations under this Section 30, or the environmental condition of the Premises or the Project. In connection with such testing, upon the request of Landlord, Tenant shall deliver to Landlord or its consultant such non-proprietary information concerning the use of Hazardous Materials in or about the Premises by Tenant or any Tenant Party. Access shall be granted to Landlord upon Landlord's prior written notice to Tenant and at such times so as to minimize, so far as may be reasonable under the circumstances, any disturbance to Tenant's operations. Such inspections and tests shall be conducted at Landlord's expense, unless such inspections or tests reveal that Tenant has not complied with any Environmental Requirement, in which case Tenant shall reimburse Landlord for the reasonable cost of such inspection and tests. Tenant shall, at its sole cost and expense, promptly and satisfactorily remediate any environmental conditions identified by such testing in accordance with all Environmental Requirements. Landlord's receipt of or satisfaction with any environmental assessment in no way waives any rights that Landlord may have against Tenant.

(d) **Tenant's Obligations**. Tenant's obligations under this Section 30 shall survive the expiration or earlier termination of the Lease. During any period of time after the expiration or earlier termination of this Lease required by Tenant or Landlord to complete the removal from the Premises of any Hazardous Materials (including, without limitation, the release and termination of any licenses or permits restricting the use of the Premises and the completion of the approved Surrender Plan) for which Tenant is responsible under this Section 30, Tenant shall continue to pay the full Rent in accordance with this Lease for any portion of the Premises not relet by Landlord in Landlord's sole discretion, which Rent shall be prorated daily.

31. **Tenant's Remedies/Limitation of Liability**. Landlord shall not be in default hereunder unless Landlord fails to perform any of its obligations hereunder within 30 days after written notice from Tenant specifying such failure (unless such performance will, due to the nature of the obligation, require a period of time in excess of 30 days, then after such period of time as is reasonably necessary). Upon any default by Landlord, Tenant shall give notice by registered or certified mail to any Holder of a Mortgage covering the Premises and to any landlord of any lease of property in or on which the Premises are located and Tenant shall offer such Holder and/or landlord a reasonable opportunity to cure the default, including time to obtain possession of the Project by power of sale or a judicial action if such should prove necessary to effect a cure; provided Landlord shall have furnished to Tenant in writing the names and addresses of all such persons who are to receive such notices. All obligations of Landlord hereunder shall be construed as covenants, not conditions; and, except as may be otherwise expressly provided in this Lease, Tenant may not terminate this Lease for breach of Landlord's obligations hereunder.

All obligations of Landlord under this Lease will be binding upon Landlord only during the period of its ownership of the Premises and not thereafter. The term "**Landlord**" in this Lease shall mean only the owner for the time being of the Premises. Upon the transfer by such owner of its interest in the Premises, such owner shall thereupon be released and discharged from all obligations of Landlord thereafter accruing, but such obligations shall be binding during the Term upon each new owner for the duration of such owner's ownership.

32. **Inspection and Access**. Landlord and its agents, representatives, and contractors may enter the Premises at any reasonable time to inspect the Premises and to make such repairs as may be required or permitted pursuant to this Lease and for any other business purpose. Landlord and Landlord's representatives may enter the Premises during business hours on not less than 48 hours advance written notice (except in the case of emergencies in which case no such notice shall be required and such entry may be at any time) for the purpose of effecting any such repairs, inspecting the Premises, showing the Premises to prospective purchasers and, during the last year of the Term, to prospective tenants or for any other business purpose. Landlord may erect a suitable sign on the Premises stating the Premises are available to let or that the Project is available for sale. Landlord may grant easements, make public dedications, designate Common Areas and create restrictions on or about the Premises, provided that no such easement, dedication, designation or restriction materially, adversely affects Tenant's use or occupancy of the Premises for the Permitted Use. At Landlord's request, Tenant shall execute such instruments as may be necessary for such easements, dedications or restrictions. Tenant shall at all times, except in the case of emergencies, have the right to escort Landlord or its agents, representatives, contractors or guests while the same are in the Premises, provided such escort does not materially and adversely affect Landlord's access rights hereunder.

33. **Security**. Tenant acknowledges and agrees that security devices and services, if any, while intended to deter crime may not in given instances prevent theft or other criminal acts and that Landlord is not providing any security services with respect to the Premises, the Shared Conference Facility or the Common Area. Tenant agrees that Landlord shall not be liable to Tenant for, and Tenant waives any claim against Landlord with respect to, any loss by theft or any other damage suffered or incurred by Tenant in connection with any unauthorized entry into the Premises, the Shared Conference Facility or the Common Area or any other breach of security with respect to the Premises, Shared Conference Facility, Common Areas or other portion of the Project. Tenant shall be solely responsible for the personal safety of Tenant's officers, employees, agents, contractors, guests and invitees while any such person is in, on or about the Premises and/or the Project. Tenant shall at Tenant's cost obtain insurance coverage to the extent Tenant desires protection against such criminal acts.

34. **Force Majeure**. Landlord shall not be responsible or liable for delays in the performance of its obligations hereunder when caused by, related to, or arising out of acts of God, sinkholes or subsidence, strikes, lockouts, or other labor disputes, embargoes, quarantines, weather, national, regional, or local disasters, calamities, or catastrophes, inability to obtain labor or materials (or reasonable substitutes therefor) at reasonable costs or failure of, or inability to obtain, utilities necessary for performance, governmental restrictions, orders, limitations, regulations, or controls, national emergencies, delay in

issuance or revocation of permits, enemy or hostile governmental action, terrorism, insurrection, riots, civil disturbance or commotion, fire or other casualty, and other causes or events beyond the reasonable control of Landlord ("**Force Majeure**").

35. **Brokers**. Landlord and Tenant each represents and warrants that it has not dealt with any broker, agent or other person (collectively, "**Broker**") in connection with this transaction and that no Broker brought about this transaction, other than Colliers. Landlord and Tenant each hereby agree to indemnify and hold the other harmless from and against any claims by any Broker, other than the broker, if any named in this Section 35, claiming a commission or other form of compensation by virtue of having dealt with Tenant or Landlord, as applicable, with regard to this leasing transaction.

