



RISK newsletter

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What Does it Mean for Risk Analysis?

“It is, as many have said, a new world.”

—SRA President John Ahearne

One of the most common remarks heard since the September 11 terrorist attacks in the United States is that things will never be the same; there will be many changes in the American way of life. Society for Risk Analysis (SRA) members, including the President, President-elect, and many Past Presidents, have shared their views on what kind of changes can be expected in the risk analysis community. The following are their answers to the question:

What short- and long-term effects do you think the September 11 terrorist attacks will have on your particular area of risk analysis?

Nuclear Reactor Safety

John Ahearne, SRA President 2000-2001
Adjunct Professor of Civil and
Environmental Engineering, Duke University

My areas of risk analysis are nuclear reactor safety and storage, transportation, and disposal of radioactive waste. All of these areas will be affected by the events of September 11. Reactors will be analyzed for their vulnerability to suicide crashes of fuel-laden large aircraft. Scenarios will be developed for attacks by larger numbers of well-armed groups, such as the 20-person teams discussed in Congressman Edward Markey’s proposed legislation (http://www.house.gov/markey/iss_terrorism_pr011003.pdf). Insider threats will be expanded for analysis. Spent fuel pools and dry cask surface storage will be reviewed similarly to the reactors to examine vulnerabilities of much more severe attacks than previously considered. Spent fuel is now shipped between reactor sites. The Department of Energy (DOE) is shipping transuranic (TRU) waste from several locations to the Waste Isolation Pilot Plant (WIPP) site in New Mexico and is planning to ship TRU waste with higher radioactivity (called remote-handled waste) across the country to WIPP. Plans for the Yucca Mountain repository include shipping spent fuel from many sites around the United States to the Nevada site. Transportation routes, vehicles, and procedures will be analyzed with much more demanding scenarios and with heightened urgency. Plans for monitored retrievable surface facilities, such as that proposed in Utah, will be



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**“Risk Analysis in an Interconnected World”
2-5 December
Seattle, Washington
2001 SRA
Annual Meeting
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The Society for Risk Analysis (SRA) is an interdisciplinary professional society devoted to risk assessment, risk management, and risk communication.

SRA was founded in 1981 by a group of individuals representing many different disciplines who recognized the need for an interdisciplinary society, with international scope, to address emerging issues in risk analysis, management, and policy. Through its meetings and publications, it fosters a dialogue on health, ecological, and engineering risks and natural hazards, and their socioeconomic dimensions. SRA is committed to research and education in risk-related fields and to the recruitment of students into those fields. It is governed by by-laws and is directed by a 15-member elected Council.

The Society has helped develop the field of risk analysis and has improved its credibility and viability as well.

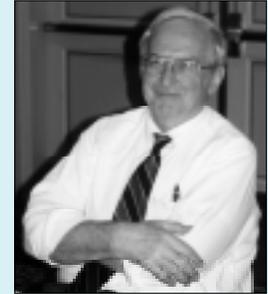
Members of SRA include professionals from a wide range of institutions, including federal, state, and local governments, small and large industries, private and public academic institutions, not-for-profit organizations, law firms, and consulting groups. Those professionals include statisticians, engineers, safety officers, policy analysts, economists, lawyers, environmental and occupational health scientists, natural and physical scientists, environmental scientists, public administrators, and social, behavioral, and decision scientists.

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President's Message

The nomination of former Society for Risk Analysis president John Graham to be the director of the Office of Management and Budget Office of Information and Regulatory Affairs has been approved. His nomination cleared the appropriate committee many weeks ago but was prevented from coming to the Senate floor by a Senatorial hold. That was lifted and a vote taken on 19 July. Graham was approved by a large margin. Confirmation is a signal that objective and well-done risk analysis is appreciated in the political process.



In May, I attended and presented at a Special Symposium on Quantitative Risk Assessment, sponsored by the Family Foundations of Chauncey Starr and B. John Garrick, held at the National Academies facility on the campus of the University of California, Irvine. Attendees included several Past Presidents: Betty Anderson, John Garrick, Warner North, and Elisabeth Paté-Cornell. Presenters included several recipients of the Distinguished Achievement Award: Chauncey Starr, John Garrick, and Stan Kaplan, as well as George Apostolakis, recipient of the Outstanding Service Award. Attendees included many longtime practitioners of quantitative risk analysis, including Bob Budnitz, Hal Lewis, and Richard Wilson. In addition to Paté-Cornell, session facilitators included Vicki Bier, the engineering area editor for our journal. One objective of this symposium was to encourage more discussion of the applications of risk analysis to technical issues. This is quite timely, since on the national agenda are such issues as ballistic missile defense (BMD) and many associated with energy programs and policies, including drilling in the Arctic National Wildlife Refuge (ANWR), suitability of the proposed Yucca Mountain repository for high-level radioactive waste, extensive new pipelines, and many aspects of the debate on global warming. All have substantial opportunities for quantitative risk analysis to clarify options.

I encourage members working on these issues to share their expert work with others by submitting articles to our journal, *Risk Analysis* (<http://riskanalysis.manuscriptcentral.com>).

Finally, as the nation changes to deal with the horrors of September 11 and the anthrax attacks, as described in many articles in this edition of the *RISK newsletter*, SRA members should use their knowledge to assist local and national efforts to address what are now immediate and large risk issues.

John J. Graham

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rethought to consider protection against the types of attacks of September 11 and the terrorist threats proposed by Congressman Markey. As has already been discussed by one Nevada Representative, the DOE will be asked to consider what changes should be made to the Yucca Mountain geologic repository plans. Finally, there will be many challenges to existing facilities by those opposed to nuclear power. It is, as many have said, a new world.

A Different Sense of Perspective

Gail Charnley, SRA President 1998-1999

HealthRisk Strategies

When the United States was attacked on September 11, I was attending a Children's Environmental Health Global Forum in Washington, D.C. We watched in horror as the events unfolded live on the hotel ballroom's huge TV and then we could see the black smoke pouring out of the Pentagon from the hotel's windows. Suddenly, concern about possible subtle developmental neurotoxic effects of tiny amounts of pesticide residues in schools had to be considered in a whole new context. Was the mere idea that we could even devote energy to worrying about such a possibility bourgeois and irrelevant? While it is unlikely that risk assessors, environmental activists, and moms will cease worrying about the potential effects of pesticides on kids, they may now need to do so with a different sense of perspective.



Many SRA members (myself included) preach the gospel of the importance of putting risks in their larger public health context. That doesn't mean we should ignore small or poorly defined risks and focus only on the big risks. It means that risk—along with values, economics, and other important factors—should be part of the equation when we decide what are the best ways to reduce or eliminate threats to our health and our environment. At the same time, it is important not to lose track of the large and well-defined threats to our health in order to direct our efforts at risk management most effectively. In that context, the likelihood that you or I will die in a terrorist attack is still pretty remote. Nonetheless, the fear and outrage factors, along with spectacular media coverage, have made terrorism a number one priority. What the events of September 11 did was remind us that when we value and seek to protect our children and our health, risks from chemicals in the environment may be evaluated best in the context of the myriad other threats to our health and our quality of life.

Unfortunately, the events of September 11 put a lot more risks into the category of the larger public health context. Once-remote concerns—losing a child to a bomb, a plane crash, sarin, or anthrax—are suddenly within the realm of possibility.

Against that backdrop, the long-term impacts on a child's emotional development due to the loss of a parent in a terrorist attack, for example, becomes a more immediate concern than threats from regulated chemicals in our increasingly safe environment—which isn't to say that environmental health risks are no longer important, but they are in a category of risk that we have increasingly gotten under control. By comparison, the whole new category of "involuntary" risks brought to our attention so violently on September 11 is essentially out of our control and is likely to change not

what we value, but how we value it.

The first SRA principle begins: "Risk analysis uses observations about what we know to make predictions about what we don't know. Risk analysis is a fundamentally science-based process that strives to reflect the realities of Nature in order to provide useful information for decisions about managing risk."

But what do we know about terrorism that can help us predict what happens next? How do we figure hate into the public health risk equation? Is al Qaeda a reality of Nature?

What effects will the September 11 attacks have on my area of risk analysis? Probably none, as far as how we evaluate the effects of long-term exposures to chemicals in our environment is concerned. Lots, as far as how we set risk management priorities is concerned (at least in the short term). It is interesting to note that the term "risk management" is now prominent in the newspapers and debate about the arsenic drinking water standard has disappeared. In any case, despite my ability as a risk analyst to understand relative risk, the universe of my risks of concern just got a lot bigger and I am now a lot more worried about my teenage stepson dying on the field of battle than from the dioxin in his ice cream.

Attention to Vital Infrastructures

Yacov Haimas, SRA President 1997-1998

Quarles Professor of Systems and Information Engineering and Director of the Center for Risk Management of Engineering Systems, University of Virginia

I can best answer this question by changing its focus to: "What *should* be the short- and long-term effects of the September 11 attacks on your particular area of risk analysis?" First, however, some historical perspective is necessary. As early as five years ago, on 15 July 1996, President Clinton issued Executive Order 13010 that established the President's Commission on Critical Infrastructure Protection (PCCIP). Its mandate was to develop a national strategy for protecting the nation's infrastructures from various threats and to assure their continued operation. The President declared:



America's critical infrastructures underpin every aspect of our lives. They are the foundations of our prosperity, enablers of our defense, and the vanguard of our future. They empower every element of our society. There is no more urgent priority than assuring the security, continuity, and availability of our critical infrastructures. . . . (Eight infrastructures were identified by the PCCIP as critical, in that their incapacitation or destruction would have a debilitating effect on the nation's defense or economic security. These are telecommunications, electrical power systems, gas and oil storage and transportation, banking and finance, transportation, water supply systems, emergency services, and continuity of government.)

The Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction (also known as the Gilmore Commission) released its second Annual Report to the President and the Congress in December 2000. It highlights the dire consequences of cyber-physical terrorism:

In a terrorism context, cyber-attacks inside the United States could have "mass disruptive," if not "mass destructive" or "mass casualty" consequences . . . Moreover, it is conceiv-

able that terrorists could mount a cyber-attack against power or water facilities or industrial plants—for example, a commercial chemical plant that produces a highly toxic substance—to produce casualties in the hundreds or thousands.

Numerous other government commissions (including the Rudman-Hart Commission) and studies (for example, the Center for Strategic and International Studies) have issued stern warnings on our vulnerability as an open society and the risks posed by terrorists. Recognizing this threat should have been an important step in addressing it. Furthermore, in spite of the already-disruptive impact of Internet hackers and the denial of service to millions of users/customers, there has been an almost fatalistic acceptance of cyber-terrorism by the public. There seems to be no general awareness that the risk of both direct and indirect impacts from an attack could result in the denial of critical services. For example, telecommunications and other critical infrastructures are both interconnected and interdependent. Thus, the risk that critical physical infrastructures can be crippled through a cyber-terrorist attack remains a major problem.

It is worth noting that the vulnerability of the nation's critical infrastructures is not confined separately to the civilian or to the military sectors. Rather, the strong dependency of the military on civilian infrastructures and the resulting cascading effects possible from one to the other amplifies the risks.

Short-Term Effects

The risk analysis community is committed to addressing the emerging risk of terrorism to our critical physical and cyber infrastructures. However, the present level of commitment is not sufficient to meet the challenges that threaten our general well-being. Therefore, I believe that a broad-based and effective federal research program in risk analysis must receive high priority on the national agenda.

Long-Term Effects

Research needs in risk management that are likely to challenge my area of risk analysis transcend four domains:

1. Hardening and adding surety to critical infrastructures by incorporating redundancy, robustness, and resiliency in their design, construction, and operation.
2. Developing planned response and recovery strategies. Among other approaches, this means restructuring some institutional and organizational infrastructures, training special domestic emergency response forces, and allocating appropriate funds and other resources.
3. Improving our understanding of the interconnectedness and interdependencies among our national critical infrastructures, including the interface between cyber and physical infrastructures.
4. Developing standards, practices and procedures, and safety and security policies.

I would like to believe that the September 11 attacks have enticed us to finally accept the reality that our vital infrastructures are seriously threatened by terrorism (cyber, physical, biological, chemical, and nuclear).

Our government has redefined the threats and consequences of terrorism as an act of war. Now we must also restructure our institutional and organizational infrastructures, develop the technology and tools which will ensure their sustainable operation, and transfer this knowledge base to all who are concerned with the entire life-cycle of these critical systems.

To meet these challenges, we must recognize the real risk that cyber-threats and physical threats present and undergo a paradigm shift in our conception and perception of their im-

pacts on our vital infrastructures. To manage this change, we need to marshal not only precious human and material resources, but also a *strong and sustained political will*.

Risk and Reality

Rae Zimmerman, SRA President 1996-1997

Professor and Director,

NYU Institute for Civil Infrastructure Systems

The stark reality of September 11 has changed how we understand extreme events. What role can risk analysis and risk management play in managing the aftermath, the consequences, and the possibility of the recurrence of such events and the emergence of new risks?

At the heart of framing risk management and risk analysis strategies is an understanding of how we live. The immediate effect of September 11 was the destruction of connectivity that we once took for granted for communication, transport, and the provision of the goods and services that are the backbone of our lives. This disruption occurred well beyond the immediate site and the city's borders. These support systems that connect us to our livelihoods and our culture were not only vulnerable in this particular instance, but may also become the route by which new risks emerge and spread.

Within just a century, we have created vast infrastructure networks and production systems to enable dispersed regions to thrive around concentrated urban centers. On the one hand this infrastructure is highly dispersed and distributed for the provision of services over large distances. On the other hand, it is often centralized for the purposes of production and control.

Herein lies the contradiction. To avoid risk, there is a call to decentralize our infrastructure and other support systems. Decentralization, however, may reduce control and thereby increase vulnerability or at least make it more complex as well as increase access points. Centralized systems have the disadvantage that a single disruption can disable the whole system.

