Risk Management REVIEW

Wharton

RISK MANAGEMENT AND DECISION PROCESSES CENTER

SPRING 1997

ENIAC and Natural Disasters

The University used 1996 to examine current challenges in the world as a result of the development of the first computer at the University of Pennsylvania half a century ago. As part of a series of activities spearheaded by the SCI Center to celebrate the 50th Anniversary of the Electrical Numerical Integrator and Calculator (ENIAC), the Wharton Risk Management and Decision Processes Center, the Annenberg Public Policy Center, and Risk Management Solutions, Inc., sponsored a research conference to examine the impact of information technology on natural hazards. The conference brought practitioners from industry and government together with natural and social scientists for the purpose of understanding the role of information technology in the assessment, communication, and management of risk. It also provided an opportunity for dialog between public and private stakeholders concerned with catastrophic risks in order to develop new strategies for reducing losses from future natural disasters and provide more effective relief and recovery to the victims.

Harvey G. Ryland, President & CEO, Insurance Institute for Property Loss Reduction, addressing the ENIAC Conference.

Thomas Gerrity, Dean of the Wharton School, captured the scope of the conference by addressing the intersection of three major developments in our society: advances in computing power

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http://opim.wharton.upenn.edu/risk/

Inside This Issue

The Wharton School
University of Pennsylvania

Managing Catastrophic Risks

Howard Kunreuther

The costs of natural disasters have risen dramatically. The increase in the magnitude of actual and insured losses from natural disasters in the past ten years has exceeded the predictions of scientific experts and industry. Ten years ago, when an insurance industry study estimated a natural disaster could yield losses over $7 billion, this estimate was received skeptically because at that time no disaster had cost more than $1 billion.

Today expectations about losses have changed substantially. Hurricane Andrew in 1992 yielded insured losses in Florida of over $15 billion. The Northridge earthquake of 1994 caused over $12 billion in insured damage in California. Revised projections of losses to the insurance industry from future disasters are estimated to range from $50-$100 billion or more from an individual event The causes of these increased losses and risk are complex but they stem from a combination of forces, including development of hazard-prone areas, lack of enforcement of building codes, standards and land-use regulations, and better estimation of exposures.

The Wharton Risk Management and Decision Processes Center and Wharton Financial Institutions Center are initiating a three-year research project on Managing Catastrophic Risk and held their first meeting with project sponsors in January 1997. The research will address four broad sets of questions.

One set deals with how catastrophe risk should be measured. What are appropriate methods for estimating an individual's or company's exposure to natural disaster risk, *i.e.*, disaster frequency and severity? How can computer simulation models be used to enhance our understanding of this exposure? How can competing models be evaluated by companies and state insurance regulators?

A second set of issues involves the best ways to encourage pre-disaster mitigation to reduce risk and losses. What mechanisms are available for providing incentives for homeowners and organizations to mitigate against disaster losses in advance of a disaster?

What are the cost-benefit trade-offs (*i.e.*, cost-effectiveness) of pre-disaster mitigation options? Are insurance discounts for mitigation viable? Are state or federal hazard insurance requirements for mortgages a viable option?

A third set of questions surrounds the role of insurance and capital markets. How can insurance and reinsurance companies enhance their diversification of disaster risk over time? How can companies restructure their insurance portfolio to reduce disaster risk while continuing to write coverage? What options are available for improving catastrophe reserving? What are the benefits and costs of insurance risk swaps, surplus notes, and other forms of financial tools for diversifying disaster risk? Can capital markets assist in financing disaster risk? How does one design and price new catastrophic risk securities? Can one develop better catastrophic risk indices? Can one design well-accepted standards for measuring the performance of catastrophic securities?

Finally, an important element in this debate is public policy issues. How can federal and state governments improve society's ability to reduce and finance disaster losses? New state programs have been developed in Florida (Florida Catastrophe Fund), California (California Earthquake Authority) and Hawaii to increase insurer capacity in these high risk markets? How well are these new arrangements likely to perform? Is there a role for a federal reinsurance program? What role can building costs and land use regulations play in reducing losses from future disasters? How can regulators help catastrophe insurance markets function effectively while maintaining necessary consumer protections?