36. **Limitation on Landlord's Liability**. NOTWITHSTANDING ANYTHING SET FORTH HEREIN OR IN ANY OTHER AGREEMENT BETWEEN LANDLORD AND TENANT TO THE CONTRARY: (A) LANDLORD SHALL NOT BE LIABLE TO TENANT OR ANY OTHER PERSON FOR (AND TENANT AND EACH SUCH OTHER PERSON ASSUME ALL RISK OF) LOSS, DAMAGE OR INJURY, WHETHER ACTUAL OR CONSEQUENTIAL TO: TENANT'S PERSONAL PROPERTY OF EVERY KIND AND DESCRIPTION, INCLUDING, WITHOUT LIMITATION TRADE FIXTURES, EQUIPMENT, INVENTORY, SCIENTIFIC RESEARCH, SCIENTIFIC EXPERIMENTS, LABORATORY ANIMALS, PRODUCT, SPECIMENS, SAMPLES, AND/OR SCIENTIFIC, BUSINESS, ACCOUNTING AND OTHER RECORDS OF EVERY KIND AND DESCRIPTION KEPT AT THE PREMISES AND ANY AND ALL INCOME DERIVED OR DERIVABLE THEREFROM; (B) THERE SHALL BE NO PERSONAL RECOURSE TO LANDLORD FOR ANY ACT OR OCCURRENCE IN, ON OR ABOUT THE PREMISES OR ARISING IN ANY WAY UNDER THIS LEASE OR ANY OTHER AGREEMENT BETWEEN LANDLORD AND TENANT WITH RESPECT TO THE SUBJECT MATTER HEREOF AND ANY LIABILITY OF LANDLORD HEREUNDER SHALL BE STRICTLY LIMITED SOLELY TO LANDLORD'S INTEREST IN THE PROJECT OR ANY PROCEEDS FROM SALE OR CONDEMNATION THEREOF AND ANY INSURANCE PROCEEDS PAYABLE IN RESPECT OF LANDLORD'S INTEREST IN THE PROJECT OR IN CONNECTION WITH ANY SUCH LOSS; AND (C) IN NO EVENT SHALL ANY PERSONAL LIABILITY BE ASSERTED AGAINST LANDLORD IN CONNECTION WITH THIS LEASE NOR SHALL ANY RECOURSE BE HAD TO ANY OTHER PROPERTY OR ASSETS OF LANDLORD OR ANY OF LANDLORD'S OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS. UNDER NO CIRCUMSTANCES SHALL LANDLORD OR ANY OF LANDLORD'S OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS BE LIABLE FOR INJURY TO TENANT'S BUSINESS OR FOR ANY LOSS OF INCOME OR PROFIT THEREFROM.

37. **Severability**. If any clause or provision of this Lease is illegal, invalid or unenforceable under present or future laws, then and in that event, it is the intention of the parties hereto that the remainder of this Lease shall not be affected thereby. It is also the intention of the parties to this Lease that in lieu of each clause or provision of this Lease that is illegal, invalid or unenforceable, there be added, as a part of this Lease, a clause or provision as similar in effect to such illegal, invalid or unenforceable clause or provision as shall be legal, valid and enforceable.

38. **Signs; Exterior Appearance**. Tenant shall not, without the prior written consent of Landlord, which may be granted or withheld in Landlord's sole discretion: (i) attach any awnings, exterior lights, decorations, balloons, flags, pennants, banners, painting or other projection to any outside wall of the Project, (ii) use any curtains, blinds, shades or screens other than Landlord's standard window coverings, (iii) coat or otherwise sunscreen the interior or exterior of any windows, (iv) place any bottles, parcels, or other articles on the window sills, (v) place any equipment, furniture or other items of personal property on any exterior balcony, or (vi) paint, affix or exhibit on any part of the Premises or the Project any signs, notices, window or door lettering, placards, decorations, or advertising media of any type which can be viewed from the exterior of the Premises. Signage on first floor lobby directory tablet shall be inscribed, painted or affixed for Tenant by Landlord at the sole cost and expense of Landlord, and shall be of a size, color and type acceptable to Landlord, in Landlord's reasonable discretion. Nothing may be placed on the exterior of corridor walls or corridor doors other than Landlord's standard lettering. The first floor lobby directory tablet shall be provided exclusively for the display of the name and location of tenants.

39. **Early Termination Right**. If Tenant enters into a lease agreement with an affiliate of Landlord pursuant to which Tenant leases no less than 165,000 rentable square feet of space at 60 Binney Street, Cambridge, Massachusetts (the "**Binney Lease**"), for a term of not less than 60 months, then Tenant shall have the right, subject to the provisions of this Section 39, to terminate this Lease ("**Termination Right**") with respect to the entire Premises only at any time after the expiration of the 18th month after the Commencement Date, following delivery of written notice written notice from Tenant to Landlord ("**Termination Notice**") of its election to exercise its Termination Right, which termination notice shall identify the date on which Tenant desires to termination the Lease (the "**Early Termination Date**"), which Early Termination Date shall in no event be earlier than 60 days after Tenant's delivery of the Termination Notice to Landlord. If Tenant timely and properly exercises the Termination Right, Tenant shall vacate the Premises and deliver possession thereof to Landlord in the condition required by the terms of this Lease on or before the Early Termination Date and Tenant shall have no further obligations under this Lease except for those accruing prior to the Early Termination Date and those which, pursuant to the terms of this Lease, survive the expiration or early termination of this Lease. Nothing contained herein shall obligate Landlord, Landlord's affiliate or Tenant in any way to enter into the Binney Lease.

In the event that the Binney Lease is entered into and Tenant subleases more than 25,000 rentable square feet thereunder, Landlord shall have the right to terminate this Lease on at least 60 days' notice to Tenant, which notice shall specify an Early Termination Date, and in such event Tenant shall vacate the Premises and deliver possession thereof to Landlord in the condition required by the terms of this Lease on or before the Early Termination Date and Tenant shall have no further obligations under this Lease except for those accruing prior to the Early Termination Date and those which, pursuant to the terms of this Lease, survive the expiration or early termination of this Lease. Nothing contained herein shall obligate Landlord, Landlord's affiliate or Tenant in any way to enter into the Binney Lease.

40. **Notification of Asbestos**.

(a) **Notification of Asbestos**. Landlord hereby notifies Tenant of the presence of asbestos-containing materials ("**ACMs**") and/or presumed asbestos-containing materials ("**PACMs**") within or about the Building in the location identified in **Exhibit H**.

(b) **Tenant Acknowledgement**. Tenant hereby acknowledges receipt of the notification in paragraph (a) of this Section 40 and understand that the purpose of such notification is to make Tenant and any agents, employees, and contractors of Tenant, aware of the presence of ACMs and/or PACMs within or about the Building in order to avoid or minimize any damage to or disturbance of such ACMs and/or PACMs.

