

STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934 or Section 30(h) of the Investment Company Act of 1940

| OMB APPROVAL | |
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|--|---------|----------|---|--|--|--|
| 1. Name and Address of Reporting Person* Sullivan Eric | | | 2. Issuer Name and Ticker or Trading Symbol bluebird bio, Inc. [BLUE] | | 5. Relationship of Reporting Person(s) to Issuer (Check all applicable) Director 10% Owner <input checked="" type="checkbox"/> Officer (give title below) Other (specify below) Principal Accounting Officer | |
| (Last) | (First) | (Middle) | 3. Date of Earliest Transaction (Month/Day/Year) 01/02/2015 | | 6. Individual or Joint/Group Filing (Check Applicable Line) <input checked="" type="checkbox"/> Form filed by One Reporting Person Form filed by More than One Reporting Person | |
| C/O BLUEBIRD BIO, INC. 150 SECOND STREET | | | 4. If Amendment, Date of Original Filed (Month/Day/Year) | | | |
| (Street) | (City) | (State) | | | | |
| CAMBRIDGE MA 02141 | | | | | | |

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned

| 1. Title of Security (Instr. 3) | 2. Transaction Date (Month/Day/Year) | 2A. Deemed Execution Date, if any (Month/Day/Year) | 3. Transaction Code (Instr. 8) | | 4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5) | | | 5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4) | 6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4) | 7. Nature of Indirect Beneficial Ownership (Instr. 4) |
|---------------------------------|--------------------------------------|--|--------------------------------|---|---|------------|--------------------------|---|--|---|
| | | | Code | V | Amount | (A) or (D) | Price | | | |
| Common Stock | 01/02/2015 | | M | | 3,500 | A | \$20.7 | 3,500 | D | |
| Common Stock | 01/02/2015 | | M | | 250 | A | \$24.47 | 3,750 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 1,169 | D | \$88.2356 ⁽²⁾ | 2,581 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 446 | D | \$88.8936 ⁽³⁾ | 2,135 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 862 | D | \$90.174 ⁽⁴⁾ | 1,273 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 245 | D | \$91.1632 ⁽⁵⁾ | 1,028 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 943 | D | \$92.0156 ⁽⁶⁾ | 85 | D | |
| Common Stock | 01/02/2015 | | S ⁽¹⁾ | | 85 | D | \$92.9569 ⁽⁷⁾ | 0 | D | |

Table II - Derivative Securities Acquired, Disposed of, or Beneficially Owned (e.g., puts, calls, warrants, options, convertible securities)

| 1. Title of Derivative Security (Instr. 3) | 2. Conversion or Exercise Price of Derivative Security | 3. Transaction Date (Month/Day/Year) | 3A. Deemed Execution Date, if any (Month/Day/Year) | 4. Transaction Code (Instr. 8) | | 5. Number of Derivative Securities Acquired (A) or Disposed of (D) (Instr. 3, 4 and 5) | | 6. Date Exercisable and Expiration Date (Month/Day/Year) | | 7. Title and Amount of Securities Underlying Derivative Security (Instr. 3 and 4) | | 8. Price of Derivative Security (Instr. 5) | 9. Number of derivative Securities Beneficially Owned Following Reported Transaction(s) (Instr. 4) | 10. Ownership Form: Direct (D) or Indirect (I) (Instr. 4) | 11. Nature of Indirect Beneficial Ownership (Instr. 4) |
|--|--|--------------------------------------|--|--------------------------------|---|--|-----|--|-----------------|---|----------------------------|--|--|---|--|
| | | | | Code | V | (A) | (D) | Date Exercisable | Expiration Date | Title | Amount or Number of Shares | | | | |
| Stock Options (right to buy) | \$20.7 | 01/02/2015 | | M | | 3,500 | | (8) | 12/02/2023 | Common Stock | 3,500 | \$0.00 | 8,500 | D | |
| Stock Option (right to buy) | \$24.47 | 01/02/2015 | | M | | 250 | | (9) | 03/03/2024 | Common Stock | 250 | \$0.00 | 7,750 | D | |

Explanation of Responses:

- The sales reported in the Form 4 were effected pursuant to a Rule 10b5-1 trading plan adopted by the reporting person on July 17, 2014.
- The range in prices for the transaction reported on this line was \$87.53 to \$88.52. The average weighted price was \$88.2356. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$88.54 to \$89.51. The average weighted price was \$88.8936. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$89.62 to \$90.62. The average weighted price was \$90.1740. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$90.63 to \$91.61. The average weighted price was \$91.1632. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$91.66 to \$92.50. The average weighted price was \$92.0156. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$92.92 to \$92.99. The average weighted price was \$92.9569. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- This option vests over a four-year period, at a rate of twenty-five percent(25%) on November 11, 2014 and in 36 equal monthly installments thereafter.
- This option vests over a four-year period, at a rate of twenty-five percent(25%) on January 1, 2015 and in 36 equal monthly installments thereafter.

Remarks:

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.

* If the form is filed by more than one reporting person, see Instruction 4 (b)(v).

** Intentional misstatements or omissions of facts constitute Federal Criminal Violations See 18 U.S.C. 1001 and 15 U.S.C. 78ff(a).

Note: File three copies of this Form, one of which must be manually signed. If space is insufficient, see Instruction 6 for procedure.

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB Number.