

Via Facsimile and U.S. Mail
Mail Stop 6010

February 20, 2009

Dr. John M. Maraganore
Chief Executive Officer
Alnylam Pharmaceuticals, Inc.
300 Third Street
Cambridge, MA 02142

**Re: Alnylam Pharmaceuticals, Inc.
Form 10-K for the Fiscal Year Ended December 31, 2007
File No. 000-50743**

Dear Dr. Maraganore:

We have reviewed your January 22, 2009 response to our December 9, 2009 letter and have the following comments. In our comments we ask you to provide us with information so we may better understand your disclosure. Where a comment requests you to revise disclosure, the information you provide should show us what the revised disclosure will look like and identify the annual or quarterly filing, as applicable, in which you intend to first include it. If you do not believe that revised disclosure is necessary, explain the reason in your response. After reviewing the information provided, we may raise additional comments and/or request that you amend your filing.

Intellectual Property Related to Fundamental Aspects and Uses of siRNA and RNAi-related Mechanisms, page 18

1. In response to our previous comment 3, you state that you will include the expiration dates of patents material to your business in future filings. Please respond with the disclosure relating to these patents that you propose to include in future filings.

Material Agreements

2. We note your response that you analyzed each agreement for materiality and that you determined that the agreements are not material, and thus do not need to be filed as exhibits as required by Item 601(b)(10) of Regulation S-K. Please provide us a comprehensive analysis, including any relevant facts and circumstances you considered, that led to your conclusions that these agreements are not material.

Roche Alliance, page 99

3. We acknowledge your response to our comment four. Based on your response, it appears that you do not intend to recognize revenue for an achieved substantive milestone over the term of the agreement but rather you intend to recognize it over the remaining term of the agreement. This accounting treatment results in this revenue being recognized heavily on the back-end of the agreement and does not reflect that a portion of the revenue relates to services performed before the milestone is achieved. Please tell us why you believe your intended accounting treatment is appropriate under GAAP.

Please provide us the information requested within 10 business days of the date of this letter or tell us when you will provide a response prior to the expiration of the 10-day period. Please furnish a letter with your response that keys your response to our comment. Detailed letters greatly facilitate our review. You should furnish the letter to us via EDGAR under the form type label CORRESP.

Please contact Christine Allen, Staff Accountant, at (202) 551- 3652 or Lisa Vanjoske, Assistant Chief Accountant, at (202) 551-3614 if you have any questions regarding the processing of your response as well as any questions regarding comment three. You may contact Michael Rosenthal, Staff Attorney, at (202) 551-3674 or Jeffrey Riedler, Associate Director, at (202) 551-3715 with questions on any of the other comments. In this regard, do not hesitate to contact me, at (202) 551-3679.

Sincerely,

Jim B. Rosenberg
Senior Assistant Chief Accountant