These questions will form the basis for research that will bring together expertise from insurance, finance and public policy. In future issues of the newsletter we will share the results of these efforts with you. We would welcome your ideas on ways that the two Centers can link our research with other efforts currently under way.

—Howard Kunreuther

Co-Director

Marketing Environmental Excellence

Paul R. Kleindorfer

The Marketing Science Institute (MSI), a Cambridge-based non-profit organization dedicated to promoting sound marketing practices, has just released its research priorities for the coming two years. The results are not surprising. In this era of globalization, electronic commerce and market-driven strategy, MSI has called for continuing research on a number of issues to focus scarce organizational energies and attention on attracting and retaining customers, managing key accounts and segments strategically and embracing information technology and new media. Also included on the research agenda are traditional issues of brand equity and value creation for all stakeholders. What are the implications of this research agenda for managers and scientists concerned with assuring the value of an organization's capabilities and performance in the safety, health, and environmental (SHE) and risk management areas?

In my view, it is critical that companies not just create excellence in these important drivers of profitability and continuing support of the organization's social franchise to operate. They must also *market* their excellence to their stakeholders. Marketing here means understanding the needs of each stakeholder (from customers and investors to local communities), creating capabilities and performance that meet these needs, communicating the organization's intent and progress in deploying these capabilities, and measuring and cashing-in on the performance generated. Too often, SHE and risk management professionals lose sight of the ultimate "why" of their activities. Marketing and marketing science provide one important avenue for answering this question by linking organizational objectives and activities to proactive programs of understanding and communicating value-based results of capabilities and outcomes to affected stakeholders. Moreover, if this is done at the product and facility level, a very different fabric for understanding and reporting performance in stakeholder-relevant terms becomes evident.

Consider the recent interest in ISO 14000 standards for environmental management systems (EMS). Various publications of the Center have explored the question of whether it is worth the effort for a company to become registered under ISO 14000. This will require, after all, a significant amount of effort to accomplish. Moreover, once implemented, there will be on-going, potentially costly interactions with customers, suppliers, regulators, insurers, communities, investors and employees about the structure and results of the organization's ISO 14000 system, including whether or not this system reflects a high-quality organization which can be trusted to be environmentally responsible. In line with the above comments on marketing, one way to think through the costs and benefits of ISO 14000 is to adopt a "marketing mindset." This would lead to determining stakeholder needs *before* designing the objectives, structure and metrics of the intended EMS, with the implementation of ISO 14000 then focused not just on performance itself, as desirable an end as that is, but on marketing the organization's environmental excellence to its stakeholders. Such an approach will not only clarify the value of ISO 14000 to the company; it will do so in a manner which will allow it to see this value against the perspectives of each of its stakeholders.

—Paul R. Kleindorfer

Co-Director

Some Challenges in Environmental Management — A Perspective from a Government Administrator

Stanley L. Laskowski

Stanley L. Laskowski

It has been my great pleasure to be associated with the Risk Management and Decision Processes Center for the past several years. The ability of the Center to involve a broad range of business, academic, government, and public interest group perspectives and experiences in addressing problems is exactly what is needed to address future environmental challenges. When I was asked to provide a few thoughts for this column, I felt that it would be a good opportunity to offer a perspective on what some of these challenges may be and how these challenges may, in my opinion, benefit from the Center's unique capabilities.

Forecasting Future Environmental Problems

Ozone depletion, species extinction, and climate change arguably are all global environmental problems that may have been avoided, or at least considerably lessened, by sophisticated environmental forecasting. Limited capabilities in predicting future environmental impacts also have considerable impact at the corporate level. For example, business would have benefited greatly were someone able to predict that "acceptable industry practices" of the 1950s might have resulted in current Superfund liabilities.

It seems as if a major new environmental concern is "discovered" every few years. There is currently every reason to believe that new problems will continue to be discovered resulting in costly remediations and that could have been prevented if their impacts could have been forecasted in advance. As one current example, consider the issues raised in the recent controversial book, *Our Stolen Future*, concerning the alleged impacts of chemicals on human hormones, fertility systems, etc. The field of environmental forecasting is beginning to grow more rapidly and the Center's risk probability, insurance, business and scientific background may uniquely position it to carve a niche in this area. Emphasis could be in a variety of areas including developing models to predict future environmental problems and/or predicting the impact of potential environmental problems on business.

