

# RISK *newsletter*

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## SRA ACTIVITIES INCREASING IN UNITED STATES, EUROPE

Two separate groups in California are organizing new SRA chapters and a group in Europe is rapidly moving toward becoming the first SRA chapter established outside the United States. Reports in this newsletter from the Society's East Tennessee Chapter and National Capitol Area Chapter describe ongoing activities, and the New England Chapter is busily preparing for the Society's annual meeting to be held in Boston in November. SRA activities are definitely on the increase both in the U.S. and in Europe, which, of course, will strengthen the society at large.

The two groups in California will be identified as the Southern California Chapter and the Northern California Chapter, respectively. B. John Garrick and Ray Boykin, both of Pickard, Lowe and Garrick,

### NORTHERN CALIFORNIA CHAPTER INITIATED

Chris Whipple of the Electric Power Research Institute reports that 57 persons heard Ed Zebroski, also of EPRI, give a timely report on the Chernobyl accident at a May 1 kickoff meeting for a Northern California Chapter of SRA. An additional 30 persons asked to receive announcements of future activities of the proposed chapter. The meeting, held in Palo Alto, drew particularly well among local industrial hygienists, toxicologists, and health physicists.

This first meeting of the proposed chapter was organized by Whipple and Jeff Daniels of Lawrence Livermore National Laboratory. They were assisted by Lynn Anspaugh, LLNL; Joseph Fiksel, Teknowledge, Inc., Palo Alto; Thomas McKone, LLNL; and Elisabeth Pate-Cornell, Stanford University. (Pate-Cornell is a member of the SRA Council.) Anspaugh has drafted bylaws for the chapter, and she and Whipple, who is a past president of SRA, are handling the arrangements for nominations and the initial balloting of the chapter.

Inc., Newport Beach, California, are organizing the Southern California Chapter. They recently mailed out 40 questionnaires and have already received 20 responses. As reported elsewhere in this newsletter, the Northern California Chapter, organized by Chris Whipple of the Electric Power Research Institute and others, has already held its first meeting; and SRA-Europe, under the leadership of SRA Council Member Pieter Jan Stallen of The Netherlands, has formed an advisory committee with representatives from 12 different countries. The 1986 annual meeting should be interesting as these three new groups add reports of their activities to those of the three current chapters.

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## PRESIDENT'S COLUMN

### Building a Solid Foundation for RAAM

The use of risk analysis and management (RAAM) in decision making has increased dramatically in the last half dozen years. Since the Supreme Court *Benzene* decision in 1980 and President Reagan's Executive Order 12291 in 1981, RAAM has become ubiquitous. Managers and professionals who didn't know what RAAM was six years ago now know perhaps too much about the point estimates and their assumptions, uncertainties, and ambiguities. This is true in the private sector as well as in government, both because of federal government reliance on RAAM tools and the simple fact that the tools are helping in managing risks—from those associated with auto safety to those inherent in chemical plant operations. Inevitably, the press and public have wanted to know more about all this activity and the risk estimates generated. As a result, a spate of magazine and newspaper stories on RAAM have appeared, along with a number of popular books. Thus, RAAM now plays a principal role as we think about and manage our high tech society.

Unfortunately, as interest in the subject has increased, research funding for RAAM has been dwindling. The National Science Foundation risk program has been terminated and NSF RAAM activities have been given something of a stepsister role in another program. Also, funds from mission-agencies, such as the Department of Energy, have decreased, with funding for areas such as risk perception essentially disappearing.

Those persons performing risk analysis or attempting to use the results of such analyses are painfully aware of current limitations of the available tools and of the value of and need for improved techniques. What good is quantifying risk if we cannot communicate with the public the difference between a  $10^{-3}$  risk and a  $10^{-8}$  risk? Convincing an EPA administrator or a chemical company president of the value of better answers is not difficult. Yet in the past several years as we have witnessed a vast increase in resources for conducting analyses, we have also seen a large decrease in funds for improving the foundation for RAAM. I don't believe anyone thinks this allocation makes sense. It isn't that anyone has made a conscious decision to cut overall research funding; rather dozens of individual decisions have resulted in a lack of attention to the foundation just as greater reliance is being put on RAAM.

On June 2, the National Research Council held a meeting to consider whether there was a need for a study of the research opportunities in RAAM. No one had difficulty in naming research areas starved for funds—areas in which research is likely to have large payoffs. However, in these Gramm-Rudman days, going to a program director in a mission agency, or even to an assistant administrator, is not fruitful. Everyone funds analyses but no one funds research on improving the analytical tools. Almost everyone agrees that research is likely to be fruitful, but each administrator is buried in short-term problems and has an inadequate budget. No one can lengthen his time horizon enough to convince him to invest in improving the foundations in order to improve later assessments.