These contradictions need to be incorporated into risk management frameworks, and could result in dramatic changes in how our profession analyzes and manages risk. Thus, civilization as we know it depends upon some system components that are centralized and others that are decentralized, and the two interact and depend upon one another in complex and often unanticipated ways.

In order to face the new reality that has been imposed upon us, the risk profession has to meet the needs of the communities that are rebuilding a more resilient future by incorporating into risk analysis and management their lifestyles and implications of the built environment that sustains those lifestyles.



Fusion of Intelligence Information

Elisabeth Paté-Cornell, SRA President 1994-1995
Department of Management Science and Engineering,
Stanford University

The attack on September 11 was the result of a failure to detect and prevent the terrorist operations that hit the United States. This failure of the "defense," however, has to be viewed in the context of a long series of earlier "offense" attempts that were foiled. As often in risk management, success implies that nothing happens, and only failures are visible to

the public. Defense success is contingent on our ability to detect a threat in time and to derail the attack plan. Given obvious resource limitations (time, money, attention capacity, etc.), priorities have to be set, which requires quantification. The question is to categorize the large spectrum of existing threats, find the weakest points of the system, and prioritize their strengthening.

The U.S. government thus faces the daunting tasks to increase drastically its ability to obtain and interpret different types of signals of possible terrorist attacks with sufficient lead time and to improve its ability to react effectively. One of the main challenges is the fusion of the different pieces of information (electronic, human intelligence, etc.).

Fusion involves two separate issues: internal communication, that is, ensuring that the different intelligence agencies communicate in a timely fashion, and (more difficult) actually merging signals, some "sharp" and some "fuzzy," into useful information. This is where probabilistic Bayesian models of engineering risk analysis can be useful. These models apply best to new and unknown systems. They are not based on statistical time series: we don't have such a luxury, neither in this new situation nor when assessing *a priori* the performance of new space technologies. The process is based on a probabilistic systems analysis that requires two key components: identification of the different *classes* of attack scenarios and their prior probabilities given all available background information, and, for each possible type of signal, assessment of the probabilities of false negatives and false positives, including signal dependencies described by conditional probabilities. Bayesian updating then allows computation of the posterior probability of an attack given the quality of intelligence information, the possibility of error, and dependencies among signals.

Assessing the prior probability of an attack at any given time requires thinking of the conjunction of events that may lead to its success: (1) intent of a particular type of action, (2) effective planning, (3) successful implementation, and (4) the plan must not be discovered or must be discovered too late for successful countermeasures. In other terms, the offense must be ready to go and the defense be defeated.

The value of this analysis depends on two factors: the proper description of each class of scenarios and the choice of the experts asked to assess the different parts of the puzzle. More importantly perhaps, the Bayesian model can guide clear thinking at a time when the amount of information is large and confusing and where intuitions can be tragically misleading.

This kind of model allows assessment of the effectiveness of different types of countermeasures that can be taken. In the short term, the probability of an attack intention can be decreased by making a particular type of action be—or look—difficult. The probability of successful planning given the intent can be foiled by measures such as cutting off the flow of cash. The probability of successful implementation can be decreased by putting in place protective measures (access denial, target reinforcement, etc.). Finally defeating a well-thought-through plan requires collection of relevant information, understanding of its meaning, and well-targeted response.

Nothing, of course, guarantees that better detection and interpretation of intelligence signals will "prevent" a terrorist attack on the United States. What it will do is increase the



chances of success, that is, that nothing happens. We are facing a new situation. I believe that the analytical methods that we have used in the past to assess the failure risks of new engineered systems and to optimize the use of our resources to reinforce them can be useful in this challenging context where many lives are at stake.

Opportunity to Provide Guidance and Technical Support

Robert G. Tardiff, SRA President 1993-1994

President, The Sapphire Group, Inc.

In the aftermath of the devastation and death at the Pentagon and the World Trade Center, the terms "risk" and "risk management" have been used widely and repeatedly by public officials and media consultants raising the consciousness of the public to these concepts. Recent fears over expanded attacks employing chemicals and pathogens as agents of mass destruction cast risk analysis and management into central roles in defending the U.S. population against further catastrophe.



These events are providing a rare opportunity for we who are professionally engaged in risk analysis to provide guidance and technical support on a scale and level of importance unparalleled in the history of the SRA. Within the confines of my scientific interests, namely risks to human health from excessive exposures to chemicals as well as pathogenic organisms, I find the challenges to fall within three areas.

First, in the near term, I anticipate a renewed interest in clearly prioritizing those types of substances and situations that are strong candidates for terrorist use. Managing risks requires a sound understanding of what might constitute a weapon for mass illness and death. Thus, toxic potency (particularly from very few exposures), accessibility, ease of handling, stability in air and drinking water, and means of delivery are some of the major factors that are likely to be reexamined to construct tools for making informed decisions to protect the population. The outputs are likely to be descriptions of substances and scenarios of greatest concern in order to direct the efforts and limited resources of law enforcement authorities (that is, the risk managers). No doubt, any grouping of substances and situations will include those compounds and organisms that were researched and developed decades ago and found to be plausible in military operations; however, these represent only a point of departure. SRA's coterie of health scientists will likely tackle these issues to make tangible contributions in this arena. I personally will address issues related to vulnerabilities of our nation's drinking water supplies to terrorist threats, an area in which I had some experience at another time in my history.

Over a longer horizon, the opportunity exists, I suspect, to contribute substantively to the establishment of an institutionalized approach to screen emerging chemistries to see if any might, in the wrong hands, prove deadly. By combining the strengths of the analytical chemistry profession with those of risk analysis, we are likely to eventually make significant inroads into early detection and prevention of potential emerging weaponry. More than three decades ago, the vestiges of such research were begun, and that could perhaps serve as foundation for forthcoming development of new decision tools

to aid risk managers.

The second area of heightened technical activity in risk analysis, near- and long-term, is in constructing tools with which to make reasonably precise estimates of probabilities of risk events and medical outcomes. This ability, while presently tenuous, represents opportunities for fertile development, particularly when dealing with complex multifactorial situations. This undertaking will draw on highly varied fields of knowledge, including the mathematics of “fuzzy logic,” database management (including access to sensitive information via the Internet), psychology of motivation, and predictability of extremists, coupled with a strong comprehension of the toxicological sciences and medicine to understand not only the magnitude of adverse medical consequences but also the resilience of the country’s medical delivery infrastructure.

Combining disparate data related to risk estimations is not new to many in our Society. And the trade-off between sophisticated analytical tools and professional judgment is well recognized by our members. However, the dimensions of the problems as applied to chemical and pathogen weapons in the hands of terrorists will require considerable research and development as well as thoughtful deliberation.

A third area of opportunity is an enduring part of SRA’s mission and professional interests: risk communication. Since our Society’s inception, the communication of risk information to audiences of all types has been a source of considerable scholarship and has contributed substantially to the placing of risk into assorted balanced frameworks. Whether the recipient of risk information is a potentially affected individual, a risk manager in a private organization, or the head of a major governmental agency, the results often have led to more informed decisions, if not agreement, about risk reduction strategies. In today’s climate, the public hears almost daily of one agent or another (today “anthrax,” tomorrow something else). Our government leaders are struggling with messages which balance the recognition that some grave danger exists without creating unwarranted panic, which carries its own dangers.

Prudence dictates the importance of the communication—indeed, education—about health dangers, probabilities of events and their magnitude and severity, and levels of confidence in risk estimates. Individually and collectively, SRA professionals can and should actively contribute to balanced and trustworthy communications about medical risks. Research in this area, I expect, will occur at a higher tempo than prior to the attacks and lead to significant insights that will doubtless develop better approaches for our risk managers. I anticipate that the tragic events of September 11 will serve as a stimulus to us all to be ever mindful of properly communicating our findings not just to peers but also to all who would use them to protect the public health from wanton aggression.

Time to Reflect on Need for Better Methods

James D. Wilson, SRA President 1992-1993

Consultant Fellow, Resources for the Future

I am part of the subdiscipline of risk analysis concerned with evaluating long-term health effects of chemicals. My research deals with how scientific information, particularly information regarding these kinds of effects, is used by governments in making health-protection decisions. I would be very surprised if the terrorist attacks of September 11—and, for that matter, any other such attacks—will bring about any signifi-

cant change in the way we conduct these kinds of risk analyses. It may speed somewhat the ongoing evolution of methods, since public attention will now be diverted away from minor health impacts to catastrophes. Orderly development of methods does not flourish in the glare of Klieg lights, as the Environmental Protection Agency’s experience with implementing the Food Quality Protection Act will testify. The need for better methods will continue to exist; perhaps we will now be allowed time to reflect and think about how best to satisfy this need, to test and try, keep what works and discard what doesn’t.



Use of QRA to Manage Terrorism

B. John Garrick, SRA President 1989-1990

Consultant

The more important question is what can quantitative risk assessment (QRA) contribute to the control of terrorism. If it can make a contribution, then the impact of the September 11 attacks on QRA should be a great opportunity for the risk sciences to serve the public good.

Extrapolating from the experience with QRA in assessing the safety of complex technological systems, the evidence is substantial that QRA should have a major beneficial impact on addressing terrorism. QRA explicitly addresses the questions that need to be answered in order to effectively manage terrorism. These questions have to do with what scenarios we need to protect against, how likely they are, and what the consequences are. The transition of risk assessment from analyzing, for example, the safety of technological systems to analyzing the risk of terrorism is primarily one of perspective. The perspective of analyzing the risk of technological systems is one of structuring scenarios that answer the question, What can go wrong with the system? For analyzing the risk of acts of terror, the question becomes, How can I make something go wrong? Contained in that question is the need to know what can go wrong. In either case, the theory of scenario structuring, a key component of QRA, is also the key element of terrorist risk assessment. While the QRA thought process is modified to address terrorist acts rather than just system failures, the principles of QRA remain the cornerstone of the analysis approach. Methods exist in the literature that, when added to traditional QRA approaches, provide the necessary orientation for developing appropriate scenario categories covering terrorist activities.

As implied above, a risk assessment is essentially a listing of scenarios (accident or terrorist) linking initiating events and different damage states, each with a likelihood of occurrence. Of the three components of a risk assessment (scenarios, likelihoods, consequences) the most controversial is the calculation of likelihoods as they involve the calculation of uncertainties using probabilities, the language of uncertainty. As it turns out, this controversy was the primary stimulant for the development of the discipline known as probabilistic risk assessment or, as referred to here, quantitative risk assessment. Currently, QRA is a mature discipline having established itself as a major contributor to improved safety and performance of complex technological systems, most notably nuclear



power plants. In particular, QRA was developed to deal explicitly with events for which there was little or no experience. That is exactly the position we find ourselves in with respect to terrorist threats, although the experience base is probably better than it was when QRA was first successfully applied to the nuclear safety field. As noted earlier, the key is developing a structured set of scenarios that connect what we need to know to what we do know, the essence of a QRA model. The logic models that perform this connection are the central feature of a risk assessment, be it a risk assessment of a complex industrial facility or the risk assessment of terrorism. The thought processes may differ, but the basic approach is the same in the two cases.

When we analyze the risk to the public of a complex system such as a nuclear power plant, we are faced with assessing the risk of events that have never really occurred, at least with U.S. plants, such as a major release of radiation. That risk is dependent on the course of a sequence of failures, some of which we have observed. The logic models referred to earlier make the connection between the ones observed and the events of interest. Now it becomes a matter of appropriately propagating what has been observed (such precursor events as pump and valve failures, human errors, etc.) through the models to the events of interest while accounting for the uncertainties involved. The same is true in terrorist risk assessment. We construct the scenarios (the logic models), note what we know, and propagate the results through the models. The precursor events are of course different because we are taking a different perspective. For terrorist risk assessment the precursor events may take the form of the USS Cole disaster, tensions in the Middle East, other isolated terrorist events, etc.—the point being that there is always evidence available at some level. It is the task of the risk assessor to make the connections to the events of interest and to expose that process to scientific scrutiny.

In summary, that subfield of the risk sciences known as quantitative risk assessment has an opportunity to make major contributions to addressing the issue of how to control terrorism. It is a discipline explicitly designed to find answers to the important questions about possible disasters. QRA not only addresses the issue of what is the risk, but has the capability to provide information that facilitates our ability to eliminate terrorist threats and to minimize the consequences of those threats not eliminated. Knowing what the risk is, including the uncertainties, as well as the contributors to risk, provides the most effective knowledge base possible for the logical allocation of resources for effective risk management.

Trade-Off Between Risk and Freedom

Richard Schwing, SRA President 1988-1989

President, Sustainable Visions, Inc.

Short-Term Expectations

I expect NATO (North Atlantic Treaty Organization) will be close to a war economy long enough to undermine the terrorist leadership via a limited number of military actions backed up by a lend-lease approach. This aid to nations under the Taliban will be similar to that provided our World War II enemies, Japan and Germany, who currently (except for Britain) are our closest allies. I would not pretend to have any expertise in this area of risk analysis but I am optimistic that the SRA will be able to return to the focus on traditional

risk analyses in the next year or two.

Long-Term Area of Interest

My current claim to an “area of risk analysis” is captured by the title of my one-person firm established a little over a year ago, Sustainable Visions, Inc. The emphasis is to provide industrial companies the basis for and hints for doing business in a sustainable world—a world which will be defined by its work toward the “triple bottom line,” a term articulated by John Elkington as a world in which economic prosperity, environmental protection, and social equity are aligned.



Given leadership with a better understanding of the multiple value systems around the globe, I have some optimism that such a world is feasible under certain scenarios. There are already some businesses, governments, and nongovernmental organizations working on such scenarios.

Currently, it is known how values vary in over 50 nations as a function of average income and the religious history of the dominant culture. This data set, The World Values Survey, covers over 70% of the world’s population. These data are from societies having per capita incomes as low as \$300 per year to those with per capita incomes one hundred times greater and from long-established democracies with market economies to authoritarian states.

Time series data for three decades indicate that as income per capita increases, the society adopts value systems that moves toward a value set favoring the sustainability triplet—economic prosperity, environmental protection, and social equity.

