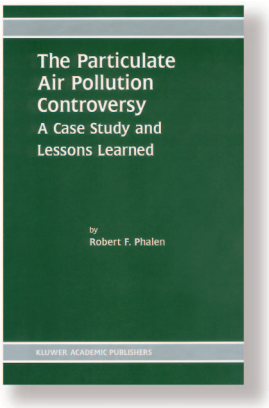
The Particulate Air Pollution Controversy: A Case Study and Lessons Learned

Robert F. Phalen
Boston, MA:Kluwer Academic Publishers, 2002. 144 pp.
ISBN: 1-4020-7225-2, $70.00 cloth.



One of the more controversial issues in the field of air pollution concerns public health implications from inhaled ambient particulate matter (PM). This book, organized into 10 chapters, aims to present the various scientific controversies and to examine the field as an overall case study for interfacing science and public policy. Each chapter is independent of the others, and each concludes with a section termed "Lessons Learned," providing a concise summary and overview of the significance of the material presented.

The first half, Chapters 1 through 5, provides a very good overview of concepts and issues involved in PM air pollution: discussions of measuring PM in air; an overview of the epidemiologic evidence, past and current, associating PM with adverse effects on human health and controversies in interpreting these studies; and a discussion of how particles are inhaled into the respiratory tract, how they deposit in the airways, and how they are cleared from the respiratory tract. Phalen's discussion of the evolution of federal PM air pollution regulations in the United States concentrates on regulations issued since 1997 and would have benefited from a broader discussion of how PM regulation has changed from total suspended particulates to PM_{10} to $PM_{2.5}$ (< 10 to < 2.5 μm) over the years. Finally, the chapter that describes physicochemical properties of particulate matter would have been more useful had it appeared earlier in the book.

The second half of the book, however, digresses from the objectivity of the first half. The discussion of the role that controlled toxicologic studies play in providing a mechanistic basis for the health effects reported by epidemiologic studies is extremely superficial, to the extent that it could be misleading. For example, certain mechanisms of injury are related to what are said to be specific "susceptible" population groups. However, epidemiologic studies are showing that PM can have adverse effects on "normal" individuals as well, depending upon exposure scenarios. In addition, Phalen suggests that particulate inhalation is actually needed to maintain optimal respiratory tract defenses, that there are actually potential health benefits from PM exposure, and that ignoring these will lead to a "distorted picture of the implications to public health." He cites the trend in infectious disease that suggests that avoidance of contact with environmental microbes can reduce immunities. Phalen implies that this phenomenon may also relate to nonbiogenic air pollutants, such as certain PM. Given that this book is written for the nonspecialist, presenting such controversial information is inappropriate and potentially misleading. The author also uses the concept of radiation hormesis as support for his argument, and cites other studies using various chemicals, such as metals. Whether these studies involved inhalation is not clear, and the route of exposure is certainly a factor in response, be it adverse or beneficial. Given that some of the citations supporting the concept of hormesis are themselves controversial, the inclusion of this discussion can lead to potential confusion for the reader.

Another concern involves the discussion of the potential economic and environmental aspects related to control of particulate emissions. Phalen notes that "the assumption that modern industry is harming public health and must therefore be forced to comply with ever more stringent regulation is subject to challenge. Modern industrial goods and services are, in fact, major factors in protecting public health and providing prosperity." Although it is clear that viable industry is critical for our lifestyle, there is still plenty of room for improvement in controlling emissions without driving industry out of business with loss of goods or services, as implied in the book. Thus, this chapter can mislead the reader to conclude that further regulation would serve merely to destroy industry without any positive impact upon public health.

Thus, in summary, the first half of the book provides an excellent overview of the PM issue for researchers or for anyone interested in this important area of air pollution health effects. It makes a strong case for interaction among scientific disciplines and among administrators, scientists, and regulators in developing air pollution standards—communication that is critical if the issues are to be resolved. However, the discussion in the second half can cause more confusion to the general reader than is warranted in a field already ripe with controversy, by presenting views as fact that are, at best, questionable. Thus, the book reverts to what is essentially a long "editorial" on the PM issue.

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