Risk assessors need to develop a careful case for research needs and get the attention of Congress and the Office of Management and Budget. Before that, however, we need to convince some of those in the private sector that research in RAAM would be a highly productive investment of their funds.

Decision makers will grow increasingly disenchanted with RAAM if we cannot shore up the foundations for our estimates and improve the tools generally. I would appreciate receiving your suggestions as to how we can accomplish this. Most especially, I would appreciate your help in making our case to research funders.

Lester B. Lave  
June, 1986

## EAST TENNESSEE CHAPTER FOCUSES ON RISK METHODS

The East Tennessee Chapter of SRA held its third annual "Risk Analysis Methods Day" on April 22. Hosted and cosponsored by JBF Associates, Inc., in Knoxville, TN, the program focused on the application of risk analysis methods to unmanned solid rocket boosters, toxic chemicals, RCRA and CERCLA waste disposal sites, reactor plant operational events, transportation of chemical munitions and nuclear plant fuel elements, and the chemical and petroleum industries.

Speakers for "The Day" were E. William Colglazier, Jr., and Michael S. Bronzini, both of the University of Tennessee; Larry W. Barnthouse, Oak Ridge National Laboratory; Laura A. Mahoney, Bechtel National; Joseph W. Minarick, Science Applications International, Inc.; William R. Rhyne, H&R Technical Associates; and Donald K. Lorenzo, JBF Associates. The program committee consisted of Rhyne (coordinator), Mahoney, and V. V. R. Uppuluri and E. L. Etnier, both of ORNL. The program was also cosponsored by the ORNL Office of Risk Analysis.

### Prioritization/Ranking Methods Studied

A second meeting planned by the same committee, held July 15\* at the Oak Ridge Associated Universities and attended by about 45 persons, had as its theme "Prioritization Techniques/Ranking Methods." Topics addressed were chemical scoring for hazard and exposure assessment; risk identification and prioritization for chemical plants; a ranking technique for hazardous waste disposal sites; using relative toxicity estimation in site ranking assessments; prioritizing technology demonstration projects and large DOE R&D programs, including high-level radioactive waste research; and the New York Human Exposure Potential Ranking Model.

The speakers at the second meeting were Werner Furth, Martin Marietta Energy Systems; Uppuluri, Bob Ross, Barnthouse, Samantha Richter, Ellen Smith, and George Flanagan, all of Oak Ridge

\*Editor's Note: While this newsletter was largely prepared in June, its publication was delayed until July, as is apparent from the reports on the East Tennessee Chapter's July meetings.

see EAST TENNESSEE CHAPTER, page 4

## SEMINAR ON RISKS OF LARGE SYSTEMS SCHEDULED

"The Risk Analysis of Large Engineered Systems" will be the subject of a one-day seminar to be held in Newport Beach, California in October. Organized by B. John Garrick and Ray Boykin, both of Pickard, Lowe and Garrick, Inc., the seminar will address the applications of risk analysis to four major industries: the chemical industry, the defense industry, the space program, and nuclear power. While the seminar will be aimed at technical and management personnel involved in these particular industries, any individuals interested in the risk analysis process for engineered systems would find the seminar informative.

### Well-Known Speakers

The speakers scheduled for the seminar are all well known in their fields. They include Elizabeth Drake, Dean of Engineering of Northeastern University; Haggai Cohen, Deputy Chief Engineer of the National Aeronautics and Space Administration; Jon Collin, a defense industry consultant; and Norman C. Rasmussen, McAfee Professor of Engineering at the Massachusetts Institute of Technology. Garrick, president of Pickard, Lowe and Garrick, Inc., will also be on the program.

### Goodman Is Luncheon Speaker

The luncheon speaker for the seminar will be Julius Goodman, a professor-scientist who was a prominent member of the nuclear power community in the U.S.S.R. until he emigrated to the United States about three years ago. Currently at California State University, Long Beach, he has a PhD in theoretical physics from the Research Institute of Nuclear Physics, Academy of Science, Tashkent, U.S.S.R. In the Soviet Union he was a full professor in the Department of Nuclear Power Stations at Polytechnical University in Odessa. While there he became interested in performing risk analyses for nuclear power systems, using Bayesian techniques. His topic at the seminar will be the nuclear power program in Russia and their safety analysis programs. He will also discuss the accident at Chernobyl.