The Environment

We are, as a nation, gradually realizing that “everything is connected to everything else” as Barry Commoner stated perhaps 40 years ago. Our environment will be at risk until all parts of the world have an incentive to share a rigorous set of environmental goals. Since our environmental goals are unlikely to be matched in parts of the world where incomes are \$300 per capita, life-spans are 40 years, and social justice is nil, our global goals for environmental improvement are at risk.

Terrorism

Recent events would indicate that our physical safety is at risk just as our environment is at risk. I would not be surprised if indices which track the social equity component of sustainability will in the future correlate with attempts at terrorism.

Caveats

Even though there are values data for nearly three decades for a major fraction of the population on earth, the data for nations that host the Taliban are masked by more traditional Muslim values. I would expect Taliban values to be on the tail of the distribution. Timothy McVeighs and Unibombers can exist, however, anywhere—but way out on the tail. The decade has taught us that we did not comprehend or anticipate the power of either individuals or relatively small cults. We will be looking at the trade-off between risk and freedom with a dramatically new perspective.

As a result, traditional risk analysts will continue to take on the questions What can go wrong? What are the consequences? and What is the probability? for many parts of the world and at home. Even though the envelope of significant risks has grown dramatically, the models and frameworks for traditional risk

management issues will remain valid. On the other hand, it is quite evident that perceptions, preferences, and priorities are now dramatically different and they will require a reassessment, given the recent tragedy.

Commitment

Like many of the members of the SRA, I am committed to the goals of gaining a better understanding of human nature. My focus has been the acceptability of risks and the behavioral contributions to risk, both driven by our values. Values-driven human behavior now will dominate our acceptance or rejection of harm whether caused by the rash risk taker or the vile terrorist.

Lessons Learned from the Front Lines of Risk and Crisis Communications

Vincent Covello, SRA President 1987-1988

Director, Center for Risk Communication

In the wake of the events of September 11, it is critical that we draw on what we know about risk and crisis communications and remind ourselves and others of what we have learned. With this goal in mind, I offer for discussion within the risk analysis community the following 21 guidelines for effective risk and crisis communications.



Listening/Caring

1. Listen to, acknowledge, and respect public fears, anxieties, and uncertainties: when people are upset they want to know that you care before they care what you know.

2. Appear calm and in control, even in the face of public fear, anxiety, and uncertainty.

3. Offer authentic statements of caring, empathy, compassion, and listening; back up these statements with actions.

Presentation

4. Avoid using humor; if humor is needed, plan, test, and use it carefully.

5. Be honest, ethical, frank, and open, recognizing that there are limits on what needs to be disclosed.

6. Recognize that people are risk adverse and when upset will often fixate on negatives; be extremely careful in offering up the five "N" words—no, not, never, nothing, none—and words with negative connotations.

7. When providing information or sharing bad news, be the first to share the news; formulate messages according to the formula: three positives are necessary to balance one negative.

8. Avoid mixed or inconsistent verbal and nonverbal messages.

9. Practice and hone media verbal and nonverbal skills: avoid major media traps and pitfalls (for example, offering or not offering guarantees, speculating on worst-case scenarios, repeating allegations or accusations).

Message Development

10. Develop and offer a central message with three elements; stay on message and avoid the comment: "no comment."

11. Be concise; use clear nontechnical language free of jargon and acronyms.

12. Make extensive use of visual material (graphics, tours, demonstrations, animation, analogies, and anecdotes).

13. Check and double-check the accuracy of facts.

Leadership

14. Lead the way: "walk the talk."

15. Inform colleagues and family of expected behavior and the need to conform with official policy or recommendations.

16. Be highly visible.

17. Seek, engage, and make extensive use of endorsements and support from credible third parties; do not attack the credibility of those with higher credibility.

Organization

18. Do advance scenario planning: identify important stakeholders, anticipate questions and concerns, prepare messages, test messages, anticipate follow-up questions, rehearse responses (for example, through simulations).

19. Provide information on a frequent basis; prevent information vacuums that can be filled by others.

20. Coordinate all interorganizational and intraorganizational communications; speak with one voice.

21. Avoid town meetings, which often fail unless carefully organized and implemented to convey information and can increase public frustration; encourage open houses, information exchanges, and face-to-face contact.

Effects Will Be Profound

Paul F. Deisler, Jr., SRA President 1986-1987

Retired

Starting in the 1960s, I have been involved with many types of risk assessment and management, including probabilistic venture analysis to characterize venture financial risks, human health risk analysis and, most recently, comparative risk analysis. It is thus difficult for me to say what my "particular area of risk analysis" is; so, I must respond more generally to RISK newsletter's question.



The specific, actual, disastrous events of September 11, 2001, were neither predicted nor prevented. The multifaceted, rapid responses at both national and local levels of public and private organizations underscore the value of the continuing strategic and tactical studies by many agencies which led to the resulting preparedness for action. Pundits may criticize some of the responses made to the disaster to date; however, the overall effort has been remarkable.

One of the well-developed fields of risk analysis immediately applicable, now and in the long term, is risk communication. By and large, the media have been straightforward in their reporting. Nevertheless, I have wished at times that better risk communication practices were followed. Generalizations like "the nation is jittery" or "the U.S. population is waiting for the next shoe to drop," sounding like fact when made, are very poor risk communication, tending, if anything, either to be ignored or to create the very sense of panic that allegedly exists. Reports by governmental officials have been more circumspect but the involvement of risk communications experts would greatly improve all reporting, making it more accurate, full, and useful to the public and to efforts to defend the public. The Society for Risk Analysis might highlight the importance and usefulness of this field by organizing a national workshop on risk communication and the handling of situations such as have occurred.

Certain components of more conventional risk analysis para-

digms, such as hazard identification and consequence definition and assessment under different scenarios can be applied fairly quickly to determining vulnerabilities to terrorism and to setting initial priorities for action. Some of the methods developed in comparative risk analysis for obtaining consensus data from panels of experts, working with risk analysts, should be applicable to these initial, curtailed, and rapid analyses while other methods involving interviews with large numbers of individuals in government, the private sector, and non-governmental organizations and from among the general public might also apply. This latter data-gathering method was used effectively in a recent study in Texas in which I participated. The actual estimation of probabilities, however useful in the long term, would generally be beyond the scope of timing set by short-term needs. However, that the long term must be considered is clear: terrorism is likely to be with us for many years, in many forms and guises, from many sources.

Because Texas is such a diverse state, the Texas report¹ offers suggestions for targets and vulnerabilities for the nation as a whole. One of the problems mentioned in the report is chemical and biological terrorism. As this piece is being written, the deliberate spread of anthrax in the United States is underway. If the chemical industry in Texas were to suffer a significant, successful attack of this or another kind, there would be serious implications for local human safety and for the national economy since some 35% of chemical manufacturing in the United States is located in Texas, largely in two relatively compact locations: along the Houston Ship Channel and in Corpus Christi. This exemplifies a major risk that demands early attention by risk analysts of several types, including technological risk analysts, to make possible the early implementation of preventive and defensive measures. It also calls for long-continuing analysis since chemical plants need to be retrofitted for better protection against all kinds of terrorist attacks, and new facilities need to be designed with terrorism in mind for chemical and biological attacks, for bombings, for arson, and for electrical or mechanical sabotage. Extension of this case to the rest of the nation and to other industries and essential activities quickly shows the importance technological risk analysis, combined with other types of risk analysis, will have in this current age.

One of the effects of the employment of risk analysis to combat terrorism will be the rapid development of new methods of risk analysis in many major areas, including, for example, biological terrorism risk analysis, technological risk analysis, and risk communication. In the area of biological terrorism risk analysis, for example, the further development of methods for detecting attack and determining of what kind it is will be much needed.

Research into the cultural, sociological, and individual psychological roots of terrorism will be needed to complete many risk analyses, including the estimation of probabilities. New linkages will have to be forged with governmental agencies, where possible, particularly with those agencies that must operate under secrecy (intelligence agencies) which, because of their nature, will be the main sources of much of the data enabling fuller risk assessments to be made. In many cases, the need for secrecy will mean that risk analysts will be employed within the agencies themselves, and the methods these analysts develop will not reach public view and utilization for a long time, if ever.

It is possible to discuss only these few, indicative effects of

the existence of terrorism on a massive scale in this short piece. That the effects on many fields of risk analysis will be profound is without question in this author's mind.

¹INSIGHTS, "Major Problems/Opportunities Facing Texas and the Chemical and Refining Industries in the 21st Century," Texas Institute for the Advancement of Chemical Technology (TIACT), Vol. 9 (No.2), 2000. (<http://www-chen.tamu.edu/tiact/>).

Need to Define Social Perceptions

Elizabeth Anderson, SRA President 1984-1985

President and CEO, Sciences International, Inc.

Experiencing the September 11 tragedies from the south coast of Turkey has strongly influenced my thoughts about their short- and long-term impacts. The events bring a certain end to the innocent view that we, as U.S. citizens and residents, are somehow immune to terrorist attacks on our soil. We must first understand the nature of the risk we face before we can discuss short- and long-term impacts. From my observations abroad, I believe we face two types of risk. The first



is the obvious array of possible terrorist events and their potential impacts. The second is less definable, but there are people of many nations who abhor the terrorist event itself and express sympathy for the United States while at the same time do not mind seeing the United States sobered in some essential way. Whether this reaction is the result of distrust, resentment, fear, lack of information, or some other perception is unclear. The impacts of the terrorist events have prompted the establishment of a cabinet-level post to address U.S. security issues; the identification of safety goals and implementation of strategies to limit the occurrence of a terrorist attack as well as potential consequences; how to deal with this second-tier perception is less defined.

My field of risk analysis is already responding to the terrorist threats by employing the methods we have developed over the last 25 years to address health and environmental risk associated with the release of chemicals and biological agents to the environment. Many of us have commenced organizing the possible events that could occur and for each address the two risk assessment questions: (1) How likely is the event to occur? and (2) If it does, what are the impacts in quantitative terms? These responses can guide prevention and response decisions.

The second risk is less well defined and is one to which I feel we must turn our attention. The United States, as the single most powerful political, military, and economic power is frequently perceived as a nation that is insensitive or unfair in its relationships with many countries, particularly in the developing nations. These perceptions differ from the somewhat one-dimensional and unequivocal extremists' views that spawn terrorist activities. The approaches we have developed in risk analysis to help us to define social perception can perhaps guide our response to this second-tier risk. As we address risks arising from terrorists' activities, we need also to define and address the social perceptions that breed dislike and distrust. I feel that my colleagues in the social sciences have developed many approaches to understanding perceptions involving en-

vironment risk that could equally be useful in defining the social perceptions that breed hatred, distrust, or resentment of our country.

Terrorism as Hazard: A New Species of Trouble

Paul Slovic, SRA President 1983-1984

President, Decision Research



In several insightful papers written around 1990, sociologist Kai Erikson sought to understand why people held particular dread for accidents involving chemicals and radiation. Erikson characterized such accidents as “a new species of trouble.” He concluded that, whereas “conventional disasters” such as floods or earthquakes proceed in an orderly way from beginning to middle to end, certain chemical and radiation accidents contaminate in ways that never seem to end. An all clear

is never sounded. The book of accounts is never closed.

The terrorist acts of September 11 represent an even more disturbing form of this new species. Not that terrorism is entirely new, but this form of it certainly is—the use of commercial airliners as weapons of mass destruction, followed by the threat of chemical and biological assaults on our air, water, and bodies. We might characterize this as “mind as hazard” and recognize that this new species of trouble strains the capacity of quantitative risk analysis. Our models of the hazard-generating process, terrorists’ minds, are too crude to permit precise predictions of where, when, and how the next attacks might unfold. What is the role of risk analysis when the stakes are high and the uncertainties are enormous?

Theories of risk perception and cognition inform us that, besides risk analysis, we have another mode of thinking that is essential for rational decisions in the face of danger. This is the experiential mode, which enabled us to survive during the long period of human evolution and remains the most natural and most common way to respond to threat, even in the modern world. Experiential thinking is intuitive, automatic, and fast. It relies on images and associations, linked by experience to emotions and affect (feelings that something is good or bad). This system represents risk as a gut feeling, telling us whether it’s safe to walk down this dark street or drink this strange-smelling water.

Proponents of formal analysis, the newcomer on the risk scene, tend to view “risk as feeling” as irrational. It is not. Sophisticated studies by neuroscientists such as Antonio Damasio and others have demonstrated that logical argument and analytic reasoning cannot be effective unless it is guided by emotion and affect. Rational decision making requires proper integration of both modes of thought. But both systems have their biases and limitations as well. The challenge before us is to figure out how to minimize these when we assess risks. Thus, when our feelings of fear move us to consider purchasing a handgun to protect against terrorists, our analytic selves should also heed the evidence showing that a gun fired in the home is 22 times more likely to harm oneself or a friend or family member than to harm an unknown, hostile intruder. Risk as feeling tends to overweight frightening consequences; risk as analysis can give us perspective on the likelihood of such consequences.

Another line of thought: A startling feature of the September

11th attacks is the degree to which a handful of determined individuals, in a very short time, so greatly disrupted the world’s most powerful nation. I suggest that risk analysis should be supplemented by “vulnerability analysis” that characterizes the forms of physical, social, political, economic, cultural, and psychological harms to which individuals and modern societies are susceptible. What conditions foster extreme vulnerability (for example, large, densely populated cities; jumbo jetliners; modern communications media; computers; availability of chemical, biological, and nuclear weapons; social inequities; complex interdependent systems, etc.)? Can we quantify vulnerability? How can an understanding of vulnerability help us reduce risk?

Such analysis of vulnerability should consider the insights gleaned from risk perception studies that have sought to model the impact of accidents and other adverse events. This work, in the context of a theoretical framework called “the social amplification of risk,” introduced the concept of “accidents as signals” to explain why some events have enormous “ripple effects,” extending beyond the immediate direct damage to encompass many other victims (for example, companies, industries, agencies, the economy, etc.). In the aftermath of September 11th, we are witnessing not just ripple effects but cascading waves of impacts, likely to batter us for much of this new century. In bringing risk analysis to bear on decision making, we should make a concerted effort to take the social amplification of risk into account.

