

BY EDGAR

August 17, 2007

Brian Cascio  
Accounting Branch Chief  
Division of Corporation Finance  
Securities and Exchange Commission  
100 F Street, N.E.  
Washington, DC 20549-6010

Re: Axcelis Technologies, Inc.  
Form 10-K for the fiscal year ended December 31, 2006  
Form 10-Q for the quarterly period ended March 31, 2007  
File No. 000-30941

Dear Mr. Cascio:

The following responds to your letter of July 20, 2007, to the undersigned regarding the Forms 10-K and 10-Q referred to above filed by Axcelis Technologies, Inc. (the "Company").

For convenience, each of your comments is restated below, followed by our response.

Form 10-K for the fiscal year ended December 31, 2006

Consolidated Statements of Operations, page F-2

1. We see that you separately disclose revenue generated from sales of systems, services and royalties. In future filings, please revise your income statement to also separately disclose the related costs of generating those revenues. Refer to Article 5-03(b)(1) and (2) of Regulation S-X. As a related matter, the gross profit for systems, services and royalties should be separately discussed in the results of operations section of MD&A.

The Company operates in one business segment, which is the manufacture of capital equipment for the semiconductor manufacturing industry. Our primary revenue driver is system sales. We view revenues from spare parts, equipment upgrades and maintenance services as a derivative of system sales and do not view these revenues as a separate business. Accordingly, we built our financial systems consistent with this view and we do not track these costs in a format that would enable us to report them separately. For instance, certain shared costs of systems, services and royalties such as variances, material scrap, training and valuation reserves cannot be attributed to specific cost of revenue categories. Therefore, we have no practical manner in which to allocate such costs in way that would provide more meaningful financial information to our investors.

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Consolidated Balance Sheets, page F-3

2. In future filings, please revise to clearly label your long term debt as "convertible subordinated debt," as described in the footnotes to your financial statements.

We will provide the requested disclosure in future filings.

Notes to Consolidated Financial Statements

Note 2. Significant Accounting Policies, page F-6

Revenue Recognition, page F-8

3. Please tell us and revise future filings to clearly disclose your accounting policy for recognizing revenue from royalty arrangements. Please note that it should be evident from your disclosure that the royalty revenue is from a related party.

The Company's accounting policy for recognizing revenue from royalty arrangements is as follows:

Royalty revenue is primarily earned under the terms of our license agreement with SEN. Royalty revenue is recorded at the time SEN notifies the Company that royalties have been earned.

We will describe this policy in future filings.

Form 10-Q for the quarterly period ended March 31, 2007

Consolidated Statement of Cash Flows, page 5

4. We see that you currently present the cash dividend from SEN within operating activities in your consolidated statement of cash flows. Please tell us why you should not record the dividend as a component of net cash provided by investing activities. We reference paragraph 16(b) of SFAS 95 which states that returns of investment in equity instruments are generally recorded as investing activities.

In 2006, the Company and Sumitomo Heavy Industries agreed upon an annual dividend relating to SEN's fiscal year ended March 31, 2006. The two shareholders instructed SEN to dividend 40% of SEN's net earnings for that year. On January 31, 2007, the Company received a payment of approximately \$5.7 million representing its 50% share of the dividend.

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Paragraph 16(b) of SFAS 95 states "returns of investment in equity instruments are generally recorded as investing activities". In this situation, the Company believes that the cash received from SEN represents a return on investment, rather than return of investment. The Company holds this position as the intent of the dividend payment was to distribute a portion of SEN's net earnings to the shareholders. Further clarification is provided in Example 1 of Appendix C of Statement 95. The example illustrates that a dividend received from an affiliate, as well as undistributed earnings of an affiliate, are classified as operating activities in the statement of cash flows.

Because the cash payment received from SEN was a dividend payment and not a return of the company's original investment in the joint venture, the Company's position is classification of the cash receipt within operating activities is appropriate.

In connection with this letter, as requested, the Company acknowledges that (i) the Company is responsible for the adequacy and accuracy of the disclosure in the filings; (ii) staff comments or changes to disclosure in response to staff comments do not foreclose the Commission from taking any action with respect to the filing; and (iii) the Company may not assert staff comments as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please direct any questions or further comments regarding this letter to me at the above address or contact me directly by telephone at (978) 787 - 4110 or by email at Stephen.Bassett@axcelis.com.

Sincerely,

/s/ STEPHEN G. BASSETT

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Stephen G. Bassett  
Executive Vice President and  
Chief Financial Officer

cc: Kristin Lochhead  
Securities and Exchange Commission

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