

| OMB APPROVAL                                 |           |
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**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

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|--|--|--|
| <b>1. Name and Address of Reporting Person*</b><br><u>Finer Mitchell H.</u><br><br>(Last) (First) (Middle)<br><u>C/O BLUEBIRD BIO, INC.</u><br><u>150 SECOND STREET</u><br><br>(Street)<br><u>CAMBRIDGE MA 02141</u><br><br>(City) (State) (Zip) | <b>2. Issuer Name and Ticker or Trading Symbol</b><br><u>bluebird bio, Inc. [ BLUE ]</u> | <b>5. Relationship of Reporting Person(s) to Issuer</b><br>(Check all applicable)<br>Director 10% Owner<br><input checked="" type="checkbox"/> Officer (give title below) Other (specify below)<br><u>Chief Scientific Officer</u> |
|  | <b>3. Date of Earliest Transaction (Month/Day/Year)</b><br><u>03/03/2014</u>             |  |
|  | <b>4. If Amendment, Date of Original Filed (Month/Day/Year)</b>                          | <b>6. Individual or Joint/Group Filing (Check Applicable Line)</b><br><input checked="" type="checkbox"/> Form filed by One Reporting Person<br>Form filed by More than One Reporting Person                                       |

**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                    | 03/03/2014                           |  | M                              |   | 8,000   | A          | \$0.95                 | 8,000   | D  |   |
| Common Stock                    | 03/03/2014                           |  | S <sup>(1)</sup>               |   | 8,000   | D          | \$24.79 <sup>(2)</sup> | 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 |
| Stock Option (right to buy)                | \$0.95   | 03/03/2014                           |  | M                              |   | 8,000  |     | (3)  | 09/15/2020      | Common Stock  | 8,000                                      | \$0.00   | 73,769  | D  |       |
| Stock Option (right to buy)                | \$24.47  | 03/03/2014                           |  | A                              |   | 55,000   |     | (4)  | 03/03/2024      | Common Stock  | 55,000                                     | \$0.00   | 55,000  | D  |       |

**Explanation of Responses:**

- The sales reported in this Form 4 were effected pursuant to a Rule 10b5-1 trading plan adopted by the reporting person on October 11, 2013.
- The range of prices for the transaction reported on this line was \$24.05 to \$25.40. The average weighted price was \$24.785. The reporting person will provide, upon request by the SEC, the issuer or a security holder of the issuer, full information regarding the number of shares sold at each separate price.
- This option vests in 48 equal monthly installments, commencing on March 8, 2010.
- 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:**

/s/ Linda C. Bain, Attorney-in-Fact 03/05/2014

\*\* Signature of Reporting Person Date

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.