Creating a Calm after the Storm

Robin Cantor, SRA President-elect 2000-2001

Principal and Managing Director, LECG, LLC

Although more than a month has passed since the horrific terrorist attacks of September 11, it seems as though each day



brings a new expression of their impacts. Unlike the many calls for Americans to return to their “normal” routines, I do not believe that we can ever return to the world that existed on 10 September. The attacks have caused fundamental changes for so many, and I want to express my sympathies for our SRA members who may have experienced a personal loss of family or

friends. I am also struck by how even those fortunate enough to escape personal tragedy are facing changes in the restriction of our freedom and ease of travel, in our personal finances, in the economics of our communities, in placing our country at war, and in reevaluating our personal priorities regarding what is most precious in our lives.

Some of you may know that I grew up on Staten Island, in some sense in the shadow of the World Trade Center and its twin towers. I remember the great controversy about their design, but also the thrill of eating for the first time in one of the twin towers’ snack bars, where my brother had landed a job as a short-order cook. I currently work in Washington, D.C. On September 11, I experienced firsthand a city being evacuated. I also experienced the phenomenon of strangers assisting strangers in a time of crisis.

I relate these personal accounts because so much of the effects of the attacks have been absorbed in personal terms. Individuals and their communities have been affected, and it remains to be seen how deeply and broadly these changes in our

personal perspectives will influence our planning, decision making, and priority setting. Personal and business relationships have experienced a tremendous shock, and even those who study risk for a living are struggling to place these events in context.

At the same time, our SRA community has helped respond to the heightened attention to risk and uncertainty by communicating our best science and judgments. In numerous areas including risk perception, extreme events, critical infrastructure, exposure analysis, insurance strategies, and risk characterization, members from our community are providing the much-needed frameworks and discipline to examine these events in constructive terms. Our members, and our scientifically based approaches to risk analysis, are helping to create the calm after the storm. Government, industry, and the media are actively seeking

our counsel, and risk analysis has been given a prominent and respected role in developing strategies for the times ahead.

Over the longer term, we will learn a great deal about how well our science and judgments were received and put to use. We will learn as well about the efficacy or relevance of our methods and models in a crisis of this magnitude. Throughout this process, we should not lose sight of the importance of sharing what we learn with other SRA members and with the broader community interested in risk analysis. I am therefore greatly encouraged that SRA is moving forward with plans for a World Congress on Risk. In my view, the need has never been greater for risk professionals and those parties interested in risk issues to have an international forum in which they can exchange knowledge and reinforce the foundations of a global risk community. <<>

The Journal's Focus on the Use of Risk Analysis to Address Various Risks Posed by Terrorists

In concert with the SRA RISK newsletter, *Risk Analysis: An International Journal* is inviting two special collections of papers. The first is an invited collection of perspectives papers from current and past presidents of SRA responding to the question: "How can the methods and approaches we have developed in risk analysis be applied to define the nature and magnitude of the current terrorists' risk?" Secondly, we are inviting a special collection of research papers on assessing various risks posed by terrorists. We expect that the first special collection will be published in the next issue of the Journal; while the collection of research papers will take a longer time to assemble and peer review.

We anticipate that the collection of perspectives papers will expand on the brief articles presented in this RISK newsletter. The research topics are intended to provide broad coverage of our respective fields, including impacts on human health and ecological systems, infrastructure, and the social dimensions of risk. It is my belief that the coverage that we are providing on this topic through our newsletter and our Journal will prove to be a substantial resource for formulating strategies to prevent terrorist risk and limit the consequences of a potential attack.

—Elizabeth L. Anderson, PhD, Editor-in-Chief, *Risk Analysis: An International Journal*

Risk Analysis in an Interconnected World

The Society for Risk Analysis (SRA) 2001 Annual Meeting will be held 2-5 December at the Westin Seattle in Seattle, Washington, with the theme "Risk Analysis in an Interconnected World." Topics to be highlighted include the emergence of computer viruses, food and microbial risks, climate variability, contagious diseases, and children's risks, as well as the usual range of topics.

Three plenary sessions will be featured that focus on risk analysis in interconnected systems, a set of issues critical to discussions about national security. On Monday Mr. Howard A. Schmidt (Corporate Security Officer for Microsoft Corporation) will speak and moderate a panel on "Information Security in an Interconnected World." On Tuesday Howard Kunreuther (Wharton School, University of Pennsylvania) will moderate a plenary session on "Improving Environmental Safety Through Third Party Inspections." On Wednesday, Ragnar Löfstedt (University of Surrey) will moderate a group of panelists on "An Analysis of the European Foot-and-Mouth Crisis: The core policy, risk management, and communication issues."

About 35 oral sessions, 3 poster sessions, 11 poster platform sessions, and 25 symposia were organized for the three-day program. Workshops will be held on Sunday, 2 December (see page 13 of this RISK newsletter).

A number of roundtables is also planned to give participants a more interactive platform relative to what is typically offered in the oral or poster presentation sessions: (1) Education Roundtable: SRA and Students: What Do Students Need? How Can SRA Be Responsive to Those Needs?, (2) Integrating Science Into the Decision-Making Process, (3) Making Analysis and Discourse Work: Structured Approaches and Other Strategies, and (4) Packaging Risk Assessment for Decision Trees: Innovations at the California EMF Program.

Exhibits of risk- and exposure-related products, services, and books will also be part of the meeting. A Best Paper competition is new this year. Preliminary programs have been mailed to members of the Society, as well as to those nonmembers whose abstracts have been accepted, and are available at the SRA Web site (www.sra.org). Final programs will be available at the meeting in December.

Questions? Contact Program Chair Robin Cantor (phone: 202-466-4422, fax: 202-466-4487, email: robin_cantor@lecg.com) or the SRA Secretariat (phone: 703-790-1745, fax: 703-790-2672, email: SRA@BurkInc.com).



Regulatory Risk Review

Crisis and Cost-Benefit Benchmarks

David P. Clarke, American Chemistry Council

After the shocking events of 11 September, it is hard to imagine any American who doesn't feel more exposed to a risk of sudden and perhaps catastrophic attack. In the immediate aftermath of the World Trade Center and Pentagon assaults, crisis dominated the government's activities, pushing aside all other priorities, as security became the top national focus.

But as the government resumed its normal business in ensuing weeks, the workaday issues of science, risk, and cost-benefit analysis and their role within the U.S. regulatory framework moved to the fore of regulatory policy as both Congress and the White House took significant steps in advancing these policies. The significant attention risk and cost-benefit issues received during September and early October underscores their continuing centrality in environmental and other governmental decision-making arenas.

First, on 20 September, John Graham, past president of SRA and the new head of the Office of Management and Budget's (OMB) Office of Information and Regulatory Affairs (OIRA), published an important memorandum on "Presidential Review of Agency Rulemaking by OIRA." Graham's memo to President Bush's newly established "President's Management Council," comprising senior managers of federal agencies, describes how OMB will carry out its review of significant federal regulations, relying on the Clinton-era Executive Order 12866 on "Regulatory Planning and Review."

The Graham memo is highly significant because it makes clear to agencies that they will be held to a high standard of risk and cost-benefit analysis. They must meet these standards if they expect their major regulations to pass OIRA review. If, for example, the quality of an agency's analysis is inadequate, or "if the regulatory standards adopted are not justified by the analyses," OIRA may decide to return the regulation to its originating agency for "reconsideration." To avoid such "return letters," the U.S. Environmental Protection Agency (EPA) may need to dramatically step up the resources it devotes to its program evaluation and economic analysis capabilities. According to recent testimony by environmental policy expert J. Clarence Davies, EPA's capabilities in these areas have eroded in recent years and were finally eliminated under the Browner administration, even as their importance has steadily grown.

In addition, on 28 September OMB issued final guidelines "for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies," with a request for comments. Like Graham's memo, the OMB *Federal Register* notice cites the 1996 Safe Drinking

Water Act's language on using "the best available peer-reviewed science and supporting studies," as well as other risk-related language, as a benchmark standard of quality for the use of science in agency decision making.

Besides Graham's memorandum on cost-benefit analysis and the OMB notice, significant events in the area of EPA science also occurred in Congress over recent weeks. EPA science was not the featured topic of a 21 September hearing by a subcommittee of the House Committee on Government Reform. Rather, the hearing was on H.R. 2438, legislation to elevate EPA to a cabinet-level department. Nevertheless, science issues played a prominent role in the hearing. In his opening statement on the cabinet bill, Rep. Vernon Ehlers (R-MI) said, "[T]he most fundamental reform the EPA needs to make to the regulatory process is to strengthen the role that science plays in the Agency's decision-making process." Peter Guerrero of the General Accounting Office presented testimony arguing, "EPA needs better information to manage risks and measure results."

Combining this recent testimony with numerous other science-related reports, could the message be any clearer?

A few weeks later, at a 3 October markup, the House Science Committee unanimously passed H.R. 64, legislation Ehlers had introduced earlier this year to "strengthen science at EPA" by, among other things, creating a new Deputy Administrator for Science position at the Agency. The legislation grew straight out of a National Academy of Sciences study, involving more than 200 scientists, which concluded that EPA science needs "more clout." Passage out of the Science Committee prepared the way for H.R. 64 to go to the House floor. Whether floor action will occur this year or next remains to be seen. But it is clear that concerns about EPA science will continue to be raised, whether in the form of H.R. 64 or in debates about elevating EPA.

As America becomes an increasingly security-conscious society, adopting various strict measures to defend against future terrorist attacks, it shouldn't surprise anyone that federal regulatory programs are being told to produce decisions more rigorously justified by good use of science and solid risk and cost-benefit analyses. Demands on federal resources are rising, both for security programs and to boost the recession-afflicted economy. Everyone needs money for something important, as evidenced by the mass lobbyist lunge toward President Bush's \$75 billion fiscal stimulus package. For federal agencies convinced that their programs are necessary to serve the public interest, it appears that they'll have to state their case more rigorously than in the past to measure up to the—not new, but set in bolder relief—benchmarks. <<>>

... it shouldn't surprise anyone that federal regulatory programs are being told to produce decisions more rigorously justified by good use of science and solid risk and cost-benefit analyses.



Committees

Conferences and Workshops Committee

Scott Ferson, Chair

The big news from the Conferences and Workshops Committee is the roster of continuing education workshops planned for the upcoming 2001 Society for Risk Analysis Annual Meeting (2 December 2001) in Seattle:

Workshop #1: Methods and Guidance for Health Risk Assessment of Chemical Mixtures—Presenters: Linda Teuschler, Moiz Mumtaz, and Richard Hertzberg

This half-day workshop presents scientific principles and risk-based methodologies for assessing cumulative health risk from exposure to chemical mixtures, including descriptions of current methods and the introduction of state-of-the-art approaches.

The content of this workshop includes a general overview of chemical mixture health risk assessment data evaluation and procedures, a detailed description of several new methods, and hands-on exercises with test data sets. Discussions include real-world examples, exercise results, issues for application of the procedures, and general questions and comments.

Participants are asked to bring a calculator. This course is for anyone interested in chemical mixtures risk assessment. However, basic knowledge of this area is helpful (for example, understanding of additivity concepts, application of the Hazard Index). An overview of the basic tenets and scientific principles will be given, but emphasis will be on additional development of these tenets and presentation of new ideas and approaches. More information on this workshop can be found at <http://www.sra.org/wrkshp1.pdf>.

Workshop #2: Practical Applications of Bayesian Methods in Ecological Risk Assessments—Presenters: John Toll and Robert Fares

The purpose of this introductory half-day workshop is to demonstrate the utility of using Bayesian methods to conduct ecological risk assessments in the context of the U.S. Environmental Protection Agency's risk assessment paradigm. Emphasis will be on practical, step-by-step, cost-effective approaches to the process. Bayesian analysis is very useful in cases where data are sparse or lacking in quality. This half-day workshop will explain the use of probabilistic analyses within the context of ecological risk assessment, as well as methods, limitations, and case studies. The intended audience includes current risk assessment practitioners desiring increased familiarity with Bayesian methods for conducting ecological risk assessments, and this workshop is suitable for persons who have a working knowledge of the ecological risk assessment framework, objectives, terminology, and methods, as well as completion of an undergraduate-level statistics course. No prior experience in probabilistic modeling or development of probability distributions is necessary. More information can be found in the 2001 SRA Annual Meeting Preliminary Program.

Workshop #3: Beyond Point Estimates: Risk Assessment Using Interval, Fuzzy, and Probabilistic Arithmetic—Presenters: Scott Ferson, J. Arlin Cooper, and David Myers

This full-day workshop will introduce the use of interval analysis, fuzzy arithmetic, and probability bounds analysis for propagating uncertainty through calculations in a quantitative risk assessment. These methods can be used even when

data are far too sparse for conventional Monte Carlo methods. Interval analysis underlies any reasonable conception of worst-case analysis, and, although it is less powerful than other methods when empirical information is abundant, it can be used for analyzing uncertainty of all kinds, no matter what its nature or source. An important theme of the workshop is how additional information can be incorporated to tighten the risk estimates in a way that does not require unjustified assumptions. The methods will be applied to several environmental risk and safety assessment problems as examples, including hydrocarbon soil contamination, pesticide misapplication, targeting lead cleanup levels, wildlife exposures to environmental contaminants, extinction of endangered species, and event-tree/fault-tree safety analysis.

A workshop booklet and software CD will be provided to participants. The booklet contains hard copies of transparency illustrations used in the presentations, numerical examples, and references, including instructions for accessing the various Internet resources for interval, fuzzy, and probabilistic arithmetic. The software disk contains source code and executable programs for doing arithmetic with uncertain quantities. Some computers will be available at the workshop to run the provided software and make calculations needed to solve the example problems. Participants are encouraged to bring portable computers if they desire. More information on this workshop can be found at <http://www.ramas.com/interval.htm>.