Finding the Right Approach to Address Environmental Problems

During the past decade, the command-control approach to addressing environmental problems has been supplemented by a broad array of environmental management tools. Financial incentives, public disclosure of information, emissions trading, insurance, and voluntary approaches have all been used to address problems ranging from radon to climate change. The effectiveness of other approaches, such as ISO 14000, are now being debated. Yet, for any given problem, what is the best approach? Could models be developed that, depending on stated objectives *(e.g.*, cost effectiveness for government, minimal impact on business, or maximum public involvement), would suggest the appropriate approach? With scarce governmental resources to implement programs, international competitiveness issues, and the trend toward involving more stakeholders, it will become increasingly important to find the best approach or combination of approaches to a given problem. Again, the Center, with its many diverse partners and record of success in addressing related issues may be in an excellent position to establish itself as the organization for government and business to consult in grappling with these issues. ■

Stanley L. Laskowski is Deputy Regional Administrator for the U.S. EPA Region III, and responsible for implementing all federal environmental programs in the Mid-Atlantic states. He also directs Region III's assistance to more than a dozen countries on five continents and is the EPA's lead senior official in advising Poland on improving its environmental programs. In addition to his role in Region III, he serves on a number of national task forces and is Chairman of EPA's Environmental Education Advisory Board. For his distinguished service Mr. Laskowski has received the highest award given to federal managers, the Presidential Executive Award. He has been a member of the Risk Center's Advisory Committee since 1991.

Major Chemical Accidents

Irv Rosenthal

Consistent with its interest in catastrophic risk, whether such risks are the consequence of technology or the result of natural disasters, the Risk Management and Decision Processes Center continues to investigate risks associated with major chemical accidents. This research interest is one shared with EPA's Chemical Emergency Preparedness and Prevention Office (CEPPO) and is proceeding along five avenues of investigation.

Research Using EPA's Accident Database

Practitioners of major chemical accident risk have developed powerful methodologies for determining root causes of accidents. These methodologies include techniques for gathering, classifying and communicating accident information. Use of the findings from root cause accident investigation results in the design of safer new facilities and the prevention of accidents in existing ones. Investigation by the Risk Center, however, has shown that root cause accident investigations are not widely used in industry, or if used, the findings are not made easily available. Most published accident investigations end with the discovery of an unsafe act and/or an unsafe piece of equipment, rather than information on a deeper system's failure which might be the underlying cause of a specific accident. This lack of application of root cause analysis appears to be the result of the conflict between the use of root cause information to increase learning and the use of the same information to assess penalties under regulations or common law.

Stanley L. Laskowski, Deputy Regional Administrator, EPA Region III; Paul R. Kleindorfer, Co-director, The Wharton Risk Center; and George E. Meyer, Secretary, Wisconsin Department of Natural Resources, at the ISO 14000 Roundtable.

Given this dichotomy between theory and practice in accident investigations, the Risk Center undertook a series of roundtable meetings to address three broad questions:

- How should accident investigations be structured to promote learning that will prevent accidents and increase the social acceptability of factual findings?
- What are the factors that influence a firm regarding the depth of an investigation and its willingness to share accident investigation findings?
- What are the socially acceptable incentives capable of altering these factors that will lead to an improved depth of understanding and a sharing of accident investigation findings?

The Risk Center has been holding a series of roundtable meetings to explore these questions. The first two roundtable meetings, June 11 and December 5, 1996, brought together diverse stakeholders from industry, labor unions, EPA, OSHA, public interest groups, trade associations, insurance companies, and the National Safety Council.

What has become clear is that prevention of accidents is, by far, the highest priority goal of all parties. There are, however, other legitimate considerations and goals which different stakeholders must take into account. Government agencies, insurance companies, and the managers of firms experiencing accidents have different legal and fiduciary responsibilities that may interfere with the timely realization of prevention goals. Even partial resolution of these issues is expected to be challenging.

