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Risk in Perspective

The Greening of Industry

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John D. Graham, Ph.D.

Jennifer Kassalow Hartwell, M.S.

The track record of the risk-management approach, as applied by EPA and the states to these six industries, offers reason for optimism that interests in risk analysis and environmental protection are compatible.

Among organized environmental advocacy groups, there is fear that a regulatory system based on risk assessment and risk management will not produce strong and creative programs of environmental protection. This fear has been revealed in the intense opposition that many organized environmentalists have expressed about regulatory reform legislation aimed at making more systematic use of scientific and economic analysis in major rulemakings.

Are risk-analytic tools antithetical to pro-environment objectives, or are organized environmental groups engaged in the natural tendency to resist overdue reforms that may curtail their own priority-setting powers? Are risk-analytic requirements simply another means for industrial groups to snarl or capture the regulatory process, or will analytical requirements shift agency resources away from the "risk of the month" toward prevention of serious environmental health risks? In this issue of **RISK IN PERSPECTIVE**, we summarize an effort to answer these questions that was marshalled by a team of faculty, staff, and students at the Harvard Center for Risk Analysis.

The results of the effort are published in the 1997 book *The Greening Of Industry: A Risk Management Approach* (eds., JD Graham, JK Hartwell), now being distributed by Harvard University Press. The book examines six industrial risks that were targeted by EPA risk assessors in the 1980s under the leadership of Administrator William Ruckelshaus, an advocate of the risk management approach. Those industrial risks are leaded gasoline, chlorofluorocarbons, dry cleaning, coke production, municipal waste incineration, and chlorine-based pulp and paper production. An in-depth chapter of the book is devoted to each of the six industries, taking into account information on risk, cost, technology, and the prevailing statutory framework governing EPA authority.

Here we offer a brief summary of the six case studies and some lessons that emerge from them.

The Demise of Lead in Gasoline

George Gray, Laury Saligman, and John Graham examine the history of lead's use in gasoline and focus on EPA's decision to accelerate the phase out of lead during the Reagan Administration. In a fascinating case of analysis overwhelming politics, they show how EPA benefit-cost analyses played an important role in blocking industrial efforts to repeal EPA's planned phaseout of lead in gasoline. With support from both the leadership of EPA and the Office of Management and Budget, a decision was ultimately made to accelerate the phaseout of lead in gasoline instead of repeal the lead phasedown. Interviews with key officials at the agency indicated that this unexpected decision by the Reagan Administration was explained more by the robustness of EPA analysis than by any petitions or lawsuits threatened by environmental advocacy groups.

Protecting the Ozone Layer

James Hammitt and Kimberly Thompson trace the complicated series of events that caused the phaseout of chlorofluorocarbons by the EPA and by the international community in an effort to protect the stratospheric ozone layer. In this case, a qualitative demonstration that chlorofluorocarbon emissions were linked to ozone depletion was sufficient to induce a ban on aerosol uses of chlorofluorocarbons. Bans on the more valuable uses of chlorofluorocarbons came more slowly, but as the scientific case for the ozone-depletion theory continued to build and the potential ramifications of ozone depletion were fully considered, even the more valuable uses were restricted at international conventions. This is a case where, although the quantitative risk assessments and cost-benefit analyses were broadly supportive of strong action, the driving factors seemed to be a qualitative judgment that precautionary action to protect the atmosphere was prudent coupled with industrial success in developing economical alternatives to most uses of chlorofluorocarbons.

Cleaning Up Dry Cleaners

Kimberly Thompson traces the history of the dry cleaning industry with particular emphasis on recent concerns about emissions of perchloroethylene (perc) into the environment. She finds that the industry has reduced substantially its consumption of perc since 1970 due to cost saving opportunities, qualitative concerns that human exposures to perc may be associated with human cancer, and regulatory requirements to reduce perc emissions in ozone non-attainment areas. Whether EPA should label perc a "probable human carcinogen" proved to be a central source of controversy for more than a decade and, although consensus was not reached, the possibility of cancer risk triggered pollution control and prevention activities. Interestingly, EPA used the threat of quantitative risk assessment as a tool to entice the industry into its "voluntary" Design for the Environment program.

Fewer Fumes from Coke Plants

Jennifer Kassalow Hartwell and John Graham show how organized environmentalists used the results of EPA's quantitative risk assessment process as a tool in a legislative campaign to subject industry to tougher technology-based controls on air pollution. Coke is a vital ingredient in the integrated steel making process yet coke plants are notoriously dirty operations that are significant sources of toxic air pollution. EPA published

quantitative cancer risk estimates for each of the 36 operating coke plants in the country. Although these estimates of risk were by no means precise, they helped persuade elected officials and regulators to subject this highly regulated industry to yet another round of technology-based controls on air emissions. There is interest in the development and commercial application of new and cleaner methods of making coke and steel, but these methods will take decades to have a major impact. Although major environmental progress has been made, further regulation of the coke production industry based on risk is likely.