The price given in the preliminary program for workshop #3 is incorrect. The correct price for this workshop is \$330 on-site registration.

Workshop #4: SRA Food and Water Specialty Group Workshop - Decision Support Tools for Microbial Risk Assessment—Presenters: Richard Whiting, Tom Ross, Don Schaffner, Harry Marks, Mark Tamplin, Greg Paoli, Douglas Crawford-Brown, and Suzanne van Gerwen

The interdisciplinary nature of microbial risk assessment creates a need for decision support tools. Some modeling tools are available for estimating the prevalence and number of bacteria in foods, estimating the amount of food consumed, for modeling dose-response relationships and for risk characterization. In exposure assessment, expert knowledge is needed of the dynamics of growth and death of microbial pathogens in foods. In this workshop we will give a general overview of the tools available, then focus on predictive microbiology and its use in expert systems for microbial risk assessment. The science of predictive microbiology will be considered in the morning sessions. In the afternoon, the focus will be on expert systems for use in microbial risk assessment. An interactive panel discussion and brainstorming session will provide opportunity for dialogue between speakers and participants about specific questions relating the science and judgment in predictive microbiology and microbial risk assessment. The global importance of food safety and microbial risk assessment merits participation from industry, academia, government scientists, and risk assessors in this full-day workshop featuring some of the world's leaders in the science of predictive microbiology and the decision theoretics of risk analysis. An extensive manual of materials will be provided as both a compilation from the presentations and supplemental materials. CDs

will be distributed to participants for the Agricultural Research Service Pathogen Modeling Program and perhaps other applications. More information on this workshop can be found at <http://www.sra.org/wrkshp4.pdf>.

Workshop #5: Ecological Effects Characterization and Interpretation for Arid Ecosystems—Presenters: Randall Ryti, Jim Markwiese, and Bruce Hope

Ecological risk assessment (ERA) is a process used to estimate adverse effects on the environment from chemical or physical stressors. Substantial tracts of land in the southwestern and western United States are undergoing or will require ERA. While ERA is a rapidly emerging field receiving much attention, ERA guidance for arid ecosystems is largely absent. This course is specifically designed to enhance the understanding of ERAs that have been or will be conducted in arid ecosystems. More information on this workshop can be found at <http://www.neptuneandco.com/eecai.html>.

Workshop #6: FRAMES 1.3 and MEPAS 4.1.2 Hands-On Workshop—Presenters: Randal Taira, John Buck, and Christa Knudson

The purpose of this full-day workshop is to introduce new users and orient previous users to the new versions of the popular environmental modeling and risk assessment software FRAMES (Pacific Northwest National Laboratory) and MEPAS (U.S. Department of Energy). Workshop attendees will learn how to use FRAMES to set up a conceptual site model and perform multimedia contaminant fate and transport modeling for a risk assessment. Attendees will also learn how to integrate their own models into FRAMES. This workshop is intended for people involved in multimedia contaminant transport modeling and also human health and environmental risk assessors. If you bring your own computer, the minimum computer requirements for this course are (1) Windows 95/98 (Win Me and Win 2000 not fully tested), (2) 20 Mb hard drive space, (3) 32 Mb RAM, and (4) Microsoft Excel 97 or later to view graphical output. More information can be found at <http://www.sra.org/wrkshp6.htm>.

History Committee

Paul Deisler, Cochair

The three Historians, Paul Deisler (in Texas), Richard Schwing (in Michigan), and Jeanne X. Kaspersen (in Sweden), continue to make progress on the writing of a history of the Society for Risk Analysis (SRA). The history will include a description of the scientific climate, the regulatory environment, and the motivations that kindled the founding of *Risk Analysis: An International Journal* (first) and the Society (second). A chronological history of the SRA will cover the presidencies up to the end of the year 2000 and include brief descriptions of developments in the environment external to the Society. Special sections will address the history of the SRA's various outreach activities: its annual meetings, journal, newsletter, Web site, e-communications and workshops; the formation of SRA-Europe, SRA-Japan, chapters in North America, and other efforts to spread out across the globe; an account of the formation of various specialty groups; and a history of interdisciplinary integration in the Society. Among other issues under consideration are a history of the development of a position on the Society's taking positions on public issues; other risk-related societies and their effects on the Society;

interactions with other societies; and interactions with government, industry, and nongovernmental organizations.

Drafting of several of the segments and relevant tables is well underway. One thing is clear to the authors, however: although the work is progressing, it will certainly be well into next year before drafts of all the segments are in hand. Even then the authors will need to integrate their various contributions into a single, coherent, draft history suitable for review. Only after the review process runs its course will the authors prepare a final draft revision for publication.

Public Policy Committee

Jack Fowle, Cochair

“Science Advisory Panels: Balancing Expertise and Impartiality”

The Society for Risk Analysis (SRA) Public Policy Committee cosponsored a luncheon briefing with the American Chemical Society's Risk Education Project in Washington, D.C., on 21 August 2001 titled “Science Advisory Panels: Balancing Expertise and Impartiality.” It drew a crowd of 101 people, including 32 Congressional staffers, 14 staffers from the Executive Branch, and 4 reporters.

Detailed scientific advice on policy issues is often critical to government decision making. Frequently, such expertise is provided through federal advisory committees made up of credible and informed scientists, engineers, and others. Identifying an expert panel that is independent or represents a balance is a challenge. The briefing reviewed the difficulties in assuring unbiased scientific advice for policy makers, highlighting the recent U.S. General Accounting Office (GAO) report on the Environmental Protection Agency (EPA) Science Advisory Board (SAB) (GAO-01-536).

Dr. Gail Charnley, Principal of Health Risk Strategies and Past President of SRA, moderated. She opened the session by noting that science is a necessary but insufficient input for decision making and that, while science can tell us about some things with a fair degree of certainty (for example, the speed of light), great uncertainty surrounds many aspects of environmental science. Science advisory boards were invented to provide peer review and ensure that the best science can be brought to bear to inform government decisions.

Regulatory Requirements Based on “Sound Science”

The first speaker was Mr. David Wood, Director of Natural Resources and Environment at the GAO. Wood is responsible for leading audits and evaluations concerning a range of federal environmental issues, policies, and programs. He noted that Congress and the public want assurance that regulatory requirements are based on “sound science.” Much study has occurred over the past decade on the adequacy of the science base at EPA by the Agency itself, the National Research Council, and others. The GAO's objectives for evaluating the EPA SAB were to determine whether the Board's policies and procedures are adequate to insure that peer-review panelists are independent, that the panels are properly balanced, and that the public is sufficiently informed about point of view represented on the panel.

GAO obtained documentation and information about the Board's policies and procedures as well as its implementation on four specific panels. GAO found that policies and procedures had limitations that reduced their effectiveness in that they did not provide for (a) determining exactly what conflict

of interest provisions, if any, the panels are subject to, (b) routinely insuring that prospective panels' financial disclosure forms contain sufficient information to potential conflicts of interest, (c) systematically requesting other information pertinent to assessing independence and overall balance among panelists, (d) adequately training panel members on the financial conflict-of-interest requirements and other issues, (e) systematically "balancing" viewpoints on panels, and (f) sufficiently informing the public about the points of view represented on the panel.

Wood noted several policy/procedural changes were needed, including (a) determining which conflict-of-interest provisions apply to each panel, (b) obtaining and evaluating relevant background information before appointing panel members, and (c) developing criteria for, and guidance on, the process to be used by SAB staff to achieve proper balance of viewpoints.

In closing he noted that the Board expressed general agreement with the report's findings and recommendations, and he thanked the Office of the Science Advisory Board (OSAB) for its cooperation during the review.

OSAB and GAO

The next speaker was Dr. Donald Barnes, Director of the SAB Staff. He opened his presentation with the caveat that if he should be caught or killed, the Agency and the SAB can legitimately disavow any knowledge or agreement with these statements.

He then stated that you learn more from your critics than from your admirers. But being the subject of a GAO investigation is not the totally unalloyed pleasure that it has been cracked up to be. He stated that the OSAB had a good working relationship with GAO folks, and that they have a high regard for GAO's professional behavior during the course of the project.

To avoid mischaracterizing the findings of the report, Barnes said that it was important to clarify the charge with respect to what the audit covered and what it didn't cover. And it is also important to make a distinction between SAB itself, which is composed of independent scientists brought in from around the country to advise the Agency, and OSAB staff who are the career federal employees who administer the processes and procedures that the GAO recommends improving. The GAO made it clear that its recommendations refer to the need to improve the staff processes and procedures. Barnes said that the shortcomings and the responsibility to fix them are, ultimately, his responsibility.

Barnes reported that the GAO focused on two points in its audit: (a) Do the policies and procedures of the OSAB ensure that SAB panels are independent and balanced? and (b) Do the policies and procedures of the OSAB ensure that public is sufficiently informed about points of view represented on the panels? Regarding both points, Barnes reported that the GAO answered no.

With respect to the first point, this does not mean that panels were corrupted or unbalanced; rather, it means that the SAB staff's policies and procedures could not ensure (that is, document) that they were independent and balanced. For example, his staff could not find some Confidential Financial Statements, supplied by the Members and reviewed by the Staff to judge whether there was a conflict of interest. Barnes said that there is no excuse for this breach of responsibility and trust. However, it is important to note that while this action negatively impacts the Members who provide this information in confidence, it does not compromise the independence or balance of the panel. In each case, Barnes attested that the documents were examined and assessed, but he and his staff could

not provide the evidence that this was the case.

With respect to the second point, Barnes noted that there is more that he and his staff can do and have started doing to provide greater information for and involvement of the public. But, the fact is that the OSAB's guide for public involvement has been the Federal Advisory Committee Act (FACA) and the General Services Administration (GSA) regulations implementing FACA. As a consequence, the staff has always informed the public of all SAB meetings through notices in the *Federal Register*, provided opportunity for public input at SAB meetings on the technical issues being discussed at the meetings, and, as best they could, provided prompt publication of minutes of meetings on its Web site.

In its report, the GAO has made a number of recommendations for expanding, beyond FACA, opportunities for public input and access to the SAB panel selection process. The OSAB is pursuing a number of these recommendations.

Barnes said that the effect of the report is that a number of good things are underway. For example, the SAB staff has developed procedures to tighten up its performance. In addition, it is implementing a series of steps to expand public awareness of and public involvement in the SAB Panel selection process, going beyond what the law requires, and perhaps what the Agency and even the SAB Executive Committee might desire.

The SAB Executive Committee has established a joint Member/Staff committee to look at the GAO report, to make recommendations, and to oversee the implementation of the required changes by the Staff.

Barnes noted that some bad things have also happened. Gross overstatements have been irresponsibly made about the GAO report demonstrating "industry mouthpieces" exist on the SAB. A major newspaper has editorialized about "serious procedural flaws that suggest that members of the SAB are rife with conflicts of interest . . ." and called upon the Administrator to ". . . weed out conflicted advisers . . ." Such comments conjure up a pretty dark picture of the SAB, one in which nearly every member is engaged in some kind of a conspiracy to do damage to the public good.

Barnes distributed a graphical presentation of the "home addresses" of SAB members for the past 10 years to give the participants a different view of the Board, one in which less than 20% of the members are from industry. While "home address" certainly doesn't tell the whole story, Barnes suggested that it should give one pause before buying into the worst-case scenario regarding the SAB.

Barnes noted that, unfortunately, incomplete and uninformed statements have a way of being passed on and developing into urban legends that perpetuate myths based on precious little initial fact. He stated that, sadly, predeterminations—litmus tests—based on only narrowly defined relationships are uncomfortably close to the kind of thinking that leads to the practice of racial profiling, concerns about someone of the Catholic faith being President of the United States, and the kind of single-issue thinking that closes avenues of discussion, rather than opening them. He stated that we should resist such voices.

In closing, Barnes said that the GAO has been helpful in revealing limitations in the OSAB operations. It has presented the OSAB with opportunities for making the SAB, with its well-earned reputation for high quality and high integrity over many years, even better in the future. He noted that there will be a cost, however. In order to implement the full range of changes outlined, there will have to be about a 30% reduction

in the output of the Board.

Barnes said that he believed that there is more agreement here than disagreement. In that spirit, he looks forward to working with all parties to ensure that the best scientific advice is brought to bear on the important issues of environmental protection and public health.

ACC Supports GAO's Efforts

In addition to the two featured speakers, there were two respondents. The first, Dr. Carol Henry, is the Vice President for Science and Research at the American Chemistry Council (ACC, formerly the Chemical Manufacturers Association).

Henry said that the ACC supports the GAO's efforts to improve the shortcomings in OSAB's processes, and she noted that the preliminary OSAB reaction to the GAO report was very responsive. She said that the ACC supports the use of peer review as it is a time-honored process to improve science by involving those who have no involvement in the science being peer reviewed. The National Academy of Sciences report "Strengthening Science at EPA" reinforced the need for peer review and the separation of the management of the work being peer reviewed from the management of the peer review of that work. Henry emphasized the need for peer reviewers to disclose any conflicts, real or potential, and she said that when in doubt, the ACC encourages its reviewers to err on the side of disclosure. She also emphasized the importance of having peer-review panels that are balanced in the sense that there is a balance of interests among the panelists. She talked about the resource embodied in scientists who have associations with industry and how that association does not/should not disqualify them.

Deficiencies in SAB's Appointment Process

The other respondent was Mr. David Adelman, then a senior attorney with the Natural Resources Defense Council's (NRDC) Nuclear and Public Health Programs. Adelman noted that he would be leaving NRDC in September to join the law faculty at the University of Arizona.

Adelman referred to the flawed appointments process for EPA SAB Committees and began his response by commenting on EPA's Integrated Risk Information System (IRIS) program. He stated that the IRIS process is industry dominated because industry generates much of the data, industry funds some of the reviews, and industry influences SAB reviews through the appointment process. Thus, he believes that IRIS reviews make it critical that EPA's science advisory committees be independent and balanced. Further, he believes that the evidence indicates that SAB committees are dominated by industry-affiliated scientists.