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J. Michael McCloskey, President, Sierra Club, at the ISO 14000 Roundtable.

The Center will continue this series of roundtable meetings and the next one, to be scheduled in June, will examine an accident investigation protocol that appears reasonable to a consensus of stakeholders, the new Memorandum of Understanding between EPA and OSHA, and measures that might provide incentives to increase the learning from and the sharing of findings from accident investigations.

Investigating Third Parties for Reducing Chemical Accidents — ISO 14000

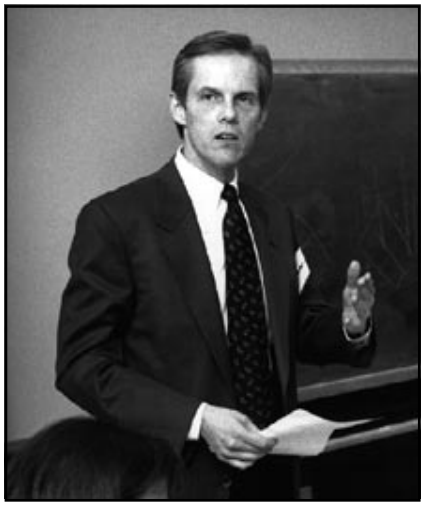
One of the challenges associated with environmental regulations is achieving cost effective implementation. To investigate market-based approaches to this problem, the Risk Center has for some time been investigating the usefulness of independent third parties. One possibility that recently has become the focus of attention is the use of ISO 14000. This is a standard from the International Standards Organization directed at the installation and operation of environmental management systems (EMS). Accreditation of a facility under this standard is obtained after its EMS is reviewed by a certified ISO 14000 auditor. Annual audits of the facility's implementation of the EMS and the specific objectives and goals of the facility are required.

The Risk Center, with the support of CEPPO, is examining the use of ISO 14000 as an environmental management tool and is joined in this effort by the Pennsylvania Department of Environmental Resources, the Wisconsin Department of Natural Resources, the La Follette Institute of the University of Wisconsin, and EPA's Region 3 and Region 5. The intent of the investigation is to find cases that will help evaluate the utility of ISO 14000 as an environmental management tool to supplement or replace conventional regulatory tools.

The Risk Center is interested in developing an ISO 14000 option for implementing EPA's Chemical Accident Prevention rule. Wisconsin, Pennsylvania and the Risk Center have committed to evaluating specific proposals that utilize ISO 14000. Two orienting roundtable meetings have been held, April 26, in Philadelphia, and October 15, in Madison, involving stakeholders from state and federal government, environmental organizations, industry, public interest groups, trade associations, environmental organizations and academe. The next roundtable meeting in this series, to be held in Philadelphia on April 1, 1997, will review specific cases.

Understanding Regulations Related to Major Chemical Accidents

Technical people and regulators around the world use widely different terminology to describe and communicate their risk assessment findings. Differences in language, industrial practice and scientific discipline make comparison of these legislative efforts very challenging. These differences make it difficult to understand both technical publications and laws and regulations enacted to control major chemical releases. The Risk Center is collaborating with EPA and the Organization for Economic Cooperation and Development (OECD) in the preparation of a dictionary/thesaurus that will capture the intended meaning of the risk assessment 'owner's' terminology. Initial efforts are focused on risk assessment operations contained in national environmental laws and regulations



W. Michael McCabe, Regional Administrator, EPA Region III, at the ISO 14000 Roundtable.

in OECD countries. The Risk Center has completed the initial design and programming phases of this project and has placed the dictionary/thesaurus on a Wharton web site. Official collaborators in four countries are testing the clarity and usefulness of the prototype by attempting to encode information required by their respective national regulations and the Seveso Directive.

Evaluating Information-based Regulations in Risk Reduction Strategy

On June 20, 1996, the EPA issued final regulations under section 112(r) of the Clean Air Act Amendments aimed at preventing major accidental chemical releases. The Risk Center, under terms of a cooperative agreement with the EPA, has explored several aspects of market-based and information-based environmental regulations. Findings from this investigation are expected to be published in the literature this Spring.