_____
Tenant's Initials

(c) **Acknowledgement from Contractors/Employees**. Tenant shall give Landlord at least 14 days' prior written notice before conducting, authorizing or permitting any of the activities listed below within or about the Building, and before soliciting bids from any person to perform such services. Such notice shall identify or describe the proposed scope, location, date and time of such activities and the name, address and telephone number of each person who may be conducting such activities. Thereafter, Tenant shall grant Landlord reasonable access to the Building, to determine whether any ACMs or PACMs will be disturbed in connection with such activities. Tenant shall not solicit bids from any person for the performance of such activities without Landlord's prior written approval. Upon Landlord's request, Tenant shall deliver to Landlord a copy of a signed acknowledgement from any contractor, agent, or employee of Tenant acknowledging receipt of information describing the presence of ACMs and/or PACMs within or about the Building in the locations identified in **Exhibit H** prior to the commencement of such activities. Nothing in this Section 40 shall be deemed to expand Tenant's rights under this Lease or otherwise to conduct, authorize or permit any such activities.

(i) Removal of thermal system insulation ("**TSI**") and surfacing ACMs and PACMs (i.e., sprayed-on or troweled-on material, e.g., textured ceiling paint or fireproofing material);

(ii) Removal of ACMs or PACMs that are not TSI or surfacing ACMs or PACMs; or

(iii) Repair and maintenance of operations that are likely to disturb ACMs or PACMs.

41. **Miscellaneous**.

(a) **Notices**. All notices or other communications between the parties shall be in writing and shall be deemed duly given upon delivery or refusal to accept delivery by the addressee thereof if delivered in person, or upon actual receipt if delivered by reputable overnight guaranty courier, addressed and sent to the parties at their addresses set forth above. Landlord and Tenant may from time to time by written notice to the other designate another address for receipt of future notices.

(b) **Joint and Several Liability**. If and when included within the term "**Tenant**," as used in this instrument, there is more than one person or entity, each shall be jointly and severally liable for the obligations of Tenant.

(c) **Financial Information.** Tenant shall furnish Landlord with true and complete copies of (i) Tenant's most recent audited annual financial statements within 90 days of the end of each of Tenant's fiscal years during the Term, (ii) Tenant's most recent unaudited quarterly financial statements within 45 days of the end of each of Tenant's first three fiscal quarters of each of Tenant's fiscal years during the Term. Notwithstanding the foregoing, Tenant shall not be obligated to provide the foregoing information at any time that Tenant is a public company listed on a nationally recognized securities exchange. At any time that Tenant is not a public company, Tenant may deliver the foregoing information subject to a confidentiality agreement in commercially reasonable form (provided that Landlord may furnish such information to such other parties as Landlord may deem appropriate subject to the same confidentiality).

(d) **Intentionally Deleted**.

(e) **Recordation**. Neither this Lease nor a memorandum of lease shall be filed by or on behalf of Tenant in any public record. Landlord may prepare and file, and upon request by Landlord Tenant will execute, a memorandum of lease.

(f) **Interpretation**. The normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Lease or any exhibits or amendments hereto. Words of any gender used in this Lease shall be held and construed to include any other gender, and words in the singular number shall be held to include the plural, unless the context otherwise requires. The captions inserted in this Lease are for convenience only and in no way define, limit or otherwise describe the scope or intent of this Lease, or any provision hereof, or in any way affect the interpretation of this Lease.

(g) **Not Binding Until Executed**. The submission by Landlord to Tenant of this Lease shall have no binding force or effect, shall not constitute an option for the leasing of the Premises, nor confer any right or impose any obligations upon either party until execution of this Lease by both parties.

(h) **Limitations on Interest**. It is expressly the intent of Landlord and Tenant at all times to comply with applicable law governing the maximum rate or amount of any interest payable on or in connection with this Lease. If applicable law is ever judicially interpreted so as to render usurious any interest called for under this Lease, or contracted for, charged, taken, reserved, or received with respect to this Lease, then it is Landlord's and Tenant's express intent that all excess amounts theretofore collected by Landlord be credited on the applicable obligation (or, if the obligation has been or would thereby be paid in full, refunded to Tenant), and the provisions of this Lease immediately shall be deemed reformed and the amounts thereafter collectible hereunder reduced, without the necessity of the execution of any new

document, so as to comply with the applicable law, but so as to permit the recovery of the fullest amount otherwise called for hereunder.

(i) **Choice of Law**. Construction and interpretation of this Lease shall be governed by the internal laws of the state in which the Premises are located, excluding any principles of conflicts of laws.

(j) **Time**. Time is of the essence as to the performance of Tenant's obligations under this Lease.

(k) **OFAC**. To Tenant's knowledge, Tenant, and all beneficial owners of Tenant, are currently (a) in compliance with and shall at all times during the Term of this Lease remain in compliance with the regulations of the Office of Foreign Assets Control ("**OFAC**") of the U.S. Department of Treasury and any statute, executive order, or regulation relating thereto (collectively, the "**OFAC Rules**"), (b) not listed on, and shall not during the term of this Lease be listed on, the Specially Designated Nationals and Blocked Persons List maintained by OFAC and/or on any other similar list maintained by OFAC or other governmental authority pursuant to any authorizing statute, executive order, or regulation, and (c) not a person or entity with whom a U.S. person is prohibited from conducting business under the OFAC Rules.

(l) **Incorporation by Reference**. All exhibits and addenda attached hereto are hereby incorporated into this Lease and made a part hereof. If there is any conflict between such exhibits or addenda and the terms of this Lease, such exhibits or addenda shall control.

(m) **Entire Agreement**. This Lease, including the exhibits attached hereto, constitutes the entire agreement between Landlord and Tenant pertaining to the subject matter hereof and supersedes all prior and contemporaneous agreements, understandings, letters of intent, negotiations and discussions, whether oral or written, of the parties, and there are no warranties, representations or other agreements, express or implied, made to either party by the other party in connection with the subject matter hereof except as specifically set forth herein.

(n) **No Accord and Satisfaction**. No payment by Tenant or receipt by Landlord of a lesser amount than the monthly installment of Base Rent or any Additional Rent will be other than on account of the earliest stipulated Base Rent and Additional Rent, nor will any endorsement or statement on any check or letter accompanying a check for payment of any Base Rent or Additional Rent be an accord and satisfaction. Landlord may accept such check or payment without prejudice to Landlord's right to recover the balance of such Rent or to pursue any other remedy provided in this Lease.

[Signatures on next page]

IN WITNESS WHEREOF, Landlord and Tenant have executed this Lease as of the day and year first above written.

