

**MANDATED SCIENCE:  
SCIENCE AND SCIENTISTS IN THE MAKING OF STANDARDS**

ENVIRONMENTAL ETHICS AND SCIENCE POLICY

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MANDATED SCIENCE:  
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IN THE MAKING OF  
STANDARDS

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## Preface

For a long time I would not eat strawberries. In 1977, a scandal broke about a testing laboratory having falsified the data that was used to register a large number of pesticides. The Canadian government, along with several others, began the process of re-evaluating both the procedures for testing and these specific chemicals. One chemical proved particularly controversial, the commonly-used pesticide named captan. In light of the controversy, which was manifest in a conflict between two government departments, in 1981, the Canadian government chose to appoint a special panel of experts to advise them. I was a member of this expert committee.

The experience on the captan committee did little to reassure me, either about captan or about the way that decisions had been made about many pesticides in widespread use. Although it could not be demonstrated that captan was dangerous to people in the amounts to which they would likely be exposed, the animal studies provided the basis for concern. Prudence required at the very least that consumers take the precaution of washing their fruit, for captan is widely used on apples, cherries and berry fruits. Captan residues wash off apples relatively easily; they are less easily removed from berry fruits, such as strawberries.

I had images of my children when they were young, munching their way through the strawberry fields. I now knew about the difficulty of controlling when the pick-your-own farms let people into their fields after spraying. In a classic after-the-fact fashion, I reasoned that a little caution, even too late, might fend off any dreadful consequences. I now eat strawberries – thoroughly washed, of course – but the study of mandated science has been as troubling as my hindsight about my children eating from the pick-your-own strawberry fields.

I suspect I am typical of many consumers. I had assumed that farmers could make decisions about whether to use pesticides, and that most foods I ate were free of residues. When we began this study, I had little awareness of either the number of pesticides in use or the number of times any specific fruit or vegetable might be sprayed. I was shocked to find out that an apple might be sprayed more than twenty times, and with more than one pesticide, before I bought it.

I do not assume that all pesticide residues are dangerous, and I am willing to accept some risk for the pleasure of easily available and unblemished fruit. What

is troubling is the realization of how completely the use of pesticides is integrated into the production of food, and how little choice commercial farmers actually have. It is useful for me to think of chemical use in food production in the same way as mechanization in manufacturing. Indeed, it is reasonable to consider pesticides simply as chemical mechanization, and as inevitable as factory mechanization in industrial and industrializing societies.

Personally, I wish it were not so. I wish it were possible to control the use of chemicals in food production quite strictly, and to avoid them in many situations. I now believe that such control demands a radical transformation of the process by which food is produced, and of the social and economic relations in food and food-related industries. It demands fundamental changes in land tenure and use, for many times the agricultural land would be required if chemical mechanization were to be abandoned in favour of other farming methods. I am sympathetic to the demand that these changes take place, but I think it is naive to underestimate the magnitude of the revolution involved in turning away from large-scale chemical mechanization.

In the course of our study on mandated science, I also became aware of the degree to which chemicals are used in industrial production, and the magnitude of any decision to exert strict controls, even with respect to hazardous waste. It is hard for me as a citizen to comprehend that there are groups with a significant vested interest in the production of hazardous waste, and similarly with an interest in preventing its control. Given the enormous costs of even assessing the potential dangers of industrial chemicals, I am genuinely surprised that so few serious accidents have occurred, although it is a mistake to underestimate the less easily demonstrable damage that chemical exposure has caused.

Sobering thoughts. For some people, the answer is to advocate a less chemically-dependent world, regardless of the radical nature of their demand; for others, it is to call attention to the crises and accidents that do occur as a means of awakening citizens to the nature of the situation. For me, it is has been to turn my attention to the way that decisions are made – or not made – about chemical and pesticide control. Reference is often made to “standards”. Chemical exposure is said to be under control if chemical pollution or exposure meets an accepted standard. I want to know where these standards come from and whether there is any solid basis for trusting in them. This is my motivation in writing this book, although strictly speaking, it is not its origin.