Investigating Chemical Accident Data Bases

The EPA's rule on Risk Management Programs for Chemical Accidental Risk Prevention requires managers of facilities that have specified amounts of hazardous chemicals to prepare a Risk Management Plan (RMP). One of the information elements in this plan is a five-year record of accidental releases. To understand how such data can best be stored and used the Risk Center has begun a series of roundtable meetings to exchange thinking on the following questions:

- *What is the present use of current accidental release data bases?*
- *What kind of information would stakeholders like to obtain from the accident history data to be collected under the regulation?*
- *How might accident history data be stored in a data base that would allow stakeholders to obtain the information they want?*

Twenty diverse stakeholders having interest in accessing dataon accidental chemical releases met in the first roundtable meeting inthis series on September 12, 1996. Representatives from EPA, OSHA, labor unions, the Chemical Manufacturers Association, the National Safety Council, the National Institute for Chemical Studies, public interest groups, the state of Delaware, and manufacturing and insurance firms participated.

Accident data bases now exist across a number of agencies, including the DOT, EPA and OSHA and contain similar information on incidents and accidents. The contents across data bases is not consistent, however, because each agency defines reportables and incidents differently. A major problem with all of the present accident data bases is that they do not contain the information needed to determine an incidence rate, *i.e.*, the number of chemical accident releases in a specified period of time for a specified unit of population. Because of this limitation, the effectiveness of measures aimed at reducing low probability events could not be evaluated with assurance.

Participants offered many thoughts on the best use of information from accidental releases and indicated additional information necessary to prevent future accidents. Although they were broadly supportive of efforts to flesh out the requirements for an Accident History Database and its use for epidemiological and other statistical studies, they did not agree on its content. Participants expressed concern for the legal and liability consequences of reporting near misses and minor incidents and wanted to determine how these concerns could be alleviated so that learning from one's own experiences, as well as others, could take place. Additionally, they suggested that issues related to access, confidentiality and linking to other databases could be important implementation issues. A second roundtable meeting has been scheduled for April 24, 1997. ■

(For additional information on any of these five research initiatives please contact Dr. Rosenthal: telephone, 215-898-9660; fax, 215-573-2130; e-mail, rosenthal@wharton.upenn.edu)

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that generational descendants of ENIAC continue to provide; catastrophic risks associated with natural disasters; public policy questions concerning the economic costs of managing and mitigating the consequences of natural disasters. He suggested the first step in managing catastrophic risks must involve bringing together multi-disciplinary, multi-sector representatives, such as those present in the ENIAC conference, to examine practical new approaches to the whole business of managing low probability, high consequence events.

Anticipating what the world would be like in the year 2020, Harvey Ryland, Former Deputy Director, Federal Emergency Management Agency, and President and CEO of Insurance Institute for Property Loss Reduction, predicted the conditions against which natural disasters would occur. He said the United States would have a population of more than 300 million, 25% of whom would be over the age of 65; average life span would be 120 years; 85% of the population would live in urban areas and most would live within 100 miles of a coast; the economy would be information-based and technology-dependent; and much of our education and training would be received through the Internet.

The conference began by examining earthquakes and the role of information technology in predicting their location and severity. Bruce Bolt, University of California, Berkeley, used past incidents to anticipate future events. He examined population density, structure types, highways, power systems, current technology and forensic engineering as factors that will determine the degree to which future consequences are realized or mitigated. Continuing the discussion, Richard Roth, Jr., California Insurance Department, outlined the actuarial problems involved in making an earthquake risk an insurable risk.

Dennis Kuzak, Senior Consultant, EQE International, Inc.; Karen M. Clark, President, Applied Insurance Research; G. Thompson Hutton, President, Risk Management Solutions Inc., at the ENIAC Conference.

When the conference turned its attention to hurricanes, Robert Sheets, formerly of the National Hurricane Center, initiated the discussion by recounting the influence of architecture on the development of hurricane effects and the value of prescriptive codes in mitigating consequences. Eugene Lecomte, Insurance Institute for Property Loss Reduction, next outlined the present national disarray of building codes and their relationship to hurricane damage. The role of information technology was prominent in both discussions.