TENANT:

BLUEBIRD BIO, INC.,
a Delaware corporation

By: /s/ Jason F. Cole
Its: SVP, General Counsel

LANDLORD:

ARE-MA REGION NO. 38, LLC, a Delaware limited liability corporation

By: Alexandria Real Estate Equities, L.P.,
a Delaware limited partnership, member

By: ARE-QRS Corp., a Maryland corporation, general partner

By: /s/ Eric S. Johnson
Its: SVP, RE Legal Affairs

EXHIBIT A TO LEASE

DESCRIPTION OF PREMISES

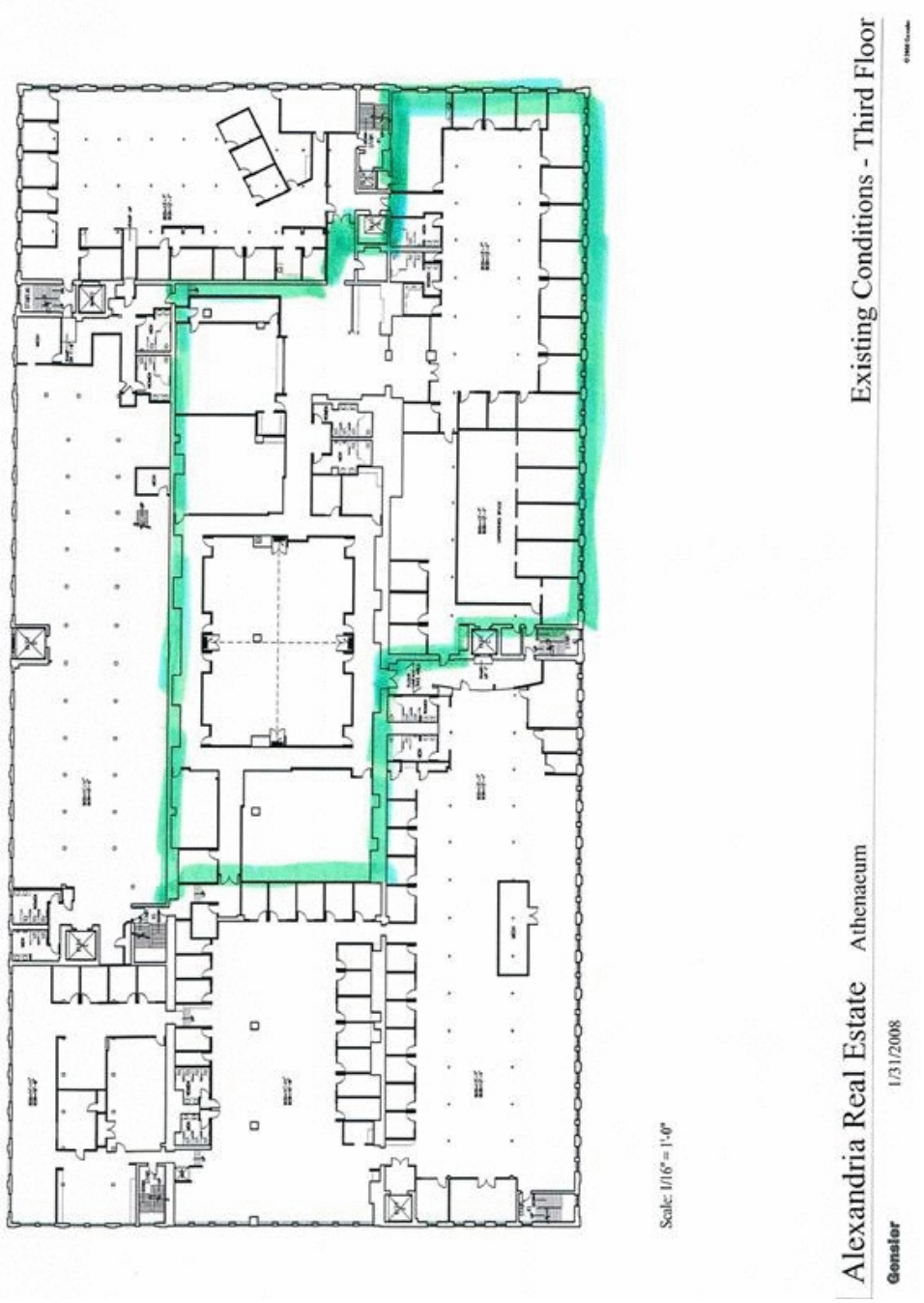

EXHIBIT A-1

APPROVED TENANT IMPROVEMENTS

EXHIBIT B TO LEASE

DESCRIPTION OF PROJECT

A certain parcel of land with the buildings thereon, in Cambridge, Middlesex County, Massachusetts, known as and numbered 215 First Street, and bounded and described as follows:

Beginning at the northwest corner of Athenaeum Street and First Street, said point being the southeasterly corner of the parcel;

Thence running N 80 degrees 12'27" W, a distance of 399.30 feet along the northerly line of said Athenaeum Street;

Thence turning and running N 09 degrees 43'10" E, a distance of 200.00 feet along the easterly line of Second Street;

Thence turning and running S 80 degrees 12'27" E, a distance of 399.41 feet along the southerly line of Munroe Street;

Thence turning and running S 09 degrees 45'06" W, a distance of 200.00 feet along the westerly line of First Street to the point of beginning.

The above described parcel contains 79,871 square feet, more or less.

EXHIBIT C TO LEASE

TENANT'S PROPERTY

None.

EXHIBIT D TO LEASE

ACKNOWLEDGMENT OF COMMENCEMENT DATE

This **ACKNOWLEDGMENT OF COMMENCEMENT DATE** is made this _____ day of _____, ____, between **ARE-MA REGION NO. 38, LLC**, a Delaware limited liability company ("**Landlord**"), and **BLUEBIRD BIO, INC.**, a Delaware corporation ("**Tenant**"), and is attached to and made a part of the Lease dated _____, _____ (the "**Lease**"), by and between Landlord and Tenant. Any initially capitalized terms used but not defined herein shall have the meanings given them in the Lease.

Landlord and Tenant hereby acknowledge and agree, for all purposes of the Lease, that the Commencement Date of the Base Term of the Lease is _____, _____ and the termination date of the Base Term of the Lease shall be midnight on _____, _____. In case of a conflict between the terms of the Lease and the terms of this Acknowledgment of Commencement Date, this Acknowledgment of Commencement Date shall control for all purposes.

IN WITNESS WHEREOF, Landlord and Tenant have executed this ACKNOWLEDGMENT OF COMMENCEMENT DATE to be effective on the date first above written.

TENANT:

BLUEBIRD BIO, INC.,
a Delaware corporation

By:
Its:

LANDLORD:

ARE-MA REGION NO. 38, LLC,
a Delaware limited liability company

By: Alexandria Real Estate Equities, L.P.,
a Delaware limited partnership,
managing member

By: ARE-QRS Corp., a Maryland corporation, general partner

By:
Its:

EXHIBIT E TO LEASE

Rules and Regulations

1. The sidewalk, entries, and driveways of the Project shall not be obstructed by Tenant, or any Tenant Party, or used by them for any purpose other than ingress and egress to and from the Premises.

