
BOOK REVIEWS

Quality Assurance of Chemical Measurements

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REFERENCE: John Keenan Taylor, *Quality Assurance of Chemical Measurements*, Lewis Publishers, Chelsea, Mich., 1987, 328 pages, ISBN 0-87371-097-5, \$59.95.

Dr. Taylor, in his Preface to the book, states that the book is written to provide guidance for the development of a credible quality assurance program and also for its implementation. To a fair degree he is successful. The author's extensive experience as an analytical chemist and advocate of quality assurance is evident throughout the text. The intended audience of this book is not clearly evident to the reader; however, there are many chemical data producers and users who can benefit from the wisdom, philosophy, and guidance offered in this text.

The author's attempt to cover so many topics related to quality control and quality assurance is both a strength and a weakness. The book is encyclopedic in scope (I counted 262 headings of various levels in the Table of Contents). However, too many topics get superficial treatment or are presented with insufficient examples to constitute stand-alone sections in the book. In part, this is an unfortunate consequence of the elaboration of subheadings found throughout the text. The elevation of many of these topics to identified sections in the book tends to build unrealized expectations on the part of the reader.

The author recognizes the critical nature of sound and appropriate statistics to the field of quality assurance and to the process of producing credible data ("A staff statistician could be one of the most important positions in a modern analytical laboratory."). Three chapters are filled with the most commonly used statistical procedures presented in a very readable "non-statistical" manner. The trichotomy of accuracy, bias, and precision (or imprecision) is handled very well - logically and tersely. The last of these chapters (Chapter 4) would benefit greatly from additional technical-editorial attention. Errors, usually of a minor nature (e.g., rounding errors, wrong table numbers, wrong values used in an example), affected over half of the pages in that chapter. Increasing use of spatial statistics and other field QA procedures were not recognized in the text; nor were those multivariate statistical procedures mentioned that are in current use for control of multi-analyte chemical methods. Several of the references were inaccurate.

The "midsection" of the book (Chapters 5 through 15) is written in a more narrative style with very few references to support the ideas presented or offer alternative views. There are some pearls to be found among these pages, however. The "check sheet" presented in Chapter 7 will be found useful by many; a section (in Chapter 9) posing considerations in conducting analyses "in house" versus employing an external specialist laboratory is interesting and valuable; the treatment of acceptable limits for measurement blanks, found in Chapter 13, is one of the best I have

encountered. A discussion of the concept and application of control charts, in Chapter 14, is solid and well supported with effective figures; the author's remarks and opinions in this section reflect a practical, no-nonsense approach worth emulating. While the sentiments expressed in the concluding portions of Chapter 15 (Principles of Quality Assessment) are not new or unique, they bear mentioning because of their fundamental importance: "Quality assessment must be both a philosophy and a practice. A good laboratory and all its staff will have a desire for excellence."

I would have preferred to see more emphasis on effecting quality improvement. Detection of bad data or bad practices is important, but is certainly not sufficient. There must be effective follow through to see that the basic causes are corrected. The author recognizes proper training as a key element in effecting quality performance. I most heartily concur.

Chapters 16 through 18 present information on quality assurance materials of various types, their roles and uses, and the concept of traceability of such materials to standards developed by the National Bureau of Standards (NBS) or other competent authority. Few examples or references to outside work are provided, except in the area of traceability, where a highly accurate account of the role of NBS in this process is furnished.

Quality Audits (Chapter 19) and Quality Circles (Chapter 20) offer useful information on assessing and developing quality in organizations. The profiles, surveys, and checklist will be useful in analyzing the status and potential of a laboratory's operations for quality performance. The quality circle concept is a useful one for effecting participative approaches to overall quality. The related concept of a quality assurance team, used successfully in many organizations, was not discussed, nor were other organizational approaches to effect the same goals. The use of the quality audit as a two-way mechanism to afford training and feedback, at the same time that the quality of the operation is assessed, was not discussed.

Broad guidance on the validation of samples, methodology, and data is presented in Chapter 21; the depth of treatment does not justify its identification as a separate chapter. On the other hand, the treatment of significant figures in Chapter 22 is quite complete. In Chapter 23, the author offers useful information on how to conduct laboratory performance testing in such a way that test interpretation is considerably more useful to the participating laboratory. A discussion of the Youden plot to analyze measurement problems is featured in Chapter 24. Other approaches to data analysis should be considered here.

The author finishes very strongly with top-notch presentations in Chapters 25 (Laboratory Evaluation) and 26 (The Quality Assurance Program). Good references enhance the laboratory evaluation discussions. The general overview presented in the latter chapter is aimed at the new or non-technical person and presents the topic adequately using more than one viewpoint.

Five appendices are included; each is a valuable source of information. Appendix A presents terminology used in quality assurance; it represents a good start at standardization of such terms. Appendix B provides a sample QA plan and outlines for use in preparing standard operating procedures and good laboratory prac-

tice documents. Appendix C contains tables for the statistical methods presented in the text. Study aids that complement the information on terminology are presented in Appendix D. Appendix E is an annotated bibliography of selected publications on the quality assurance of measurements. It may be worth the price of the book all by itself!

In summary, this book is flawed by an attempt to present too much material and by too many editorial errors, especially in the statistical sections. The chapters are generally well written; however, they represent the work of the author with little reference to

previous works. As such, the book has limited value as a reference source document. It will, however, be valuable as a teaching guide for advanced level students and as a resource document for practicing laboratory professionals or managers. The material is mainstream; most will be comfortable with both the philosophies espoused and the techniques recommended.

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