Adelman stated that the deficiencies in the SAB's appointment process, as noted by GAO and others, are that OSAB does not obtain or provide adequate information. Adelman indicated that the SAB appointment process is a "closed door" process and that the current SAB emphasis on having folks "from the broad middle" is misplaced. He said that the SAB should adopt a systematic and objectively based process for selecting panel members that is fully transparent.

Adelman stated that the Board's 1,3-butadiene review was flawed and biased and that, as a result, the SAB inconsistently used human and animal data in that human data trumped animal data for classification purposes but that, elsewhere, animal data trumped human data. Further, the SAB rejected (without a convincing argument) a three-fold uncertainty factor suggested by the Agency. Because of the bias among panel members, the results of this review are in question. It is important to ensure

balance and a lack of conflicts among SAB panel members.

Adelman noted that besides peer review there are other different kinds of reviews. They do have certain aspects in common with peer review. Judicial review is very formal, but it is not concerned about conflict of interest (COI). On the other hand, peer review is less formal, but it is more concerned about COI. He said that there are ways to deal with COI, for instance waivers. However, bias balancing should be more transparent. He felt that among the important information that is currently missing from consideration are data about sources of research funding. There should be a publicly accessible summary of the panel composition and the process that led to the final selection.

Adelman stated that the remedy to the problems is that no prospective SAB panelist should be allowed to serve if s/he has a personal or institutional pecuniary interest in the outcome of the review. Further, before appointing the members of a science advisory committee, EPA must first (a) describe each panelist's background and make such information on each candidate and consultant available on the SAB Web site and the *Federal Register*, with the information at a minimum including employment history, research experience, funding sources during the five-year period immediately preceding the candidate's nomination, professional affiliations, education, and prior advisory committee experience, (b) provide a 30-day public comment period on the proposed committee membership, (c) maintain a balance of member perspectives by ensuring that a member whose background information reasonably indicates that s/he may have a preexisting opinion about the subject matter is offset by a member with an opposing perspective, and (d) issue a publicly available committee composition statement following final committee membership. The statement will discuss the perspectives of each committee member, any member's personal or institutional pecuniary interest in the matter, the basis for determining that his/her participation is necessary, and procedures taken to balance the panel membership.

Questions and Answers

A question-and-answer period followed. Among the items that arose during the discussion period following the presentations were:

1. How do people get on the SAB? What is their compensation?—Barnes noted that there were several avenues to Board membership: Biannual *Federal Register* solicitation, a newly instituted targeted *Federal Register* notice for particular panels, Web site six-month calendar, direct contact to organizations, SAB members, and Agency. He also stated that the compensation for SAB panel members is \$270/day plus expenses. Adelman responded that SAB needs to look at a broader range of expertise. At this point Barnes pointed out that expertise is determined by the Charge. It is demonstrated expertise to answer the charge questions that gets a person to the table, not the matter of "representing" a particular group. Barnes went on to emphasize the importance of getting the Charge from the Agency 90 days before the meeting in order to involve the public, according to the new procedures that he outlined in his talk. The SAB only gives advice on the technical issues; other issues are legitimately important and need to be discussed, but not at or by the SAB. He used the arsenic review as an example: the SAB recruited experts who had demonstrated expertise in being able to answer the question about how the Agency used the Economics Guidelines to conduct the cost/benefit analysis. A person who wished to raise social concerns or who had fundamental objections to the Guidelines would

not be appropriate for such a review.

Adelman noted that there is little input from public interest groups. Henry agreed and encouraged that there be a list of qualified candidates from that community willing to serve on advisory panels.

2. Would the SAB select a nonchemical expert to sit on a chemical-specific panel?—Barnes answered yes. He gave as an example the dioxin reassessment in which there were both dioxin-specific experts and general risk assessment experts involved. In some cases, a chemical-specific expert might be so close to the issue that s/he would be asked to serve as an Invited Expert, but not sit on the panel. Adelman noted that it is not always easy to separate the science from the policy (for example, need to make assumptions, etc.) and, therefore, Barnes's description is overly simplistic. Expertise is important, but so is balance.

3. Does SAB have the ability to change the Charge?—Barnes said yes and explained how the Board "negotiated" the Charge with the Agency and gave the example of the five questions that SAB added to the dioxin Charge. He went on to say that under the new procedures there is the added importance of getting the Charge early.

4. The problems that the GAO found were more than just procedural, weren't they?—Barnes indicated that while he did not want to rehash any particular review in this forum, he felt if some decisions were to be remade today, they might be different. For example, he might pursue getting a waiver for some panelists in some cases. He noted that the new FACA regulations effectively grant an automatic waiver to panelists in regards to any COI arising from their connection with their primary employer. He went on to object to the notion of any sort of "litmus test" whereby someone would be automatically disqualified because of an "address problem." Some folks have raised concerns about "4 out of 17" panelists being from industry. Is that too many? If so, by what reckoning? Some might conclude that that number is neither surprising or inappropriate. Is three too many? Where is "balance"? What are you trying to balance? etc.

5. Should there be a new, relook at the 1,3-butadiene assessment document?—Henry said that disclosure was the key, which did take place for this review. You are looking for expertise, and industry has a lot of it. Excluding that fund of knowledge would be shortsighted and actually work against the goal of having better science to inform decisions. Wood said that the GAO did not make a judgment about any person or panel vis-à-vis whether it resulted in a good/bad report. That decision is

up to the Agency to make. However, he did not think that just because a person was from industry that s/he should be disqualified from serving on the panel, nor would it necessarily undercut the review, per se. Adelman felt that the review should be redone. He made a distinction between COI, which can be easily addressed by looking at any pecuniary interests, and balance-of-bias, which is more difficult to address. The NRDC is primarily interested in the COI issue. Barnes did not recommend that the report be redone. The Board has given its advice, and it is up to the Agency to deal with it. The Executive Committee has affirmed the SAB's past work, but is also serious about addressing GAO concerns.

6. The chart depicting SAB members' distribution by address is simplistic. Sources of funding are important, also. Is the SAB prepared to look more deeply at the sources of funding for panel members?—Barnes said that the OSAB was going to look more deeply, within the dynamic tension limits of right-to-know versus privacy. He described the visit of Dr. Linda Greer and Adelman, both of NRDC, to the Agency's Deputy Administrator to encourage efforts to get additional information beyond the OGE-450, that is, the use of "an alternate 450" to collect additional data. There has been some progress in that area, but the information would still be confidential. There have been efforts to experiment with voluntary sharing of introductory, background information about panelists at the meeting, on the Web site, in writing, etc. We need to be sure that we know what information is being sought for what purpose. Henry said that there are limits as to how much information should be collected and shared. At some point, we cross the line in ferreting out information about financial holdings, associations, holdings of immediate family, etc. Don't put up too many barriers. Beyond a certain point, scientists will simply choose not to participate, especially the young scientists whose best near-term personal interests are served by staying in the lab and doing research, as they seek tenure. A list of qualified public-interest scientists would be useful. She hasn't seen one yet. Adelman felt that the information being requested was not excessive. He cited the changing practices of certain medical journals (for example, *New England Journal of Medicine* and *Nature*) as examples of the changing attitude in the professional field. He recommended that ways be found to provide additional assistance to young faculty.

7. One participant faulted "everyone," specifying Barnes and the SAB by name, for using the same old set of advisors. He encouraged the use of more young, fresh faces.—Time did not permit a response. <<>>



Chapter News

Greater Pittsburgh Chapter

Lee Ann Sinagoga, Secretary

Recent Seminars

On 28 July 2001, Mr. Tom Biksey of Environmental Strategies Corporation presented an ecological risk assessment workshop titled "Ecological Risk Assessment: How is it performed? What is it used for?" The workshop provided an overview of (1) fundamental ecological risk assessment theory, (2) the methods currently used to conduct an ecological risk assessment, (3) the current guidelines and policies that drive ecological risk assessment, and (4) the various challenges that scientists

face when conducting ecological risk assessments.

Approximately 25 environmental scientists and students attended the workshop. The workshop concluded with an informal lunch and a naturalist-led walk on the trails at the Frick Environmental Center in Pittsburgh, Pennsylvania.

Upcoming Brownfields Seminar Sponsored by Greater Pittsburgh Chapter

"Residential Development of Brownfields: Sheep in Wolf's Clothing" was presented by Dr. Michael Greenberg on 23 October 2001 at Duquesne University in Pittsburgh. In this presentation, Greenberg, Professor and Associate Dean of the Fac-

ulty at Rutgers University, discussed issues involving the residential development of former brownfields. The presentation addressed several topics that are of local interest in light of recent brownfields development in the Pittsburgh region (for example, do people want to live on brownfields?). Attendees were invited to present posters on issues related to brownfields.

Chapitre Saint-Laurent, SETAC-SRA

Louise Champoux, Vice President; Sylvain Loranger, Past President; Gaston Chevalier, Chairman of the 2001 Annual Symposium

This year, the Society of Environmental Toxicology and Chemistry-Society for Risk Analysis (SETAC-SRA) Chapitre Saint-Laurent held its fifth annual symposium at the "Institut de Tourisme et d'Hôtellerie du Québec" in Montreal, 14-15 June 2001. The theme was "Environment, Health, and the Urban Ecosystem: from Research to Application." The symposium was a great success, with over 120 participants from academia, government, and industry in addition to private consultants.

The first day of the symposium started with a plenary session with our guest speaker, Dr. Mark R. Servos, SETAC President, who discussed the role of our organization in the context of market globalization and the environment.

He was followed by two keynote speakers: Dr. Renaud Vincent, toxicologist from Health Canada, who discussed the health effects related to air quality in urban environment, and Mr. Pierre B. Meunier, lawyer with the firm Fasken Martineau and DuMoulin, who presented legislative and administrative aspects related to environmental health in Quebec and Canada.



Guest and Keynote speakers of the plenary session (from left to right): Renaud Vincent; Mark R. Servos, SETAC President; Sylvain Loranger, Chapitre Saint-Laurent Past President; and Pierre B. Meunier.

This plenary session was followed in the afternoon by two parallel platform sessions of four presentations each and a dynamic poster session with 22 presentations.

After the first day's scientific program, the Chapitre Saint-Laurent held its annual corporate meeting, during which the 2001-2002 Board of Directors was selected: President Anne-Marie Lafortune, Quebec Center of Expertise in Environmental Analysis; Vice President Louise Champoux, Canadian Wildlife Service, Environment Canada; Treasurer Raynald Chassé, Quebec Center of Expertise in Environmental Analysis; Secretary Monique Boily, TOXEN Center, UQAM; Past President Sylvain Loranger, QSAR Risk Assessment Service, Inc.; and Directors Louis Martel, Quebec Center of Expertise in Environmental Analysis; Christian Gagnon, St. Lawrence Centre, Environment Canada; and Paul Benoît, Quebec Center of Expertise in Environmental Analysis. We wish to thank the members of the past Board of Directors for their work and welcome the new ones.

The second day began with another set of parallel platform

sessions allowing the presentation of 15 communications. After lunch, a workshop was held on the theme "Human and Ecological Risk Assessment in Quebec: State of the Question." Under the direction of Meunier, the following participants were invited to address this topic: Mr. Serge Barbeau, City of Montreal; Dr. Luc Lefebvre, Quebec Ministry of Health and Social Services; Dr. Lorraine Rouisse, Sanexen Environmental Services Inc.; and Dr. Raynald Chassé, Quebec Center of Expertise in Environmental Analysis.



Panel of Friday's Workshop, (from left to right): Luc Lefebvre, Lorraine Rouisse, Pierre B. Meunier, Serge Barbeau, Raynald Chassé, and Sylvain Loranger, Chapitre Saint-Laurent Past President.

The symposium ended with the Student Awards presentation and the two \$2,000 grants offered by the Chapitre Saint-Laurent to MSc and PhD students. The laureates were Ms. Christina Florina Balasoïu, of the Polytechnic School of Montreal, for her MSc research project "Influence of Soil Composition on Metal Speciation and Toxicity in CCA Contaminated Soil" and Mr. Driss Barraoui, of the INRS-Eau, for his PhD research project "Toxicological Safety of Decontaminated Municipal Sludge and Agricultural Valorization."



2000-2001 MSc Award (from left to right): Executive Secretary Monique Boily, President Anne-Marie Lafortune, and, receiving her grant, Christina Florina Balasoïu.

Best oral presentation awards were given to Mr. Stéphane Pillet, of the INRS-Santé, (first prize: \$200 from CIRTOX) for his oral presentation "Identification of Metallothionein in Grey Seal Peripheral Blood Leukocytes and their Possible Modulator Action in the Immunotoxicity of Heavy Metals" and Mr. Jean Sébastien Bolduc, of the TOXEN Center, (second prize: \$50 from SETAC) for his oral presentation "Cadmium Intracellular Localisation with Coloured Print Systems: Confocal Microscopy and DCC Camera."



Best Oral Presentation (from left to right): Alice Hontela, Head of TOXEN Center, UQAM, Stéphane Pillet receiving his student award, and Gaston Chevalier, Symposium Chairman.

Best poster presentation awards were given to Ms. Amélie Gravel, of the TOXEN Center, (first place: \$200 from Chapitre Saint-Laurent) for her poster presentation "Sensitivity of Hypothalamo-Hypophyso-Interrenal Axis to Cd: Comparison of Young and Adult Yellow Perch, *Perca flavescens*" and Mr. Martin Pelletier, of the INRS-IAF, (second place: \$50 from SETAC) for his poster presentation "In Vitro Activation of Hu-

man Neutrophils and In Vivo Induction of Neutrophilic Infiltration by Dieltrin.”