2. Tenant shall not place any objects, including antennas, outdoor furniture, etc., in the parking areas, landscaped areas or other areas outside of its Premises, or on the roof of the Project.

3. Except for animals assisting the disabled, no animals shall be allowed in the offices, halls, or corridors in the Project.

4. Tenant shall not disturb the occupants of the Project or adjoining buildings by the use of any radio or musical instrument or by the making of loud or improper noises.

5. If Tenant desires telegraphic, telephonic or other electric connections in the Premises, Landlord or its agent will direct the electrician as to where and how the wires may be introduced; and, without such direction, no boring or cutting of wires will be permitted. Any such installation or connection shall be made at Tenant's expense.

6. Tenant shall not install or operate any steam or gas engine or boiler, or other mechanical apparatus in the Premises, except as specifically approved in the Lease. The use of oil, gas or inflammable liquids for heating, lighting or any other purpose is expressly prohibited. Explosives or other articles deemed extra hazardous shall not be brought into the Project.

7. Parking any type of recreational vehicles is specifically prohibited on or about the Project. Except for the overnight parking of operative vehicles, no vehicle of any type shall be stored in the parking areas at any time. In the event that a vehicle is disabled, it shall be removed within 48 hours. There shall be no "For Sale" or other advertising signs on or about any parked vehicle. All vehicles shall be parked in the designated parking areas in conformity with all signs and other markings. All parking will be open parking, and no reserved parking, numbering or lettering of individual spaces will be permitted except as specified by Landlord.

8. Tenant shall maintain the Premises free from rodents, insects and other pests.

9. Landlord reserves the right to exclude or expel from the Project any person who, in the judgment of Landlord, is intoxicated or under the influence of liquor or drugs or who shall in any manner do any act in violation of the Rules and Regulations of the Project.

10. Tenant shall not cause any unnecessary labor by reason of Tenant's carelessness or indifference in the preservation of good order and cleanliness. Landlord shall not be responsible to Tenant for any loss of property on the Premises, however occurring, or for any damage done to the effects of Tenant by the janitors or any other employee or person.

11. Tenant shall give Landlord prompt notice of any defects in the water, lawn sprinkler, sewage, gas pipes, electrical lights and fixtures, heating apparatus, or any other service equipment affecting the Premises.

12. Tenant shall not permit storage outside the Premises, including without limitation, outside storage of trucks and other vehicles, or dumping of waste or refuse or permit any harmful materials to be placed in any drainage system or sanitary system in or about the Premises.

13. All moveable trash receptacles provided by the trash disposal firm for the Premises must be kept in the trash enclosure areas, if any, provided for that purpose.

14. No auction, public or private, will be permitted on the Premises or the Project.

15. No awnings shall be placed over the windows in the Premises except with the prior written consent of Landlord.

16. The Premises shall not be used for lodging, sleeping or cooking or for any immoral or illegal purposes or for any purpose other than that specified in the Lease. No gaming devices shall be operated in the Premises.

17. Tenant shall ascertain from Landlord the maximum amount of electrical current which can safely be used in the Premises, taking into account the capacity of the electrical wiring in the Project and the Premises and the needs of other tenants, and shall not use more than such safe capacity. Landlord's consent to the installation of electric equipment shall not relieve Tenant from the obligation not to use more electricity than such safe capacity.

18. Tenant assumes full responsibility for protecting the Premises from theft, robbery and pilferage.

19. Tenant shall not install or operate on the Premises any machinery or mechanical devices of a nature not directly related to Tenant's ordinary use of the Premises and shall keep all such machinery free of vibration, noise and air waves which may be transmitted beyond the Premises.

EXHIBIT F TO LEASE

SHARED CONFERENCE FACILITY

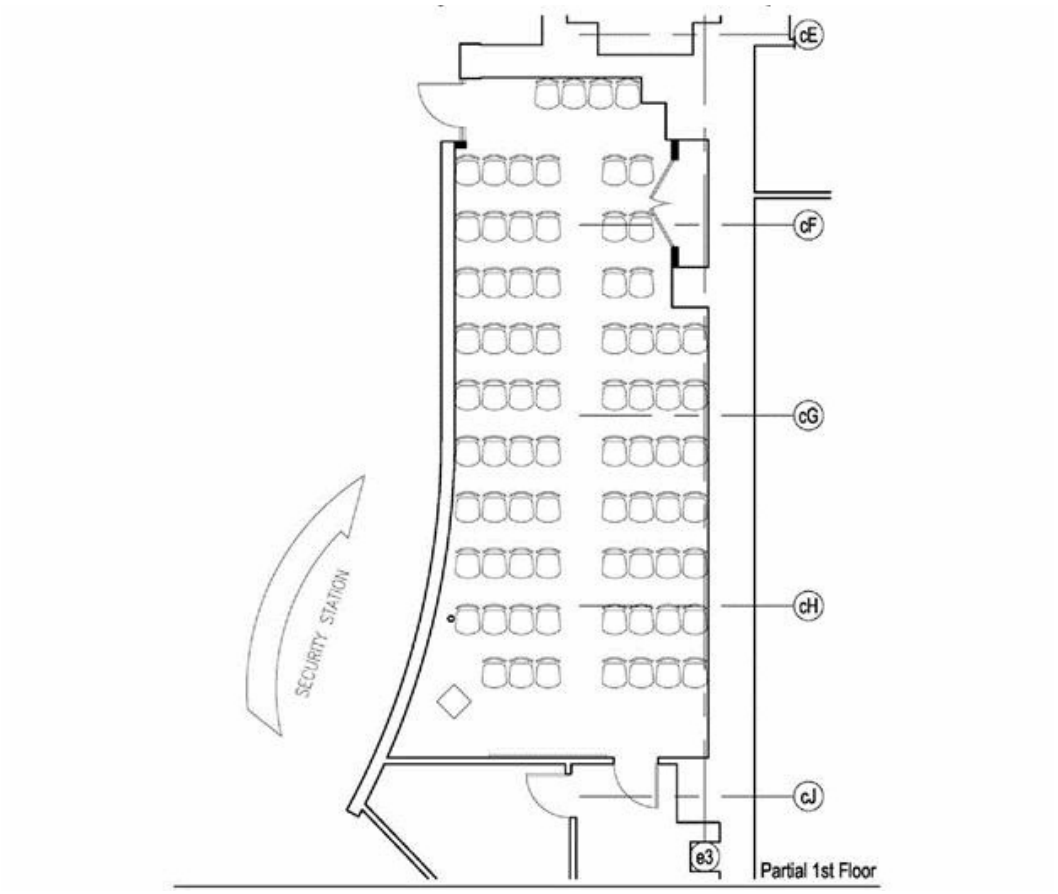

EXHIBIT G TO LEASE

LICENSE AGREEMENT

THIS **LICENSE AGREEMENT** (this "**Agreement**"), dated as of _____, 2015, is made and entered into by and between **ARE-MA REGION NO. 38, LLC**, a Delaware limited liability company ("**Licensor**"), and **BLUEBIRD BIO, INC.**, a Delaware corporation ("**Licensee**"), with reference to the following Recitals:

RECITALS

A. Licensor is the owner of that certain property commonly known as 215 First Street, Cambridge, Massachusetts (the "**Property**").