The exact date of the seminar in October has not yet been set; however, further information may be obtained by contacting Garrick or Boykin at: Pickard, Lowe and Garrick, Inc., 2260 University Drive, Newport Beach, CA 92660 (Phone 714-650-8000).

## EAST TENNESSEE CHAPTER

(cont. from page 3)

National Laboratory; Jack Roth, Vanderbilt University; Steven Arndt, JBF Associates; and Lee Ann Smith, Life Systems, Inc. Cosponsors for the meeting were the ORNL Office of Risk Analysis, the Institute for Energy Analysis, and Oak Ridge Associated Universities.

### Special Chernobyl Meeting

On July 10 the SRA East Tennessee Chapter joined with the local chapter of the Health Physics Society to cosponsor a special meeting at Oak Ridge Associated Universities on the Chernobyl accident. The group heard Dr. Clarence C. Lushbaugh of the ORAU Medical Division discuss the perspectives he gained on the fallout from Chernobyl from visits to Romania, Russia, and other countries after the accident occurred. They also heard Dr. Lester Van Middlesworth of the University of Tennessee College of Medicine, Memphis, talk on the world-wide distribution of <sup>131</sup>I in animal thyroid following the accident.

## SRA COURSE TO BE REPEATED NEXT YEAR

Approximately 35 persons attended the SRA course on "Risk Assessment/Risk Management: Carcinogenesis" that was held April 7-9 at the National Academy of Sciences in Washington, D.C. The attendees particularly welcomed the opportunity to interact with and ask questions of leaders in the field of risk analysis, and because of their very favorable response, a similar course is being planned for April 6-8, 1987. A textbook titled *Carcinogen Risk Assessment* is being produced by the society for use with the 1987 course.

The 1986 course provided an introduction and overview of the risk assessment process; uncertainties/assumptions in cancer risk assessment; the use of short-term test data, epidemiologic data, and animal bioassay data in risk assessment; exposure assessment; risk management; and de minimis risk. Special topics covered included interspecies extrapolation, biologically based low dose extrapolation, and pharmacokinetics. The lecturers were Roy E. Albert, Elizabeth L. Anderson, Melvin Anderson, Edward J.

## NCA CHAPTER HEARS TALK ON INSURANCE CRISIS

"Crisis in Product Liability—Has Risk Assessment or the Law Run Amuck?" was the topic addressed at the June 17 meeting of SRA's National Capital Area Chapter. Beginning with the paradox that "As we are able to estimate a product's risks better and better, our ability to estimate liabilities decreases," guest speaker Leslie Cheek, Vice President for Federal Affairs of the Crum and Foster Insurance Association, voiced the opinion that changes in product liability law have made it increasingly difficult to estimate the monetary risks associated with the health and safety risks of products. As a result, insurance rates have been driven up and out of reach for some companies.

### Rate-Setting Problems

Focusing on the role of the courts in patching holes in the social safety net, Cheek pointed out that in many countries payment for devastating medical expenses and loss of income comes from national welfare programs. In the U.S., however, the injured look for compensation from the "deep pockets" of business and governments. He feels that many large monetary awards for brain damage, dismemberment, or disfigurement are justified, but even that general limit is uncertain, further complicating the insurance industry's ability to estimate possible future payouts and making it more difficult to set rates and write policies.

### Should Congress Set Limits?

Following the talk, chapter members discussed the legislation now being debated in Congress to set limits on liability payments. Since liability insurance is such a complicated and controversial issue, many members would like to schedule a joint appearance of someone from the insurance industry and a representative of a trial lawyers' association (i.e., the "other side"). However, the logistics of arranging a meeting with two speakers of opposing views appear to be forbidding. If other chapters have accomplished this feat, the NCA Chapter would like to hear about it.

—Mike Gough

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Calabrese, James Falco, W. Gary Flamm, Ronald Hart, Lester Lave, Todd Thorslund, Curtis Travis, Elizabeth Weisberger, and Chris Whipple.

## EUROPEAN NEWS

## SRA-EUROPE FORMS ADVISORY COMMITTEE

The steering group of SRA-Europe has now formed an advisory committee consisting of 20 professionals from 12 European countries, and the next step in organizing a European chapter of SRA will be to approach potential members, both by direct mailings and by contacting participants of upcoming risk-related conferences.

The next meeting of the steering group will be September 23 in Surrey, U.K., during the First International Conference on Risk Assessment of Chemicals and Nuclear Materials. Definitive plans for soliciting chapter members will be made at that time.

