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

DIVISION OF
CORPORATION FINANCE

December 12, 2011

Via E-mail
Harry F. Hixson, Jr.
Chairman of the Board and Chief Executive Officer
Sequenom, Inc.
3595 John Hopkins Court
San Diego, California 92121

Re: Sequenom, Inc.
Registration Statement on Form S-3
Filed November 23, 2011
File No. 333-178134

Dear Dr. Hixson:

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.

Prospectus Summary

1. We note from your Form 10-Q for the quarterly period ending September 30, 2011 that for the nine month period ended September 30, 2011 approximately 86% of your revenue was derived from your Genetic Analysis segment while approximately 14% of your revenue was derived from your Molecular Diagnostics segment. Please revise your prospectus summary to indicate the relative importance of these segments to your current operating results.

2. We note from your Form 10-Q for the quarterly period ending September 30, 2011 that your diagnostic revenues to date have been primarily derived from your cystic fibrosis carrier screening and Rhesus D genotyping LDTs and that collections from the sale of your age-related macular degeneration LDT were not significant for the three months ended September 30, 2011 because you did not commence commercialization of that

LDT until the second quarter of 2011. Please revise your prospectus summary so that it is clear to investors how you are currently generating your revenues in the Molecular Diagnostics segment.

3. With regard to your disclosure that you began commercialization of the MaterniT21 LDT in October 2011, please clarify, if true, that to date you have not derived a material portion of your revenues from the sales of those tests.

4. We note your disclosure in the second to last sentence on page 1 that you intend to file submissions with the FDA for clearance or approval for commercialization of your diagnostic tests. We also note from your disclosure on page 2 that you have already commenced the commercialization of the MaterniT21 LDT in October 2011 and your disclosure under "FDA Oversight of LDTs" on page 3 that currently the FDA has exempted LDTs from regulation. With a view towards revised disclosure, please tell us why you are seeking clearance or approval of your MaterniT21 LDT or other LDTs given your disclosure on page 3.

5. We note the disclosure in the last sentence of the second paragraph on page 2. With a view towards revised disclosure, please tell us how you have been paid for the diagnostic services you have provided to date. In this regard, we note from an article located at http://www.genomeweb.com/sequencing/sequenom-launches-maternit21-down-syndrome-test-ldt-publishes-clinical-validatio that you expect insured patients to pay no more than $235 out of pocket and for uninsured patients, the test will cost around $1,900, and that for insured patients, the payor will be billed at the list price, and any outstanding amounts will be pursued from the payor, not the patient, on appeal. If true, please revise your prospectus summary in an appropriate location to disclose these costs.

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.

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.

You may contact Tim Buchmiller at (202) 551-3635 or me at (202) 551-3528 with any questions.

Sincerely,

/s/ Amanda Ravitz

Amanda Ravitz
Assistant Director

cc: Charles S. Kim, Esq.
Cooley LLP
(via e-mail)