We thank everyone who helped us to make this Symposium a success. The Chapitre Saint-Laurent is also grateful to our sponsors for their generous financial support: Hydro-Québec; QSAR Risk Assessment Service; INRS-Eau, University of Quebec; TOXEN Center, University of Quebec at Montreal; CIRTOX, Centre Interuniversitaire de Recherche en Toxicologie; Ministry of Health of Quebec (RRSSS-Montreal Centre); Quebec Center of Expertise in Environmental Analysis; St. Lawrence Centre, Environment Canada; and SETAC.

Our next annual symposium will be held in Quebec City at the Royal Palace Hotel, 6-7 June 2002. Those interested in participating in its organisation are invited to contact a member of the Board of Directors.

All through the year, the Board of Directors, which met six times, has worked hard to promote and favour the development of the Chapitre Saint-Laurent through its activities and committees. Apart from the annual symposium, the Chapitre Saint-Laurent also organized, jointly with the TOXEN Center, two seminars in Montreal.

Also of interest, a new Chapitre Saint-Laurent Grant Program for MSc and PhD students was launched. This program consists of two grants totaling \$4,000. More details on this Grant Program as well as additional information about the Chapitre Saint-Laurent and its activities can be obtained from our new Web site (<http://chapitre-saint-laurent.qc.ca>).

New England Chapter

Karen Vetrano, Secretary

New Officers

We congratulate the newly elected officers of the New England Chapter of the Society for Risk Analysis (SRA-NE): President Joseph Regna, President-elect Marion Harnois, our re-elected Secretary Karen Vetrano, and our re-elected Treasurer Arlene Levin.

We give immense thanks to our outgoing President Harlee Strauss who now fulfills the role of Past President. Harlee's efforts in the past year produced stimulating and lively seminars on issues important to risk assessors—from the precautionary principle to asthma and the environment and everything in between. Also, her hard work helped to nurture a context for the thoughtful application of our knowledge, skills, and concern for the critical task of protection of the public's health and the environment.

2001-2002 Seminar Series

As we begin our 17th year, our new President, Joseph Regna, has organized the seminar series around the themes of (1) the risk assessment of workplace hazards, (2) the risk assessment of physical hazards, (3) scientific knowledge and policy disputes and the use of science in conflict situations, (4) alternatives to risk assessment, and (5) controversial ideas and issues in toxicology and risk assessment.

On 12 September, the day following the tragic events associated with the terrorist attacks, we were fortunate to be able to welcome Mr. Albert Donnay, an independent environmental health engineer and certified carbon monoxide (CO) analyst. His presentation was prefaced by a brief moment of silence for everyone and everything touched by the tragic events. His presentation, “Rethinking Dose Response Curves in Terms of History, Habituation, and Heme Oxygenase: Why Paracelus

Was Wrong, Poe Was Right, and Ozone Helps Asthma,” focused on why “the dose” does not always “make the poison,” why “what you mistake for madness is but overacuteness of the senses,” and why several studies report that increasing exposure to ambient ozone is consistently associated with declining measures of asthma. Donnay also presented us with a vast array of resources on CO poisoning and multiple chemical sensitivity.

The 10 October seminar featured speakers Linda Cocchiarella, MD, MSc, who presented on the topic of “Occupational Stress: Health Risks and Preventive Strategies,” and Sanford Lewis, Esq., Environmental Attorney, who presented a talk titled “Corporate Duties to Report Emerging Risk Issues to Investors.”

For the 24 October special session we welcomed Kristin Shrader-Frechette, PhD, Professor of Philosophy and concurrent Professor of Biological Sciences and Environmental Sciences at the University of Notre Dame, who addressed the topic “Democratizing Risk Assessment.”

The upcoming seminar dates are 14 November, 16 January, 20 February (special session), 13 March, 10 April, 8 May, and 12 June.

SRA-NE Membership

To become a member of the SRA-NE chapter, contact President Joseph Regna (phone: 617-623-2856, email: josephregna@hotmail.com) or Secretary Karen Vetrano (phone: 860-298-6351, email: kvetrano@trcsolutions.com).

Research Triangle Chapter

Paul Schlosser, President

On Friday, 5 October, the Research Triangle Chapter of the Society for Risk Analysis (RTC-SRA) sponsored a seminar by Jane P. Staveley, MSPH (coauthors James N. Christman and Shawn L. Sager), ARCADIS Geraghty & Miller, Research Triangle Park, NC, on “TMDLs (Total Maximum Daily Loads): Regulatory Impacts Beyond the Clean Water Act.” Dr. Staveley explained that as the TMDL provisions of the Clean Water Act (CWA) are implemented, increasing focus will be placed upon control of nonpoint sources, which are responsible wholly or in part for approximately 90% of the waters listed nationwide as “impaired.” These sources are often not managed under CWA programs and include atmospheric emissions, discharges of groundwater contaminated by past waste disposal practices, surface runoff from inadequately controlled landfills, historically contaminated in-place sediments, and the legal application of pesticides and herbicides. Thus there is significant potential for overlap and conflict between the TMDL regulations and other regulations such as the Clean Air Act. Examples of how such overlaps have been handled were given.

The RTC will hold a fall meeting on Monday, 26 November, with a concurrent social mixer and poster session followed by a seminar by this year's student travel award winner. The meeting will begin at 5:15 p.m. with the seminar at 6:30 and is currently being planned at the offices of ARCADIS Geraghty & Miller in Research Triangle Park. Registration will be \$5. Hors d'oeuvres and soft drinks will be provided, with beer and wine available for a nominal donation. This will be a good opportunity to meet others from the risk assessment community living in the Research Triangle area! RSVP to Paul Schlosser (schlosser@ciit.org) if you are interested in attending. Include a title and author list (no abstract) if you would like to present a poster at the meeting.

More information about the Research Triangle Chapter can be found via our Web site at <http://www.rtc-sra.org>.

Ohio Chapter

Steve Weldert, President-elect

It has been another exciting year for the Ohio Chapter of the Society for Risk Analysis (OSRA), currently with 95 active members. Current Chapter officers are Femi Adeshina (President), Steve Weldert (President-elect), Glenn Rice (Immediate Past President), Ken Poirier (Treasurer), Patricia Nance (Secretary), and Deborah Gray and Ed Pfau (Councilors).

Ohio Chapter's Web site is now up and running thanks to the diligent efforts of Chapter Secretary Nance. The site lists Chapter events, names current officers, and gives membership information for the Ohio Chapter. There is even a convenient online membership application! The site can be accessed from the SRA Web site or directly at <http://www.geocities.com/ohiosra>.

OSRA presented a poster at the Environmental Protection Agency/Department of Defense Toxicology Conference held in Fairborn, Ohio, 23-26 April. The poster was presented to

increase awareness of the Chapter's activities and persuade interested individuals to join.

A workshop on Pharmacologically Based Pharmacokinetic (PBPK) Modeling was presented on 24 May. This day-long workshop presented the foundations of PBPK modeling and a hands-on laboratory with many of the more commonly used simulation tools. Our thanks to presenters Michael Gargas, Jim McDougal, Lisa Sweeney, and Christopher Kirkman for this informative workshop.

A brown-bag seminar titled "Paths and Pitfalls in Evaluating the Groundwater to Indoor Air Exposure Pathway" was presented by John Lowe on 11 September at the Cincinnati Environmental Protection Agency building. Dr. Lowe gave some valuable insights to this sometimes confusing, often misunderstood exposure pathway, including the Johnson and Ettinger screening model, air sampling, and mitigation strategies. For those interested in this topic, the presentation slides are available on our Web site. <>>



Specialty Groups

Ron Brown, DRSG President-Elect

The Dose-Response Specialty Group (DRSG) holds tele-forums three times a year on topics relating to dose-response assessment. In the 4 September 2001 tele-forum, Dr. Jim Wilson of Resources for the Future discussed an approach for defining the human dose-response relationship for dioxin-induced chloracne from published epidemiological data. He noted that the high variability in pharmacodynamics among rodent species and strains for dioxin-induced effects makes it preferable to use human data to estimate human risks. To participate in a future tele-forum or in the monthly teleconference meetings of the DRSG, call 202-260-7280, access code 0577#. All are welcome to participate. The calls are held on the first Tuesday of each month from 3:30 to 4:30 p.m. (EST).

The DRSG is sponsoring a number of symposia at the Society for Risk Analysis Annual Meeting. These sessions include: Children's Risk: Assessment, Valuation, Management, and Com-

munication—M4; Assessing Children's Risks from Environmental Exposures: A Framework—M12; Children's Risk From Environmental Toxicants—M20; When Model Meets Data in the Respiratory Tract—M15 and M23; Criteria for Use of Compound Specific Adjustment Factors—T14; Applying QSAR Models in Dose Response Assessment—T15 and T23; Technical Issues in Dose Response Assessment—W4; Development and Applications of PBPK Models—W12; Implications of Human Variability for Risk Assessment—W15; Specific Applications in Dose-Response Assessment—W19; and Benchmark Dose Analysis—W22.

In addition, the DRSG will hold a mixer at the SRA Annual Meeting on Monday, 3 December, from 6 to 7 p.m. All are welcome to attend. Dr. Elaine Faustman will serve as the keynote speaker. Faustman is Professor of Environmental Health in the Toxicology Program at the University of Washington and is Director of the Institute for Risk Analysis and Risk Communication and the Center for Child Environmental Health Risks Research at the University of Washington. <>>



SRA-Europe

Important News for SRA Members Resident in Europe

Since the beginning of October, the Society for Risk Analysis-Europe (SRA-E) Secretariat has been in operation. It is based at In Conference, The Stables, 10B Broughton Street Lane, Edinburgh EH1 3LY, Scotland; phone: +44 (0)131 556 9245; fax +44 (0) 131 556 9638. The contact person is Margaret Sherry, email: margaret@in-conference.org.uk.

For some time now the Executive Committee of SRA-E has been working with the SRA Council on the setting up of a secretariat to serve the needs of SRA members based in Europe. This was one of the decisions taken as part of the Concordat recently agreed between SRA-E and SRA (Third Quarter RISK newsletter, page 8).

The SRA-E Secretariat will support members of the Executive Committee of SRA-E and will act as an initial contact point for European members. It will maintain a register of European members, updated at regular intervals, including Central and Eastern

European countries in close contact with the SRA main office in the USA; act as a first point of contact for queries from European members of SRA; (in a supporting role to the SRA-E Executive Committee) develop and implement a strategy for stimulating SRA membership in Europe; through provision of membership lists and other secretarial duties, support the organisation of the SRA-E annual conference; administer the annual election process for SRA-E Executive Committee members; maintain the SRA-E Web site; act as a long-term location for the SRA-E bank account and support the Treasurer in keeping the accounts up to date on a professional, annually audited basis; and support the Executive Secretary and the President of SRA-E in preparation of agendas, minutes of meetings, and organisation of Executive Committee meetings.

We hope our European members will make full use of this service. <>>



SRA-Japan

Second Asian Symposium on Risk Assessment and Management (SASRAM 2001)

The Second Asian Symposium on Risk Assessment and Management (SASRAM 2001) will be held 23-25 November 2001 at Kobe University, Kobe, Japan.

The symposium is being organized by the Society for Risk Analysis-Japan Section (Tsukuba, Japan), Beijing Normal University (Beijing, China), Korea Society of Environmental Toxicology (Seoul, Korea), and Grant-in-Aid For Scientific Research (Ministry of Education and Science, Japan: No. 10680420).

The main objective of "Asian Symposium on Risk Assessment and Management" is to bring together risk researchers, analysts, and managers who are working in the fields of risk problems in health, safety, and the environment in Asian countries.

The exchanging and reviewing of our recent experiences and case studies will serve for us to understand risk issues associated with traditional and modern complex systems in Asian societies.

Risk researchers, risk managers, and concerned people all over the world are also welcome to the symposium. The official language of the symposium will be English. There will be no interpretation provided at the symposium.

Kobe is a beautiful port city in western Japan, hard hit by one of the largest-scale earthquakes in Japan on 17 January 1995. We can see and learn how Kobe has been managing the catastrophic disaster and rehabilitated since then.

The symposium will be held concurrently with the annual meeting of the Society for Risk Analysis-Japan Section. Registration, plenary and individual sessions, and a reception will be held on 23-24 November. A technical tour is planned for 25 November.

Major symposium topics and sessions include (1) Asian Perspectives for Risk Analysis, (2) Theory and Methodologies for Evaluating Risks, (3) Risk Perceptions and Risk Communication, (4) Risk and Insurance, (5) Natural Disaster and Risk Management, and (6) Health, Safety, and Environmental Risks in Public and Private Sectors.

Sunday's Technical Tour will be a visit to memorial sites of "Kobe Great Earthquake, 1995" that includes bridges, halls, parks, dislocation plane, and other sight-seeing places (Awaji Island crossing over the Akashi Channel Bridge, etc.). Transportation cost for the technical tour is Japanese Yen (JY) 2,500 (\$20).

The registration fee (a copy of symposium proceedings and reception dinner are included) is JY 12,000 (about \$100) for professionals on-site and JY 9,600 (about \$80) for students on-site.

For accommodations two types of hotels located near the symposium site can be booked upon your request: Category A (\$70 per night/single) and B (\$90 per night/single). The price is tentative and will be changeable, depending on the currency exchange rate and other factors. The nearest international airport is Kansai International Airport (Osaka). It takes about 30 minutes by high-speed ferry or one hour by railway or bus services. Please see <http://www.kansai-airport.or.jp/index-e.html>.

All symposium rooms are located in Rokkou-dai Campus of Kobe University (Address: 2-1 Rokkou-dai, Nada-ku, Kobe). The detailed map will be sent upon your request.

The International Organizing Committee includes Yasuhiro Sakai (Chair, University of Tsukuba, President of SRA-Japan), Atsushi Takao (Kobe University, Faculty of Business Administration, Japan), Teruo Ohshima (Chemical Risk Research Institute, Japan), Saburo Ikeda (University of Tsukuba, Institute of Policy and Planning Sciences, Japan), Shi Peijun (Beijing Normal University, Institute of Resource Sciences, China), and Dong Chun Shin (Environmental Pollution Research Center, Yonsei University, Korea).