The steering group also will make plans for the first meeting of the advisory committee, to take place in Paris in January or February, 1987. Major subjects to be discussed by the committee are the overall policy of SRA-Europe, the identification of prominent issues to be addressed at a European level, and the establishment of a management board of SRA-Europe.

Current members of the advisory committee are the following:

—**The Netherlands:** W. J. Beek, Unilever Research Laboratory; W. F. Tordoir, Shell International Petroleum Maatschappij.

—**France:** D. Bergez, ELF Aquitaine (Production); H. Smets, OECD, Environment Directorate.

—**Norway:** E. N. Bjordal, Norsk Hydro; J. M. Doderlein, Royal Norwegian Council for Scientific and Industrial Research.

—**United Kingdom:** A. V. Cohen, Health and Safety Executive; E. E. Pochin, National Radiation Protection Board; F. Warner, Cremer and Warner Consultancy.

—**Switzerland:** O. Giarini, L'Association pour L'Etude D'Economie de L'Assurance

—**Italy:** G. Grandori, Polytechnico di Milano; H. Otway, EC, Joint Research Centre.

—**Federal Republic of Germany:** L. Guendling, Max Planck Institute for International Public Law; B. Weber, European Parliament.

—**Sweden:** B. Holmberg, National Board of Occupational Safety and Health; E. Arrhenius, University of Stockholm.

—**Belgium:** L. Jourdan, European Council of Chemical Manufacturers.

—**Portugal:** F. J. T. Viegas, Escola Superior de Medicina Veterinaria.

—**Finland:** S. Hernberg, Institute for Occupational Health.

—**Austria:** R. E. Munn, IIASA.

The advisory committee will be expanded as responses to invitations are received.

Current members of the steering group are the following:

—Hans Bohnenblus, Basler and Partners, Switzerland.

—John C. Chicken, J. C. Consultancy Ltd., United Kingdom.

—Harald Ibrekk, Senter for Industriforskning, Norway.

—Ortwin Renn, Kernforschungszentrum, Juelich, Federal Republic of Germany.

—Pieter Jan Stallen, Netherlands Organization for Applied Scientific Research.

The steering committee solicits ideas and suggestions. Please direct your correspondence to: P. J. Stallen, Centre for Technology and Policy Studies, TNO, PO Box 541, 7300 AM Apeldoorn, The Netherlands (Telephone "31 55773344, Extension 2010).

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### COLLEGE COURSE IDEAS ON RISK REQUESTED

Sheldon J. Reaven, Department of Technology and Society, State University of New York at Stony Brook, wants to hear from SRA members who have ideas for college curriculum modules on risk analysis. He is developing the materials under a grant from the Sloan Foundation, and they will be made available for national distribution. He is particularly interested in examples of effective ways for teaching various aspects of risk analysis, vivid demonstrations or class exercises, interesting problems, and student projects. His address is: SUNY at Stony Brook, Stony Brook, NY, 11794, Phone (516)246-8645.

## SESSION TOPICS FOR ANNUAL MEETING SET

With over 120 abstracts submitted for the 1986 Annual Conference of the Society for Risk Analysis, to be held at the Park Plaza Hotel in Boston, Massachusetts, November 9-12, the session topics have now been set as follows:

Regulatory Policy  
 Transportation  
 European Outlook on Risks  
 Electric and Magnetic Fields: Risks and Myths  
 Acquired Immune Deficiency Syndrome (AIDS)  
 Artificial Intelligence  
 Airborne Toxic Agents  
 Statistical Methods  
 Computer System Security  
 Dioxin and Health Risks  
 The Automotive Industry  
 New Methods for Cancer Risks  
 Terrorism  
 Probabilistic Risk Assessment in Regulatory Decisions  
 Role of Epidemiology in Health  
 Private Sector Issues  
 Insurance  
 Communication of Risk  
 Corporate Risk Management  
 Communication of Risk Examples  
 The Electric Utility Industry  
 Theory of Communication of Risks  
 New Approaches at EPA  
 Audits and Assessments  
 Philosophical Aspects

The topics for the special session on "Material Safety Data Sheets," cosponsored by the American College of Toxicology with SRA, have also been determined to be the following:

Legal Principles  
 Toxicological Principles  
 Communication Principles  
 Critical Problems

The keynote speaker for the annual meeting will be Milton Russell, Assistant Administrator for the Office of Policy, Planning and Evaluation of the Environmental Protection Agency; and the luncheon speaker will be Harry Otway, European Economic Community, Ispra Research Establishment, Italy.

see 1986 ANNUAL MEETING, page 7

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### ADVANCE REGISTRATION FORM

1986 Annual Conference  
 SOCIETY FOR RISK ANALYSIS

Please complete this form:

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
 \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

Country: \_\_\_\_\_

Day-time telephone: (\_\_\_\_\_) - \_\_\_\_ - \_\_\_\_

Institution/Company Affiliation: \_\_\_\_\_  
 \_\_\_\_\_

Advance Registration Fees (in parentheses, fees for registering after October 25)

- |                                      |               |
|--------------------------------------|---------------|
| <input type="checkbox"/> Member, SRA | \$150 (\$175) |
| <input type="checkbox"/> Non-member  | \$188 (\$215) |
| <input type="checkbox"/> Student     | \$ 50 (\$ 50) |
| <input type="checkbox"/> One-day     | \$ 75/day     |

Please return this form to:

**Society for Risk Analysis**  
**1340 Old Chain Bridge Road**  
**Suite 300**  
**McLean, VA 22101**

You will receive further information, including hotel reservation forms.

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**Call for Papers PSA'87**  
**International Topical Meeting**  
**PROBABILISTIC SAFETY ASSESSMENT**  
**AND RISK MANAGEMENT**  
**Zurich, Switzerland, Aug. 30—Sept. 4, 1987**

Summaries of papers are solicited for an International Topical Meeting on Probabilistic Safety Assessment and Risk Management to be held in Zurich, Switzerland, August 30—September 4, 1987 at the Swiss Federal Institute of Technology (ETH). The meeting is being organized by the Swiss Nuclear Society in collaboration with the European Nuclear Society and it will be cosponsored by the American Nuclear Society, the Commission of the European Communities, the Society for Risk Analysis, plus others. Chris Whipple of the Electric Power Research Institute (Phone 415-855-2443) is the SRA liaison for the meeting.

The theme of PSA'87 is probabilistic risk assessment (PRA) and safety analysis (PSA) and risk management in the nuclear industry and the regulatory process. Special emphasis will be given to practical applications of PRA/PSA at the different stages in the life of nuclear power reactors (all types) and fuel cycle facilities. A major aim is to provide a forum for interactions between scientists and engineers dealing with PRA/PSA and risk management and also to provide for cross-communication between nuclear and non-nuclear sectors. Contributions of general interest from the non-nuclear industries are also welcome. English is the meeting language.

Specialists in the field of PRA/PSA and risk management are invited to contribute papers in the following five categories: (1) general PRA/PSA methodological research and development; (2) probabilistic systems analysis; (3) probabilistic consequence analysis; (4) applications of PRA/PSA in decision making, backfitting, emergency planning and

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accident management for conventional as well as novel reactor systems, fuel facilities, waste management, etc.; and (5) probabilistic safety criteria and management of safety and economic risks. The papers will be for 20-minute presentations or possibly for poster sessions. Transactions will be published at the beginning of the meeting and include invited as well as contributed papers.

**Ten copies of a 500- to 600-word summary should reach the Meeting Secretariat by November 30, 1986.** It should be written in English, typed single spaced, and identified as to which of the five subject categories it belongs in. The first author will be notified of acceptance by February 1987 and complete manuscripts will be due on June 15, 1987.

Your summary should be addressed to: PSA'87 Meeting Secretariat, %ENS-Secretariat, Monbijoustrasse 5, P.O. Box 2613, CH-3001 Berne, Switzerland. Telephone (+ +4131)216111, Telex 912110 (atag ch), Telecopier (+ +4131)229203.

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## 1986 ANNUAL MEETING

(cont. from page 6)

According to Paolo Ricci, Arthur D. Little, Inc., Cambridge, who is program chairman for the meeting, the quality of the abstracts is very good, and the annual meeting promises to consist of an excellent program.

All persons presenting papers at the annual meeting should hand in completed manuscripts to the Program Committee on the day they give their papers. All figures should be camera ready. Also, if possible, computer disk copies of the papers should be submitted.

Persons who wish to take advantage of reduced fees for advance registration should fill out the registration form included in this newsletter.

*A COMMENTARY***CHERNOBYL: AN INTERNATIONAL RISK TO SOCIETY**

Perhaps never in history has a single event so dramatically demonstrated to the world that risks to society do not recognize international boundaries. In fact, if one of the postulated scenarios about the course of the Chernobyl reactor accident in Russia proves to be true—that burning hydrogen initially created a chimney effect that carried fission products high into the atmosphere—then the first radioactive releases from the accident were crossing international borders shortly after increased levels were being detected in the residential region surrounding the reactor. This scenario could partially explain why a soccer tournament was held within several hundred yards of the plant on Saturday, April 26, after the accident had occurred early that morning and why evacuation of the area did not begin before Sunday.