B. Concurrently herewith, Licensee and Licensor are entering into that certain Lease Agreement (the "**Lease**") for certain space located at the Property and more particularly described therein (the "**Premises**"). All initially capitalized terms used herein but not otherwise defined shall have the respective meanings ascribed thereto in the Lease.

C. Licensee desires to have, and Licensor desires to grant to Licensee, certain rights to access and use a certain area of the Property described as the "**Shared Conference Facility**" on **Exhibit 1** attached hereto, all in accordance with the terms and provisions set forth below.

AGREEMENT

For and in consideration of the covenants and premises herein contained and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereby agree as follows:

1. **License; Scheduling and Fees for Shared Conference Facility**.

(a) **License**. Licensor hereby grants Licensee, and Licensee hereby accepts, a non-exclusive license to use the Shared Conference Facility subject to the terms and provisions of this Agreement.

(b) **Scheduling and Fees for Shared Conference Facility**. Use by Licensee of the Shared Conference Facility shall be in common with others entitled to use the Shared Conference Facility in accordance with scheduling procedures reasonably determined by Licensor. Licensor shall use commercially reasonable efforts to schedule users on a first-come, first-served basis, but Licensor reserves the right to exercise its discretion in the event of conflicting scheduling requests among users. Tenant shall have the right to use the Shared Conference Facility for up to 6 people at no charge for up to 2 hours a day, 3 days a week. The first two additional occasions in a calendar month that Licensee uses the Shared Conference Facility shall be at no charge for such use, and thereafter Licensee shall pay the hourly charges established by Licensor from time to time for use of the Shared Conference Facility. The current hourly charge for the use of the Shared Conference Facility as of the date of this Lease is $200 per hour and is subject to change as determined by Licensor from time to time. Payment of such hourly charges shall be made within 10 days of invoice therefor, and Licensor reserves the right to require an advance deposit from time to time.

2. **Use**. Licensee shall exercise its limited rights hereunder in compliance with all laws, orders, judgments, ordinances, regulations, codes, directives, permits, licenses, covenants and restrictions now or hereafter applicable to the Property or Shared Conference Facility and the use and occupancy thereof, including the rules and regulations attached as **Exhibit 3** hereto, as the same may be revised by Licensor from time to time.

3. **Term**. The term of this Agreement shall commence on the Commencement Date set forth in the Lease (the "**Commencement Date**") and continue until the earlier to occur of (a) the last day on which Licensee is entitled to occupy the Premises pursuant to the terms of the Lease, (b) the date this Agreement is sooner terminated pursuant to its terms, and (c) the date the Lease is sooner terminated pursuant to its terms. The period between the Commencement Date and the date of termination of this Agreement shall be the "**Term**."

4. **Relocation and Modification of Shared Conference Facility**. Licensor shall have the right at any time to reconfigure, relocate or modify the Shared Conference Facility from time to time and to revise or expand any of the services (if any) provided therein; provided, however, that such reconfiguration, relocation or modification of the respective facility or any revision or expansion of services shall not materially adversely affect Tenant's use of such facility or service as permitted pursuant to this Agreement.

5. **Interference**. Licensee shall use the Shared Conference Facility in a manner that will not interfere with the rights of any tenants, other licensees or Licensor's service providers. Licensor assumes no responsibility for enforcing Licensee's rights or for protecting the Shared Conference Facility from interference or use from any person, including, without limitation, tenants or other licensees of the Property.

6. **Default by Licensee**.

(a) It is mutually agreed that Licensee shall be in default hereunder ("**Default**"),

(i) if Licensee fails to comply with any of the terms or provisions of this Agreement, and fails to cure such default within 30 days after the date of delivery of written notice of default from Licensor, provided that if the nature of such default is such that it cannot be cured by the payment of money and reasonably requires more than 30 days to cure, then Licensee shall not be deemed to be in Default under this License if Licensee commences such cure within 30 days of the aforesaid notice from Licensor and thereafter diligently prosecutes such cure to completion within 90 days of the aforesaid notice from Licensor; or

(ii) with respect to the Shared Conference Facility, if Licensee fails to pay any fees or charges for use of the Shared Conference Facility or other amounts required hereunder when due pursuant to this Agreement; provided, however, that Licensor will give Licensee notice and an opportunity to cure any failure to pay such fees or charges within 5 business days of any such notice not more than twice in any 12 month period and Licensee agrees that such notice shall be in lieu of and not in addition to, or shall be deemed to be, any notice required by law or

(iii) during the occurrence and continuation of any Default (as defined in the Lease) under the Lease.

(b) In the event of any Default by Licensee hereunder, Licensor shall be entitled to all rights and remedies provided for Landlord under the Lease, and all other rights and remedies provided at law or in equity, including without limitation, termination of this Agreement and the license granted hereunder.

7. **Indemnification and Limitation of Liability**.

(a) Licensor's sole obligation for providing standby generators or any other standby power equipment, other equipment, systems, furnishings or personal property to the Shared Conference Facility, whether or not affixed to the Building (collectively, "**Equipment**") shall be (i) to provide such Equipment as is determined by Licensor in its sole and absolute discretion, and (ii) to contract with a third party (determined by Licensor to be qualified) to maintain the Equipment that is deemed by Licensor (in its reasonable professional discretion) to need periodic maintenance per the manufacturer's standard maintenance guidelines. Licensor shall have no obligation to provide Licensee with operational Equipment, back-up Equipment or back-up utilities or to supervise, oversee or confirm that the third party maintaining the Equipment is maintaining the Equipment as per the manufacturer's standard guidelines or otherwise.

During any period of replacement, repair or maintenance of the Equipment when such Equipment is not operational, including any delays thereto due to the inability to obtain parts or replacements, Licensor shall have no obligation to provide Licensee with alternative or back-up Equipment or alternative sources of utilities. Licensee expressly acknowledges and agrees that Licensor does not guaranty that the Equipment will be operational at all times, will function or perform adequately, or that emergency power will be available to the Premises when needed, and Licensor shall not be liable for any damages resulting from the failure of such Equipment. Licensee hereby releases Licensor from and against any and all claims arising directly or indirectly out of or relating to the Equipment, or the existence, use of failure thereof, unless caused solely by the willful misconduct or gross negligence of Licensor. The terms and provisions of this Section 7(a) shall survive the expiration or earlier termination of this Agreement.