Tom Hutton, Risk Management Solutions, Inc., traced the enormous impact of computing on catastrophic risk management in the insurance industry. He then joined in a panel discussion with Karen Clark, Applied Insurance Research, Inc., and Dennis Kuzak,

EQE International, Inc., to discuss critical factors, such as location, and how technology is changing loss predictions. The panel reviewed many of the data elements that risk managers must consider in deciding insurable risk, such as meteorological data, seismological data, engineering data, and historical loss data. As a result of information technology, risk managers now make much better risk decisions and also know exactly what is in their portfolios.

Another panel discussion focused on the development and current role of information technology on catastrophic risk management in the insurance industry. Mike Mangini, Chubb Group, Robert Klein, Association of Insurance Commissioners, and Frank Nutter, Reinsurance Association of America, reviewed the linkage of desktop PCs with the development of the Geographical Information System, the development of long-term data bases, and the need for electronic communication standards. They also touched on the value of the data that information technology has made available to shape sensible regulatory policy.

Anticipating the future directions of information technology and its impact on insuring catastrophic risks, Bob Giegengack, Institute for Environmental Studies, University of Pennsylvania, Paul Kleindorfer and Howard Kunreuther, Wharton School, and Haresh Shah, Risk Management Solutions, Inc., concluded that the challenge of the conference was to use information technology to better understand risks and to link the risk assessment, risk management and risk communications processes with sensible public policy. ■

(For more information on the conference or a copy of the conference report contact the Risk Management and Decision Processes Center)

New Research on Catastrophic Risks

The rapid rise in both insured and uninsured disaster losses in the United States and the large upward revision in recognized disaster exposures have sent reverberations throughout the private sector markets, the insurance community, and the public sector.

In his column in this newsletter Dr. Kunreuther announced that two of the Wharton School's leading research centers, the Financial Institution Center and the Risk Management and Decision Processes Center, have joined together in launching a multi-year research agenda to help address the vexing questions of how society should finance and mitigate disasters. The first meeting with sponsoring institutions was held on January 10, 1997, to examine questions that will frame the research initiative. The broad questions the group addressed were:

1. How to design and restructure private and public institutions to better utilize market-based approaches, incentives and institutional structures to appropriately reduce disaster losses and effectively finance the losses that do occur.
2. How scientifically based risk assessments and new advances in informational technology can be coupled with the decision processes of homeowners, insurance companies, financial markets, and federal and state governments to evaluate the relative merits of alternative programs for managing catastrophic risk.

Future issues of the newsletter will report progress on this major research project. ■

Publications and Working Paper List

(This list represents working papers, publications and books for the latter part of 1996. To obtain copies of individual publications or a complete list of Center publications from 1987, please contact Anne Stamer: telephone, 215-898-5688; fax, 215-573-2130; e-mail, stamer@wharton.upenn.edu)

96-12-07

Isadore Rosenthal, Patrick J. McNulty and Lyse D. Helsing, "The Role of the Community in the Implementation of the EPA's Rule on Risk Management Programs for Chemical Accident Release Prevention," Center working paper.

96-12-06

Patrick J. McNulty, Leon C. Schaller and Karen R. Chinander, "Communicating Under Section 112(r) of the Clean Air Act Amendments," Center working paper.

96-12-05

Leon C. Schaller, Patrick J. McNulty and Karen R. Chinander, "Impact of Hazardous Regulations on Small Firms in Delaware and New Jersey," Center working paper.

96-12-04

Paul R. Kleindorfer, "Market-Based Environmental Audits and Environmental Risks: Implementing ISO 14000," *The Geneva Papers on Risk and Insurance* (in press).

96-12-03

Neil A. Doherty, "Insurance Markets and Climate Change," *The Geneva Papers on Risk and Insurance* (in press).

96-12-02

Mark V. Pauly, "Environmental Liability Insurance as a Handmaiden to International Trade and Investment," *The Geneva Papers on Risk and Insurance* (in press).

96-11-25

Isadore Rosenthal and Donald Theiler, "Use of an ISO 14000 Option in Implementing EPA's Rule on Risk Management Programs for Chemical Accidental Release Prevention," Center working paper.