**Multiple Risks Involved**

The accident also illustrates that societal risks are seldom so compartmentalized that they can be addressed by a single specialized group of experts. For Chernobyl, engineers and scientists must determine what caused the accident and what design changes must be made to prevent a reoccurrence at other reactors; health experts must treat the injured and develop a consensus on measures for reducing radiation insults to the body should similar accidents occur (e.g., should potassium iodide pills really be distributed?); and environmental scientists must determine what radiation damage to crops and animals has occurred and when (if) the area residents can return to their homes.

Of course, the overlap of areas of concern goes much further than that. For example, the psychological impact of Chernobyl has been tremendous, in some cases leading to self-inflicted injuries. It has been reported that some people who did not have access to potassium iodide pills were drinking liquid iodine and pregnant women, including some outside Russia, were seeking abortions.

The terrible responsibilities of management during such an accident are also apparent: sending firemen to almost certain death; asking divers to enter

the suppression pool below the reactor to open valves to release the drains; sending pilots and others in helicopter flights to drop materials on the reactor.

**Economic Impacts Great**

The economic impact of Chernobyl also has already been severe, both inside and outside Russia. Some countries are debating whether the economic loss incurred by not operating completed or nearly completed power reactors is more acceptable than the potential penalties of operating them. On the other hand, Russia itself has announced that it will continue its nuclear power program as originally planned.

**Risk Communication Poor**

Finally, the Chernobyl accident has reemphasized the need for improved communications of risks. In spite of exaggerated reports by the media in the early days of the accident (e.g., 2000 dead on site), one scientist who has tried to follow the accident has pointed out that “nearly all we know has come from the press.” Another frustrated by his inability to obtain “official” information has said that he now believes that personal contact is the only information network that works during emergencies.

The communication of risks due to radiation exposures is particularly complicated because of the different types of units used. How are members of the press (or scientists) to interpret reported radioactivity levels and radiation dose exposures given in the various units—curies, becquerels, rads, rems, grays, and sieverts? And what are the tolerable limits on these units?

Nuclear power plant accidents are not, of course, the only international risks to society to be dealt with—and some would point out that they are not even the most serious. They are fundamentally different from other risks, however, and warrant the close scrutiny Chernobyl will receive from both the technologists and the public.

—Lorraine Abbott



## WHAT REALLY HAPPENED AT CHERNOBYL?

Apparently no one yet knows what initiated the accident at Chernobyl—not even the Russians—according to a Russian team reporting to an international gathering attended by SRA member Tony Buhl in Vienna in late May. Buhl, vice president of International Technology Corporation, Oak Ridge, TN, whose organization is working on the nuclear industry's IDCOR Program (Industry Degraded Core Rulemaking Program), attended a meeting of the IAEA-sponsored International Nuclear Safety Expert Group where the Russian team reviewed the Chernobyl plant design, their safety philosophy, and the accident sequence for representatives from 25 countries. Other U.S. representatives were Miles Leverett of the Electric Power Research Institute and Herbert Kouts of Brookhaven National Laboratory.

### Building Fire Controlled

The Russian team reported that the power excursion occurred in the reactor core at 1:23 AM on the morning of April 26. Following the excursion, some of the coolant channels dried out and ruptured, and the ensuing high temperatures resulted in a reaction between steam and the zircalloy cladding of the reactor's fuel. The reaction produced hydrogen, the hydrogen exploded, and the roof of the building was set on fire. About 90 minutes later the fire was under control, and it wasn't until much later that they realized the extent of a graphite fire in the core which was sending vaporized core materials, including radioactive fission products, into the atmosphere.

### Containment Attempts

In their efforts to put out the fire, the Russians dropped 5000 tons of sand, clay, dolomite, and boron on the reactor from helicopter overflights. They also sent divers into a water-filled suppression pool below the reactor to open the drains so that the water could be replaced with concrete. In addition, they constructed a wall around the plant and are entombing the reactor.

It is not yet known what fraction of the fission-product inventory was released, with guesses ranging from 10 to 40%. The Russian team estimated, however, that 50% of the total release was <sup>131</sup>I.

## IAEA SCHEDULES NUCLEAR SAFETY MEETINGS

The International Atomic Energy Agency (IAEA) announced in a June 18 bulletin that, in response to the Chernobyl accident, it has scheduled a series of special meetings on nuclear safety to be held this fall.