The National Organizing Committee includes Atsushi Takao (Chair, Kobe University, Faculty of Business Administration, Japan), Yasuhiro Sakai (University of Tsukuba, President of SRA-Japan), Kaoru Imai (Kyoto University of Industry, Faculty of Law, Japan), Norio Okada (Kyoto University, Institute of Disaster Prevention, Japan), Katsuhiko Kuroda (Kobe University, Faculty of Engineering, Japan), Shinsuke Morisawa (Kyoto University, Department of Global Environment Engineering, Japan), and Shoji Tsuchida (Kansai University, Faculty of Sociology, Japan).

For questions, more information, and all correspondence relating to the symposium program, registration, and paper submissions, contact Symposium Secretariat Saburo Ikeda, phone: +(81)-298-53-5380, fax: +(81)-298-55-3849, email: sra-japan@ecopolis.sk.tsukuba.ac.jp, home page: <http://ecopolis.sk.tsukuba.ac.jp/~sra-japan>. <<>>



Journal Notes

Book Reviews

Elizabeth L. Anderson, Editor-in-Chief

The Editor-in-Chief office of *Risk Analysis: An International Journal* regularly receives new books related to risk analysis that we would like to share with the readers of *Risk Analysis* through book reviews. The book titles range from general science topics such as toxicology and statistics to risk assessment, risk perception, and risk management. Some examples of recently received titles are *Risk Behavior Among Youths* (edited by Jonathan Gruber), *Regulation and Risk—Occupational Health and Safety on the Railways*, and *Coastal and Estuarine Risk Assessment* (edited by Michael C. Newman, Morris H. Roberts Jr., and Robert C. Hale). However, we have

frequently been unable to secure commitments from reviewers for many of the interesting books we receive.

I feel strongly that book reviews are a vital part of *Risk Analysis*. We need to keep our readers apprised of new titles that may be helpful in their research or teaching. Therefore, to encourage more book reviewers, we are now posting a list of books to be reviewed on the Sciences International, Inc., Web site (<http://www.sciences.com/Rabookreviews/html>). The same list will also be available at the SRA Web site (www.sra.org). If you would like to review one of the books on the list or have a title you believe should be added to the list, please contact me at elanderson@sciences.com or Managing Editor Dr. Rick Reiss at reiss@sciences.com. <<>>



Risk Education Resources

University Program Information via the SRA Web Site?

Tim McDaniels, Education Committee Chair

If you have tried to find out about university graduate programs in risk issues, you know the problem. It is difficult to find out what graduate programs are offered, by whom, where, and how. That's because risk-related university programs tend to be informal, spread among several different faculties in a given university, and tied more to a few individuals than to official university structures. Except at Harvard, even the biggest and most significant risk-related graduate programs largely require the potential students to learn about opportunities and plan their programs on their own, by drawing on an array of university resources. Students get help from faculty advisors when they get to the university, but finding out whether to apply is tough.

The Society for Risk Analysis (SRA) Education Committee has puzzled about how to provide some help to prospective students in finding programs, and how to help university programs find the best students. One motivation for this column was to provide a forum for that kind of information. But it's clear that the scope of the problem is large and our ability to write about programs here is limited.

Over the last few months, we at the SRA Education Committee have had the benefit of ideas and encouragement from Christie Drew and Eva Wong, two graduate students at the University of Washington. They had several suggestions about

how we could help graduate students find more information about graduate programs. We were so impressed that we added Christie and Eva to the Education Committee. After some brainstorming, we decided to take up a suggestion by Mitchell Small of Carnegie Mellon to create a place on the SRA Web site to address this concern.

The Education Committee has recommended in a report to the SRA Council that SRA should create two new features on its Web site. One would be for university programs, which a faculty member could fill in with information important for potential applicants. Interested students could find out about what kinds of degree programs are offered, the faculty involved, the research emphasis, kinds of courses, funding opportunities, and much more. The second feature would be a database of all the information for each program that could be searched, downloaded, or printed by interested people. The hope is that we can create an adaptable information source and educational opportunity marketplace for graduate risk programs.

The Education Committee would like some feedback on whether you think this approach would be helpful to prospective students and to university programs. Would potential students use this resource? Would university faculty take the time to fill in the forms? We think the answer is yes to both questions, particularly once a few of the major universities put up their information. But we would like your feedback and ideas. Comments are welcome to timcd@interchange.ubc.ca. <>>



Member News

Daniel M. Byrd and C. Richard Cothorn

Daniel M. Byrd and C. Richard Cothorn recently published *Introduction to Risk Analysis: A Systematic Approach to Science-Based Decision Making* [ISBN: 0-86587-696-7, Hardcover, 433 pages, Government Institutes, Rockville, MD (2000)], available at <http://www.govinst.com/pubscatalog/products/696.html>. The book examines risk and the structure of its analysis and is self-contained and suitable for either self-study or classroom use. Both authors are charter members of SRA.

Paul Slovic

Paul Slovic, who has attended every Society for Risk Analysis Annual Meeting since the Society's inception regrets that he will not be able to attend the Seattle meeting.

The reason is a good one, however. Slovic has been invited to be a keynote speaker at a symposium on Behavioral and Experimental Economics to be held near Stockholm as part of the centenary celebration of the Nobel Prizes.

The Symposium will be held 4-6 December, just prior to the awarding of the prizes for 2001. <>>



News and Announcements

John Graham Administrator of OMB Office of Information and Regulatory Affairs Establishes "Prompt Letters"

John Graham is now in place as the administrator of the U.S. Office of Management and Budget Office of Information and Regulatory Affairs. As one of his early initiatives, Graham has established "prompt letters" which ask federal officials to consider expedited action. The first two were sent in mid-September.

One letter, to U.S. Health and Human Services Secretary Tommy Thompson, urges acceleration of an ongoing rulemaking concerning the labeling of trans fatty acid content in foods, noting, "This rulemaking appears to be a tre-

mendous opportunity for the FDA to address the nation's leading cause of death (coronary heart disease) and to save thousands of lives."

The second letter, to Occupational Safety and Health Administration Administrator John Henshaw, calls attention to a "promising lifesaving technology" and requests he "consider whether promotion of AEDs [automatic external defibrillators] should be elevated to a priority at the Occupational Safety and Health Administration." <>>



Advertisements

Research Scholar at IIASA, Near Vienna

IIASA's Risk, Modeling, and Society Project (RMS) researches social and methodological issues concerning management of risks to public health, safety, and the environment. Current focus is risk mitigation and risk-transfer instruments for natural disasters, and risks of aging.

Tasks: conduct and dissemination of policy-relevant research (including integrated assessments) on human dimensions of selected local, national, and global risk issues; proposal preparation; project management; workshop organization; network building; supervision of summer fellows.

Qualifications: PhD or corresponding experience in social science field, good written and spoken English, knowledge of interdisciplinary literature on risk and human dimensions of global change, sound record of scientific publications, experience in research project management, ability to work independently or on a team.

IIASA, an international institution located outside Vienna, conducts scientific research on issues related to global change.

One-year contract (extension possible) starting ASAP. Salary commensurate with experience; exempt from Austrian taxation. Moving and settlement allowance.

Send cover letter, résumé, contact information for two references, and recent publications to:

Walter Foith

IIASA

Schlossplatz 1, A-2361 Laxenburg, Austria

foithw@iiasa.ac.at

Application review will begin immediately.

For details on the project and IIASA see the IIASA Web site (www.iiasa.ac.at) or contact Project Leader Dr. Joanne Linnerooth Bayer (bayer@iiasa.ac.at).

School of Health Sciences, Purdue University Environmental and Occupational Health

The School of Health Sciences, Purdue University (Web site: <http://www.purdue.edu/HSCI/>), announces a faculty position in environmental and occupational health. This is a full-time, tenure-track, academic-year appointment at the assistant professor level. Outstanding applicants will be considered for a higher rank. Applicants will be considered in the general area of environmental health. Those with interests in toxicology or risk assessment are especially encouraged to apply. The applicant will participate in undergraduate and graduate courses in health sciences.

The applicant must have a PhD or equivalent and is expected to maintain an independent, externally funded research program and to supervise graduate students. Interdisciplinary research is highly valued and encouraged.

Applications should be sent to Dr. George A. Sandison, Head and Chair, Search Committee, Purdue University, School of Health Sciences, West Lafayette, Indiana 47907-1338; phone: 765-494-1419; email: sandison@purdue.edu. Interested applicants should submit a letter of introduction which includes a statement of research interests and goals, a curriculum vitae including a list of publications, past and current research funding, and the names, addresses, and telephone numbers of three references.

Applications will be received and reviewed immediately, and the search will continue until the position is filled.

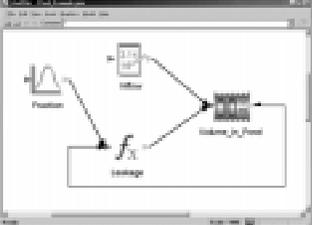
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AAAS Risk Policy Opportunities in Washington, DC, 2002:03

The American Association for the Advancement of Science (AAAS) invites scientists and engineers to apply for one-year risk policy fellowships, beginning in September 2002. Qualified Fellows serve in the U.S. Department of Agriculture or the U.S. Food and Drug Administration, applying scientific and technical input on issues relating to human health, environmental, and economic aspects of risk assessment and risk management.

The AAAS Risk Policy Fellows Program has been designed to provide each Fellow with a unique public policy learning experience and to bring technical backgrounds and external perspectives to decision-making in the U.S. government.

Applicants must have a Ph.D. in any physical, biological, or social science or an equivalent doctoral-level degree by the application deadline (**January 10, 2002**). Candidates must also be U.S. citizens; demonstrate exceptional competence in some area of science or engineering; and have an interest in applying their expertise to the economic and technical assessment of problems relating to human health or the environment. Underrepresented minorities and persons with disabilities are encouraged to apply.

Phone 202/326-6700

Web www.fellowships.aaas.org

E-mail science_policy@aaas.org





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Genevieve S. Roessler, *Editor*, gnrsslr@frontiernet.net
 Mary A. Walchuk, *Managing Editor*, mwalchuk@hickorytech.net
 Sharon R. Hebl, *Editorial Associate*
 Gail Charnley, *Associate Editor*, healthrisk@aol.com
 David Clarke, *Contributing Editor*,
 david_clarke@americanchemistry.com

Society Officers:

John Ahearne, *President*, 2001, ahearne@sigmaxi.org
 Robin Cantor, *President-elect*, 2001, robin_cantor@lecg.com
 Tim McDaniels, *Secretary*, 2001, timmcd@interchange.ubc.ca
 Richard B. Belzer, *Treasurer*, 2002, regcheck@mail.com
 Roger E. Kasperson, *Past President*, 2002,
 roger.kasperson@sei.se

Members of SRA Council:

Michael Greenberg, 2002, mrg@rci.rutgers.edu
 Charles N. Haas, 2003, haas@drexel.edu
 F. Owen Hoffman, 2001, senesensor@senes.com
 Steven Lewis, 2003, sclewis@erenj.com
 Paul A. Locke, 2001, plocke@tfah.org
 Mitchell Small, 2002, ms35@andrew.cmu.edu
 John Vandenberg, 2002, vandenberg.john@epa.gov
 Peter M. Wiedemann, 2003, p.wiedemann@fz-juelich.de
 Lauren Zeise, 2001, lzeise@oehha.ca.gov

Secretariat: Richard J. Burk Jr., Executive Secretary, Society for Risk Analysis, 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22102; phone: 703-790-1745; fax: 703-790-2672; email: SRA@BurkInc.com

Publications Chair: Roger E. Kasperson, phone: 46 8 412 14 04, fax: 46 8 723 03 48, email: roger.kasperson@sei.se

Newsletter Contributions: Send to Mary Walchuk, Managing Editor, RISK newsletter, 115 Westwood Dr., Mankato, MN 56001; phone: 507-625-6142; fax: 507-625-1792; email: mwalchuk@hickorytech.net

Address Changes: Send to SRA@burkinc.com

RISK newsletter and SRA Web Site Advertising Policy

Books, software, courses, and events may be advertised in the Society for Risk Analysis (SRA) RISK newsletter or on the SRA Web site at a cost of \$250 for up to 150 words. There is a charge of \$100 for each additional 50 words.

Ads may be placed both in the RISK newsletter and on the Web site for \$375 for 150 words and \$100 for each additional 50 words.

Employment opportunity ads (up to 200 words) are placed free of charge in the RISK newsletter and on the SRA Web site. Members of SRA may place, at no charge, an advertisement seeking employment for themselves as a benefit of SRA membership.

Camera-ready ads for the RISK newsletter are accepted at a cost of \$250 for a 3.25-inch-wide by 3-inch-high box. The height of a camera-ready ad may be increased beyond 3 inches at a cost of \$100 per inch.

The RISK newsletter is published four times a year. Submit advertisements to the Managing Editor, with billing instructions, by 15 January for the First Quarter issue (published mid-February), 15 April for the Second Quarter issue (mid-May), 15 July for the Third Quarter issue (mid-August), and 15 October for the Fourth Quarter issue (mid-November). Send to Mary Walchuk, Managing Editor, RISK newsletter, 115 Westwood Dr., Mankato, MN 56001; phone: 507-625-6142; fax: 507-625-1792; email: mwalchuk@hickorytech.net.

To place an employment ad on the Web site, fill out the online submittal form at www.sra.org/opptys.htm. To place other ads on the Web site contact the SRA Webmaster at webmaster@sra.org. Ads placed on the Web site will usually appear several days after receipt. For additional information see the Web site at www.sra.org/policy.htm#events.

Deadline for RISK newsletter Submissions

Information to be included in the **First Quarter 2002** SRA RISK newsletter, to be mailed mid-February, should be sent to Mary Walchuk, RISK newsletter Managing Editor, no later than **5 January** (115 Westwood Dr., Mankato, MN 56001; phone: 507-625-6142; fax: 507-625-1792; email: mwalchuk@hickorytech.net).

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