Coping with Municipal Waste

Alison Cullen and Alan Eschenroeder examine the role of risk-analytic tools at the state level in decisions about whether to permit proposed municipal incinerators and at the federal level during implementation of the Clean Air Act Amendments. Public reaction to the findings of facility-level risk assessments was often characterized by fear and qualitative concerns, particularly as it became apparent that dioxins are emitted by incinerators. Some states, such as California, were uniformly unsuccessful in facility siting despite a requirement for site-specific risk assessment aimed at addressing concerns about risk. Connecticut, however, was more successful in siting, perhaps because it had established a uniform risk-based standard for permissible concentrations of dioxin in the air that each proposed facility was compelled to meet. At the federal level, most of the regulation of municipal waste incinerators has followed a typical technology-based track, without a strong role for quantitative risk assessment and cost-benefit analysis. Yet EPA did prepare national estimates of risk and cost-effectiveness in support of its rulemaking under the Clean Air Act. The authors point out that incinerators have not been evaluated in a coherent waste planning process that includes an assessment of alternatives to incineration. They conclude that a more logical process that forces landfills and incinerators to be compared on the basis of risk might lead to more informed decisions at the community and national level.

Producing Paper without Dioxin Pollution

Kimberly Thompson and John Graham examine the history of the chlorine-based pulp and paper industry, with an emphasis on the events following the discovery of dioxin and furan in the wastewater and sludge at paper mills and in a variety of consumer products. They find that quantitative risk assessment played a powerful role in drawing attention to the relative magnitude of the dioxin problem at 104 pulp and paper mills around the country. Federal agencies set limits on dioxin concentrations in consumer products and food products while state agencies moved to set ambient water quality standards for dioxin under a risk-based regime established by the Clean Water Act. Although the pulp and paper industry fought tenaciously EPA's risk assessment process on dioxin, the industry also invested in process changes, including chlorine dioxide substitution, that dramatically reduced the dioxin problem at most mills. The process of making paper has not changed as much as the advocates of "chlorine-free" industry sought, but it is apparent that risk assessment processes at the federal and state levels were used effectively by organized environmentalists and regulators to encourage the industry to make substantial investments in pollution prevention.

FURTHER READING

Tal, A. (1997) Assessing the Environmental Movement's Attitudes Toward Risk Assessment. *Environment, Science and Technology* 31(10).

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PEER REVIEWERS:
James Hammitt, Ph.D.
Kimberly Thompson, Sc.D.
George Gray, Ph.D.

Harvard Center for Risk Analysis
Harvard School of Public Health
718 Huntington Avenue
Boston, Massachusetts
02115-5924

617 432-4497
www.hsph.harvard.edu/organizations/hcra/hcra.html

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Conclusion

The track record of the risk-management approach, as applied by EPA and the states to these six industries, offers reason for optimism that interests in risk analysis and environmental protection are compatible. These six industries may not be representative of the entire economy and it is easy for a reader to see how the regulation of these six industries could have been made more timely, effective, and economical. It is also critical to recognize that federal and state agencies will require adequate technical resources to implement the risk-management framework. If taxpayers and elected officials are not willing to provide agencies such resources, it may be appropriate to shift the technical burden of proof to regulated industries with peer-review procedures that assure competence and credibility. Organized environmentalists are urged to consider their own investments in scientific and economic expertise, since it is apparent that the tools of formal analysis can and will make a big difference for environmental protection in the coming decades.

Recent Reviews of *The Greening of Industry: A Risk Management Approach.*

"Many view the scientific assessment of risk as potentially slowing down environmental protection. This book shows how risk assessment and environmental protection are complementary to one another. It deals in fact not fear."

***—William D. Ruckelshaus, former EPA Administrator and reviewer of* The Greening Of Industry: A Risk Management Approach.**

"This book contains a valuable treatment of the promising risk management approach to environmental policymaking."

—Jay S. Coggins, University of Minnesota

"Greening *is a timely retrospective work analyzing the successes, failures, and motivations of the practice of comparative risk assessment in regulatory, industrial, and public frameworks."*

—B. Nero, Northern Arizona University

"The importance of this book is that it gives empirical evidence for the view that risk assessment improves the environment. These are fascinating essays, elegantly composed."

—David Pearce,* The Times Higher *October 21, 1997.

The Greening of Industry: A Risk Management Approach is available from Harvard University Press 1-800-448-2242 for $45.00.