**Meeting to Draft International Agreements, July 21-August 8.** A meeting held at IAEA Headquarters in Vienna will be attended by governmental experts who will draft two international agreements on nuclear safety. The first agreement will commit parties to provide early notification and information about nuclear accidents with possible trans-boundary effects, and the second will commit parties to coordinate emergency response and assistance in the event of a nuclear accident. Both agreements are to take into account current IAEA guidelines.

**Postaccident Review of Chernobyl, August 25-29.** At a second meeting at IAEA Headquarters in Vienna, experts from the Soviet Union and other member states, together with representatives from international and intergovernmental organizations, will review the available data on the Chernobyl accident. The meeting results and recommendations will be presented to the IAEA Board of Governors before its regular meeting on September 22-23, 1986.

**Special Session of IAEA General Conference, September 24-26.** The purpose of this special session, to be held at the Hofburg Kongresszentrum, Vienna, prior to the 30th regular session of the IAEA General Conference September 29-October 3, will be to discuss measures to strengthen international cooperation in the field of nuclear safety and radiological protection.

**Expert Working Group on Nuclear Safety.** Tentatively scheduled for November, this will be the first meeting of an Expert Working Group to consider over a longer period additional measures to improve cooperation in the field of nuclear safety, including ways and means to further refine nuclear safety standards.

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### Future Soviet Plans

The U.S.S.R. has announced that they will have 150 people operating the other three reactors at the site by the end of the year. Also, their plans for more than doubling their nuclear power output within the next five years remain unchanged.

*A COMMENTARY***RISK: PERCEPTION, COMMUNICATION, RESPONSIBILITY**

A demand for certainty in an uncertain world is the bane of any scientist. Scientists are used to uncertainty; the media and public are not. It is unlikely that this situation will change and that risks will be generally understood without a concerted effort by scientists and risk managers.

Communicating risks and the uncertainties associated with them to the public is particularly difficult because of the common misperceptions of risk. A 1984 study commissioned by the National Science Foundation for the Environmental Protection Agency concluded that "Risk communication is one of the most important tasks facing risk managers today." But the responsibility is not that of risk managers alone. In communicating a specific risk, the risk manager bases his message on the information provided to him by the risk assessor. Unfortunately, the risk assessor frequently must deal with great uncertainties which are difficult to characterize. But characterize them he must. In fact, I suggest that effective risk communication begins with the risk assessor and that he has a responsibility for improving risk characterization.

**Public Anxiety Forces Action**

It is well known that when the public's anxiety level is high, prudence and politics often tend to drive the government toward regulation even when sufficient information is not available. In spite of any concern he might have about the proper use of limited information, the risk manager must act. But his action may be more severe than necessary if the basis for it is not tempered by professional judgment. Policy judgment cannot be applied well by the risk manager if he is not adequately appraised by the risk assessor of the impact of basic assumptions made during the course of the risk assessment. At best, the result of overly severe regulation is a misdirection of national resources. At worst, it further feeds the public's seemingly limitless capacity for worry and causes inefficiencies and diversions from more significant risks. In other words, it can lead to less rather than more safety.

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Consider, for example, our communications to the public about cancer risks. Mounting evidence suggests that *how* one lives is far more important in cancer risks than *where* one lives. This by no means eliminates all concern about the potential for carcinogenesis induced by chemicals in our environment; however, Professor Bruce Ames, University of California, Berkeley, has suggested that the failure of a cancer explosion to occur as a result of the frequently referenced increase in chemical production is a phenomenon of carcinogens and anticarcinogens in nature tending to cancel each other out. How else to explain the existence of hundreds of carcinogens in our natural food supply without a commensurate increase in cancer rates in the population (excluding those due to known causes, such as smoking and alcohol consumption)?

**Relative Scale of Cancer Risks**

Ames is expected to publish shortly a relative scale for carcinogenic risks to humans based on rodent toxicity data and estimates of average lifetime exposures. Assuming that no occupational exposures to extremely high doses have occurred and using tap water as a standard, he shows that PCBs (polychlorinated biphenyls) and EDB (ethylene dibromide) have a relative risk of 0.2 while peanut butter has a relative risk of 20. Distressingly for some, the alcohol in one beer per day results in a relative risk of 2500.

Why, then, should the public's perception of the major causes of cancer risk in this country be so far removed from the most likely causes? Why have cake mixes been stripped from grocery shelves out of fear of trace amounts of EDB while at the same time smoking *and* lung cancer deaths are skyrocketing in

see RISK COMMUNICATION, page 11

## RISK COMMUNICATION

(cont. from page 10)

the female population? (Lung cancer deaths are still high for men also, but the rate of increase has slowed.)

