



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549-7010

Mail Stop 7010

May 19, 2006

By U.S. Mail and Facsimile

Mr. Michael R. Hogan
Chief Financial Officer
Sigma-Aldrich Corporation
3050 Spruce Street
St. Louis, Missouri 63103

Re: Sigma-Aldrich Corporation
Form 10-K for the Fiscal Year Ended December 31, 2005
Form 10-Q for the Fiscal Quarter Ended March 31, 2006
File No. 000-08135

Dear Mr. Hogan:

We have reviewed your filings and have the following comments. We have limited our review to your disclosures related to your operating results, long-term debt and disclosure controls and procedures and will make no further review of your documents. Where indicated, we think you should revise your document in response to these comments. If you disagree, we will consider your explanation as to why our comments are inapplicable or a revision is unnecessary. Please be as detailed as necessary in your explanation. In some of our comments, we may ask you to provide us with supplemental information so we may better understand your disclosure. After reviewing this information, we may or may not raise additional comments.

Please understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comments or any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

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Form 10-K for the Fiscal Year Ended December 31, 2005

Management's Discussion and Analysis, page 17

Operating Results, page 21

1. You identify non-cash inventory purchase accounting charges related to inventories acquired through acquisitions, the lower margin JRH industrial cell culture business, increased manufacturing and distribution costs, partially offset by cost savings from process improvements, as the reasons for the decrease in the gross profit rate in 2005. In future filings, please expand your discussion to quantify the impact of each item referred to so that readers can fully assess the impact that each item had on your cost of sales. Your discussion should also indicate whether you believe these items reflect a trend in costs (i.e., Do you expect cost savings to continue or level off? Will manufacturing and distribution costs continue to rise?)

Note 8 – Long-Term Debt, page 34

2. In future filings, please disclose the amount of interest capitalized for each period, if material, as provided in paragraph 21 of SFAS 34, Capitalization of Interest Cost.

Item 9A – Controls and Procedures, page 10

3. We note that your disclosure controls and procedures are “effective.” However, your disclosure does not provide the full definition of “disclosure controls and procedures” as defined in Exchange Act Rule 13a-15(e). Please confirm to us that your disclosure controls and procedures are also effective with respect to controls and procedures designed to ensure that information required to be disclosed by you in the reports that you file or submit under the Act are accumulated and communicated to your management, including your principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. In addition, please revise your future filings to state the full definition of disclosure controls and procedures. Alternatively, you may simply state that your disclosure controls and procedures are effective or ineffective. Please note that this comment also applies to your Form 10-Q for the fiscal quarter ended March 31, 2006.

* * *

Please respond to these comments within 10 business days, or tell us when you will provide us with a response. Please provide us with a response letter that keys your responses to our comments and provides any requested information. Detailed letters greatly facilitate our review. Please file your response on EDGAR as a correspondence file. Please understand that we may have additional comments after reviewing your responses to our comments.

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We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filings to be certain that the filings include all information required under the Securities Exchange Act of 1934 and that they have provided all information investors require for an informed investment decision. 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.

In connection with responding to our comments, please provide, in writing, a statement from the company acknowledging that:

- the company is responsible for the adequacy and accuracy of the disclosure in their filings;
- 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
- 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.

In addition, please be advised that the Division of Enforcement has access to all information you provide to the staff of the Division of Corporation Finance in our review of your filing or in response to our comments on your filing.

If you have any questions regarding these comments, you may contact Dale Welcome, Staff Accountant, at (202) 551-3865, or, in his absence, to the undersigned at (202) 551-3768.

Sincerely,

John Cash
Accounting Branch Chief