



DIVISION OF  
CORPORATION FINANCE

UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549

January 19, 2012

Via E-Mail

Dr. Michael Bristow  
President and Chief Executive Officer  
ARCA biopharma, Inc.  
8001 Arista Place, Suite 430  
Broomfield, Colorado 80021

**Re: ARCA biopharma, Inc.  
Registration Statement on Form S-3  
Filed January 12, 2012  
File Nos. 333-178984**

Dear Dr. Bristow:

We have limited our review of your registration statement to those issues we have addressed in our comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. Where you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Signatures

1. The registration statement should also be signed by the registrant's controller or principal accounting officer. Any person who occupies more than one of the specified positions required to sign the registration statement should indicate each capacity in which he signs the registration statement. See Instructions to Signatures to Form S-3.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes the information the Securities Act of 1933 and all applicable Securities Act rules require. Since the company and its management are in possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

Dr. Michael Bristow  
ARCA biopharma, Inc.  
January 19, 2012  
Page 2

Notwithstanding our comments, in the event you request acceleration of the effective date of the pending registration statement please provide a written statement from the company acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;
- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and
- the company may not assert staff comments and the declaration of effectiveness as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of the securities specified in the above registration statement. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact John Krug, Senior Counsel, at (202) 551-3862, Dan Greenspan, Branch Chief, at (202) 551-3623 or me at (202) 551-3715 with any questions.

Sincerely,

/s/ Jeffrey Riedler

Jeffrey Riedler  
Assistant Director

cc: Brent D. Fassett, Esquire  
Bryn P. Weaver, Esquire  
Cooley LLP  
300 Interlocken Crescent, Suite 900  
Broomfield, Colorado 80021