(b) NOTWITHSTANDING ANYTHING SET FORTH HEREIN OR IN ANY OTHER AGREEMENT BETWEEN LICENSOR AND LICENSEE TO THE CONTRARY: (i) LICENSOR SHALL NOT BE LIABLE TO LICENSEE OR ANY OTHER PERSON FOR (AND LICENSEE AND EACH SUCH OTHER PERSON ASSUME ALL RISK OF) LOSS, DAMAGE OR INJURY, WHETHER ACTUAL OR CONSEQUENTIAL TO PERSONAL PROPERTY OF EVERY KIND AND DESCRIPTION, INCLUDING, WITHOUT LIMITATION, TRADE FIXTURES, EQUIPMENT, INVENTORY, SCIENTIFIC RESEARCH, SCIENTIFIC EXPERIMENTS, LABORATORY ANIMALS, PRODUCT, SPECIMENS, SAMPLES, AND/OR SCIENTIFIC, BUSINESS, ACCOUNTING AND OTHER RECORDS OF EVERY KIND AND DESCRIPTION AND ANY AND ALL INCOME DERIVED OR DERIVABLE THEREFROM; and (ii) THERE SHALL BE NO PERSONAL RECOURSE TO LICENSOR FOR ANY ACT OR OCCURRENCE IN, ON OR ABOUT THE PREMISES, SHARED CONFERENCE FACILITY OR PROJECT OR ARISING IN ANY WAY UNDER THIS LICENSE AGREEMENT OR ANY OTHER AGREEMENT BETWEEN LICENSOR AND LICENSEE WITH RESPECT TO THE SUBJECT MATTER HEREOF AND ANY LIABILITY OF LICENSOR HEREUNDER SHALL BE STRICTLY LIMITED SOLELY TO LICENSOR'S INTEREST IN THE PROJECT OR ANY PROCEEDS FROM SALE OR CONDEMNATION THEREOF AND ANY INSURANCE PROCEEDS PAYABLE IN RESPECT OF LICENSOR'S INTEREST IN THE PROJECT OR IN CONNECTION WITH ANY SUCH LOSS; AND (iii) IN NO EVENT SHALL ANY PERSONAL LIABILITY BE ASSERTED AGAINST LICENSOR OR ANY OF ITS OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS IN CONNECTION WITH THIS LICENSE AGREEMENT NOR SHALL ANY RECOURSE BE HAD TO ANY OTHER PROPERTY OR ASSETS OF LICENSOR OR ANY OF LICENSOR'S OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS.

(c) Licensee acknowledges and agrees that there are no warranties of any kind, whether express or implied, made by Licensor or otherwise with respect to the Shared Conference Facility or any services (if any) provided in the Shared Conference Facility, and Licensee disclaims any and all such warranties.

(d) Licensor shall not be in default hereunder unless Licensor fails to perform any of its obligations hereunder within thirty (30) days after written notice from Licensee specifying such failure, with such extension of time by reason of Force Majeure as may be reasonably necessary; provided, however, that if the nature of Licensor's obligation arises from an emergency condition and Licensee provides notice to Licensor (which may be telephonic if followed by written notice on the same day describing the emergency condition in reasonable detail, including without limitation the emergency nature of the condition and specifying in all capital letters and boldface type that the condition is an emergency and response is required by Licensor pursuant to this Agreement), then Licensor shall respond within a reasonable period after receipt of such notice of the emergency condition. Licensee's sole remedy for any breach or default by Licensor hereunder shall be to terminate this Agreement and Licensee hereby, to the maximum extent possible, knowingly waives the provisions of any law or regulation, now or hereafter in effect which provides additional or other remedies to Licensee as a result of any breach by Licensor hereunder or under any such law or regulation.

8. **Miscellaneous**.

(a) This Agreement, together with the Lease, constitutes the entire agreement and understanding between the parties, and supersedes all offers, negotiations and other agreements concerning the subject matter contained herein. Any amendments to this Agreement must be in writing and executed by both parties.

(b) If any clause or provision of this Agreement is illegal, invalid or unenforceable under present or future laws, then and in that event, it is the intention of the parties hereto that the remainder of this Agreement shall not be affected thereby.

(c) This Agreement shall be binding on and inure to the benefit of the successors and permitted assigns of the respective parties.

(d) All notices or other communications between the parties shall be in writing and shall be deemed duly given upon delivery or refusal to accept delivery by the addressee thereof if delivered in person, or upon actual receipt if delivered by reputable overnight guaranty courier, addressed and sent to the parties at their addresses set forth in the Lease (as the same may be revised from time to time in accordance with the terms of the Lease).

(e) The license granted hereunder is appurtenant to Licensee's leasehold interest in the Premises and may not be assigned or otherwise pledged or transferred, directly or indirectly, except in connection with any assignment of the Lease or sublease of the Premises to which Landlord consents or is otherwise permitted under the Lease. In the event of a permitted assignment of the Lease, this Agreement shall automatically be assigned thereby, and thereupon the assigning Licensee shall have no further rights to use or access the Shared Conference Facility. No assignment or other transfer of the Lease or of this License shall release Licensee of its obligations hereunder.

(f) This Agreement shall be construed, interpreted, governed and enforced pursuant to the laws of the state in which the Property is located.

(g) This Agreement may be executed in multiple counterparts but all counterparts taken together shall constitute a single document.

(h) Time is of the essence of each and every provision of this Agreement.

(i) The parties to this Agreement hereby acknowledge that each such party and its counsel have participated in the negotiation and preparation of this Agreement, and this Agreement shall be construed and interpreted without regard to any presumption or other rule requiring construction against the party causing the Agreement to be drafted.

(j) Licensee acknowledges that its use of the Shared Conference Facility are non-exclusive and will be subject to the use of other tenants and licensees of the Property. Licensee acknowledges that it will be important for all such users to cooperate with each other to maintain the confidentiality of each party's documents and operations as well as information a party may hold under confidential arrangements with third parties. Licensee shall maintain and treat as confidential and secret all information and materials which may intentionally or unintentionally be disclosed to it in connection with such shared occupancy (the "**Confidential Information**"). Licensee shall not disclose Confidential Information to any third party and will take appropriate action by instruction, agreement or otherwise with its employees, agents, affiliates, associates, representatives, contractors and invitees to ensure that security of the Confidential Information is maintained. Notwithstanding the foregoing, Licensee may disclose Confidential Information to the extent that (a) disclosure is compelled by judicial or administrative process or other requirements of law, or (b) Licensee can show that such Confidential Information (i) was publicly available prior to the date of this Agreement or thereafter became publicly available without violation of this Agreement by Licensee or its employees, agents, affiliates, associates, representatives, contractors or invitees, or (ii) became available

to Licensee by means other than its use of or access to the Shared Conference Facility. The provisions of this Section 8(j) shall survive the expiration or earlier termination of this Agreement.