96-11-23

Paul R. Kleindorfer and Howard C. Kunreuther, "Challenges Facing the Insurance Industry in Managing Catastrophic Risks" presented at the National Bureau of Economic Research Conference on "The Financing of Property/Casualty Risks," Palm Beach, Florida, November 21-23, 1996.

96-11-04

Alex Farrell, Robert Carter, Kimberly A. Kilmer and Roger K. Raufer, "The Nox Budget for Northeastern United States: Costs, Emission Reductions, and Implementation Issues," Center working paper.

96-11-03

Alex Farrell, Robert Carter and Roger K. Raufer, "The Nox Budget: Costs, Emission Reductions, and Issues for the Power Sector," presented at the 17th Annual North American Conference of the U.S. Association for Energy Economics, Boston, Massachuetts, October 29, 1996.

96-11-02

James Boyd and Howard C. Kunreuther, "Retroactive Liability or the Public Purse?" *Journal of Regulatory Economics* (in press).

96-11-01

Roger K. Raufer, "Market-Based Pollution Control Regulation: Implementing Economic Theory in the Real World," Center working paper.

96-09-30

Paul K. Freeman and Howard C. Kunreuther, "The Role of Insurance and Well-Specified Standards in Dealing with Environmental Risks," *Managerial and Decision Econnomics* (in press).

96-08-21

Chitru S. Fernando and Paul R. Kleindorfer, "Integrating Financial and Physical Contracting in Electric Power Markets," Center working paper.

96-08-11

Isadore Rosenthal, "Major Event Analysis in the United States Chemical Industry: Organizational Learning vs. Liability," Center working paper.

96-08-10

Isadore Rosenthal, "Organizational Epidemiology: A Tool for Investigating Organizational Factors Related to the Occurrence and Prevention of Accidental Chemical Releases," Center working paper.

96-08-02

Rachel T. A. Croson and Robert H. Mnookin, "Does Disputing Through Agents Enhance Cooperation? Experimental Evidence," Center working paper.

96-08-01

Rachel T. A. Croson, "Contribution to Public Goods: Altruism or Reciprocity?" Center working paper.

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CIGNA Property & Casualty

Dow Chemical Company

DuPont

Elf Atochem North Americaa, Inc.

Environmental Resources Management, Inc.

FMC Corporation

ICI Americas, Inc.

Insurance Institute for Property Loss Reduction

Rohm and Haas Company

Roy F. Weston, Inc.

State Farm Fire and Casualty Company

Sun Company, Inc.

Swiss Reinsurance Company

Union Carbide Corporation

Roy F. Weston, Inc.

Zurich Insurance Company

(For information on membership in the Corporate Associates Program, please contact Dr. Rosenthal: telephone, 215-898-9660; fax, 215-573-2130; e-mail, rosenthal@wharton.upenn.edu)

Personal Notes

Paul Slovic, Professor of Psychology, University of Oregon, and President of Decision Research, has been named Senior Fellow in the Annenberg Public Policy Center and in the Wharton Risk Management and Decision Processes Center. Dr. Slovic, in addition to teaching, will coordinate with Dr. Kunreuther a research program on "Catastrophic Risk, Media, and the Vulnerable Society," work designed to develop knowledge needed to manage risk effectively in today's world.

Young-Ho Hwang, Assistant Dean of Academic Affairs, Honam University, Korea, has been named Senior Fellow in the Wharton Risk Management and Decision Processes Center. While at the Center Dr. Hwang will pursue research into strategies for siting hazardous facilities.

Jacqueline R. Meszaros, long involved in many of the Center's research projects, has joined the faculty of the University of Washington as Assistant Professor of Management. Dr. Meszaros is located at the new Bothell campus, just outside Seattle in the heart of the new Silicon Valley.

Karen R. Chinander has concluded her graduate research at Wharton, and joined the faculty of the University of Miami as Assistant Professor of Management. ■

Wharton Risk Management Review is published periodically during the academic year by the Wharton Risk Management and Decision Processes Center.

Submissions are welcome.

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