

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

August 9, 2010

Mary G. Puma Chief Executive Officer Axcelis Technologies, Inc. 108 Cherry Hill Drive Beverly, Massachusetts 01915

Re: Axcelis Technologies, Inc.

Form 10-K for fiscal year ended December 31, 2009

Filed March 15, 2010 File No. 000-30941

Dear Ms. Puma:

We have completed our review of your Annual Report on Form 10-K and do not have any further comments at this time. If you have any questions please contact Ruairi Regan at (202) 551-3269 or Tim Buchmiller at (202) 551-3635.

Sincerely,

Russell Mancuso Branch Chief

cc: Lynnette C. Fallon (978) 787-4090