[Signatures On Next Page]

IN WITNESS WHEREOF, Licensor and Licensee have caused this Agreement to be executed by their duly authorized representatives as of the date first above written.

LICENSEE:

BLUEBIRD BIO, INC.,
a Delaware corporation

By:
Its:

LICENSOR:

ARE-MA REGION NO. 38, LLC, a Delaware limited liability company

By: Alexandria Real Estate Equities, L.P.,
a Delaware limited partnership,
managing member

By: ARE-QRS Corp., a Maryland corporation, general partner

By:
Its:

EXHIBIT 1 TO LICENSE AGREEMENT

DESCRIPTION OR PLAN OF SHARED CONFERENCE FACILITY

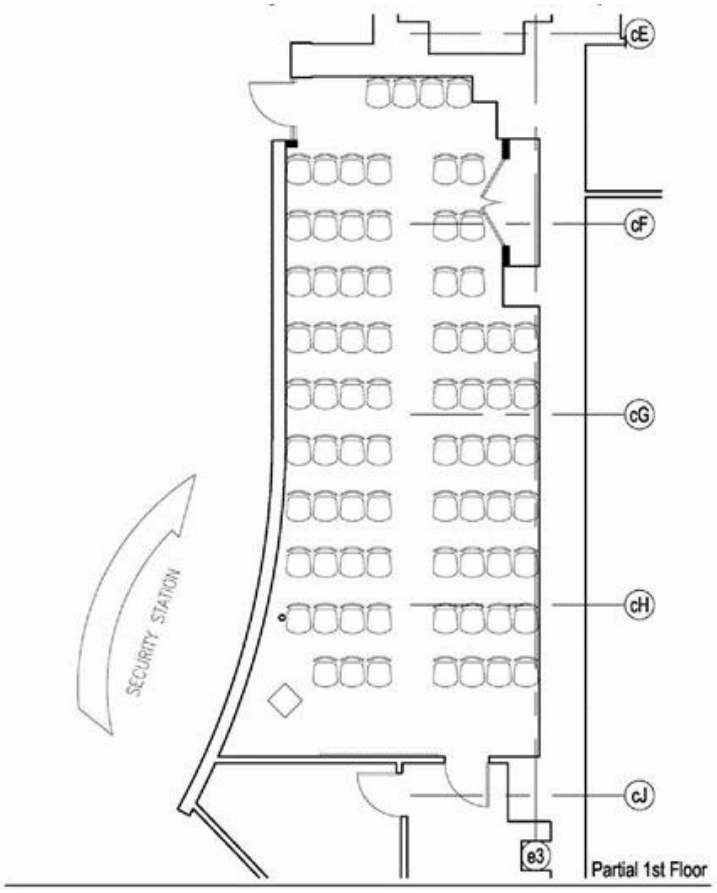

EXHIBIT 2 TO LICENSE AGREEMENT

RULES AND REGULATIONS

Rules and regulations (if any) will be established and implemented by Licensor during the Term.

EXHIBIT H TO LEASE

Asbestos Disclosure

This notification provides certain information about asbestos within or about the Premises at 215 First Street, Cambridge, MA ("**Building**").

Historically, asbestos was commonly used in building products used in the construction of buildings across the country. Asbestos-containing building products were used because they are fire-resistant and provide good noise and temperature insulation. Because of their prevalence, asbestos-containing materials, or ACMs, are still sometimes found in buildings today.

No ACMs were identified in an asbestos survey of the building conducted in 2007. However, to avoid damage, several materials were not sampled and are presumed asbestos-containing materials or PACMs as listed in the following table:

Material Description	Material Location
Ceramic tile adhesive and grout	Throughout restrooms; ground floor hallways; first floor lobby and hallways
Built-up roofing beneath rubber	Throughout roof
Flashing cement	Roof
Flex connectors on HVAC units	Roof

The PACMs described above were observed to be in good condition and may be managed in place. Because ACMs may be present within or about the Building, we have hired an independent environmental consulting firm to prepare an operations and maintenance program ("**O&M Program**"). The O&M Program is designed to minimize the potential of any harmful asbestos exposure to any person within or about the Building. The O&M Program includes a description of work methods to be taken in order to maintain any ACMs or PACMs within or about the Building in good condition and to prevent any significant disturbance of such ACMs or PACMs. Appropriate personnel receive regular periodic training on how to properly administer the O&M Program.

The O&M Program describes the risks associated with asbestos exposure and how to prevent such exposure through appropriate work practices. ACMs and PACMs generally are not thought to be a threat to human health unless asbestos fibers are released into the air and inhaled. This does not typically occur unless (1) the ACMs are in a deteriorating condition, or (2) the ACMs have been significantly disturbed (such as through abrasive cleaning, or maintenance or renovation activities). If inhaled, asbestos fibers can accumulate in the lungs and, as exposure increases, the risk of disease (such as asbestosis or cancer) increases. However, measures to minimize exposure, and consequently minimize the accumulation of asbestos fibers, reduce the risks of adverse health effects.

The O&M Program describes a number of activities that should be avoided in order to prevent a release of asbestos fibers. In particular, you should be aware that some of the activities which may present a health risk include moving, drilling, boring, or otherwise disturbing ACMs. Consequently, such activities should not be attempted by any person not qualified to handle ACMs.

The O&M Program is available for review during regular business hours at Landlord's office located at 700 Technology Square, Suite 302, Cambridge, MA 02139.

Exhibit 31.1

CERTIFICATIONS

I, Nick Leschly, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of bluebird bio, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 6, 2015

By: /s/ Nick Leschly
Nick Leschly
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, James M. DeTore, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of bluebird bio, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 6, 2015

By: /s/ James M. DeTore
James M. DeTore
Chief Financial Officer and Treasurer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of bluebird bio, Inc. (the "Company") for the period ended June 30, 2015 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of the Company hereby certifies, pursuant to 18 U.S.C. Section 1350, that to his or her knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 6, 2015

By: /s/ Nick Leschly
Nick Leschly
President, Chief Executive Officer and Director (Principal Executive Officer and Duly Authorized Officer)

Date: August 6, 2015

By: /s/ James M. DeTore
James M. DeTore
Chief Financial Officer and Treasurer (Principal Financial Officer and Duly Authorized Officer)