What I have found is not particularly reassuring. More important, I have found that the origin of standards is not widely known or researched, and that even my learned colleagues who write extensively (often with similar motivations) about the enforcement of standards have little knowledge about their origins. Before one can take any platform to debate the wisdom of standards, it is necessary to identify how they come into being. Thus, this book is not a polemic, and no statements have been made within it about the dangers of chemical mechanization, about the adequacy of any particular standard or about the

toxicity of any chemical. It has another purpose, which is simply to lay bare the kinds of decisions and decision making processes that result in standards or their revision. I believe this task must be done first.

The book itself has a different origin. It is a product – one of several – of an extended collaborative study of science and public policy. Ed Levy, one of the researchers has written extensively on science and social and political institutions. Bill Leiss has written on technology and human needs. I have done a major study on public inquiries, focussing primarily on the role that scientists and members of the public played in these inquiries, and considerable work on regulation. We came together to study standards as an example of how science, values and public policy were combined in the origination of standards.

The term “mandated science” was coined by Andrew Thompson, the Director of the Westwater Institute at the University of British Columbia. Like us, he was concerned with the way in which the policy “mandate” affects the kind of scientific assessment that is done, primarily but not exclusively in environmental regulation. We originally planned a joint project with him, but have gone in different directions with our research. Nonetheless, this study owes a debt to his original concept, which we have extended and developed as an integral part of our research.

Our research involved six case studies. Ed Levy took primary responsibility for the research on pentachlorophenol and fluoride. Ed and I jointly researched ACGIH. Bill Leiss and I worked together on the Toronto lead controversy. I took primary responsibility for the captan and for Codex, and was project and research director throughout the three years of the research. We drew upon the assistance of many people, but one deserves particular attention. Rory Daniel was the research assistant for four of the studies, and her careful scholarship made a substantial contribution to the final product. Other researchers include: Linda Drury, Barbara Nelson Hughes, Richard Pinet, Johanne Gregory, Janice Peck, Ron Trepanier, Richard Palidwor and Debra Pentacost, Peter Campbell, Lance Cooke, Rick Gordon, Jeff Hirschfield, Duncan MacIntyre, Diane Pennington and Simon Thacker. We are indebted to them for their dedication, interest and excellent work. We would also like to acknowledge the support of the Social Science and Humanities Research Council of Canada during the three year period of the research.

As I have mentioned, this is one, but not the only product of our study of mandated science. Bill Leiss has now conducted several evaluations for the Federal Government of decision making procedures relating to environmental and pesticide issues. He has written several articles on risk communication, and is actively involved in developing protocols for risk assessment in Canada. Ed Levy has elaborated the study of the scientific controversy over pentachlorophenol, examining the experience of scientists in that controversy and issues related to the studies they conducted. In addition, he has drawn upon this study to further his continuing work on scientific and value judgements. I have

published the study of captan in another context, and written on the peer review process used in standard setting in Canada. Together with other collaborators, we have embarked on a new study, this one entitled “The Discourse on Risk”. The new study examines how the concept of “risk” has emerged as significant in a variety of different disciplines, and its impact within the public policy debate.

Finally I should mention a number of friends and colleagues whose support has been important to us. We held two workshops during the study of mandated science, and drew upon the lively exchange among ourselves and Trevor Pinch, Brian Wynne, Andrew Dorsey, Andrew Thompson, Sheila Jasanoff, Claire Franklin, Frank Cedar, Judith Miller, Kim Roberts, Steve Straker, Gus Brannigan and Bob Anderson. Without the support and guidance of Julia, Benjamin, Jennifer, Marilyn, Rick, April, Colin, Ammon, Steve, Clayton, Harriet, Emma and Kate neither our research nor its several products would have been possible. Let no one underestimate their contribution. To all these people, and to the more than two hundred people we interviewed, we extend our thanks.

*Liora Salter,*  
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