### Uncertainties Must Be Communicated

There is no simple answer nor any single answer. However, addressing the interest of the Society for Risk Analysis, I suggest that the absence of reporting practices that frame uncertainty more realistically has definitely contributed to the misperceptions.

From my associations with many engaged in the development of risk assessment methodology over the past 5 years, I sense a general frustration over the lack of understanding of the limitations of the tools we use for estimating cancer risks. Also, we recognize that the tools can be no better than the underlying understanding of biological mechanisms in test animals and humans.

So where does the responsibility of the risk assessor lie? The American Chemical Society and The Conservation Foundation published a booklet in November, 1985 that provides some clues. Entitled *Issues in Peer Review of the Scientific Basis for Regulatory Decision*, the booklet states that "Because of uncertainties inherent in new scientific information and possible limitations in the peer review process itself, when information that has been peer reviewed is communicated to policymakers, it is especially important to express the range of uncertainty in the results as well as the range of agreement of experts in the field." From this statement flows a number of possible suggestions for the risk assessor:

- (1) Avoid the temptation to allow policy judgments to intrude on the assessment process.
- (2) When assumptions must be made in the face of uncertainty, identify them clearly and quantify the

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*"I sense a general frustration over the lack of understanding of the limitations of the tools we use for estimating cancer risks."*

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*"The risk assessor has an opportunity and responsibility to keep his work clearly separated from that of the risk manager."*

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contributory range of uncertainty introduced by each assumption into the final result.

- (3) Insist that the report forwarded to the risk manager includes the uncertainties plus the range of assumptions and that their impacts are fully arrayed and discussed in terms of both mathematical and biological plausibility.
- (4) Be alert to new mechanism understandings and be creative in promptly incorporating them into modeling methodologies.
- (5) Continue to press the biological community for more research into the mechanisms of cancer (and other disease processes); a better understanding of metabolism and repair processes to define differences between experimental animal cells and human cells is essential.

This list of suggestions is by no means exhaustive. However, if public fears are ever to be allayed, we must begin somewhere. The risk assessor has an opportunity and responsibility to keep his work clearly separated from that of the risk manager. A part of the discipline for doing that is for him always to include in his analysis a full exposition of the uncertainties and the most likely probabilities. The risk manager's perspectives must be influenced first. With time, we can then aspire to developing a better perspective for dealing with cancer as a public health problem because we will be able to communicate about it in a productive atmosphere. We should be more afraid of fear itself and strive to do something about that as a matter of personal responsibility.

C. W. Umland  
Environmental Health Coordinator  
Exxon Chemical Americas  
Houston, TX 77253-3272

## JOURNAL CONTENTS (cont.)

The table of contents of Vol. 6, No. 3 of the SRA journal *Risk Analysis* is reprinted below. Manuscripts of articles for the journal should be submitted to: Curtis Travis, Editor, *Risk Analysis*, Bldg. 4500S, S204, Oak Ridge National Laboratory, PO Box X,

Oak Ridge, TN, 37831. Software reviews should be mailed to: Paul D. Moskowitz, Biomedical and Environmental Assessment Division, Brookhaven National Laboratory, Upton, NY, 11973.

Vol. 6, No.3

### LIAISON COMMITTEE RECRUITING VOLUNTEERS

As SRA increases in membership and expands its horizons, the duties of the society's Liaison Committee become increasingly important. The function of the committee is to establish and maintain close ties with other professional societies engaged in activities of interest to SRA members. The committee encourages a wide variety of activities, but primarily focuses on (1) exchanges of information (announcements of meetings and workshops in official society publications) and (2) cosponsorship and assistance in arranging one or more sessions at annual meetings. The following persons have volunteered to perform these liaison functions with other professional societies:

**American Psychological Association:** Paul Slovic, Decision Research, Eugene, Oregon.

**American Economic Association:** Howard Kunreuther, Wharton School, University of Pennsylvania.

**Air Pollution Control Association:** Thomas McKone, Lawrence Livermore National Laboratory.

**American Sociological Association:** George W. Rogers, University Center for Social-Urban Research, University of Pittsburgh.

**American Society of Mechanical Engineers:** Alan Mógihissi, Institute for Regulatory Science, Ringwood, New Jersey.

SRA members interested in serving as a liaison person with other professional societies are strongly encouraged to write to the chairman of the Liaison Committee: Vincent Covello, Risk Analysis Program, National Science Foundation, 1800 G. St., NW, Washington, D.C. 20550.

Author(s)	Title
<b>LETTERS TO EDITOR</b>	
Ben J. M. Ale	Technology Acceptance: A Contribution to a Discussion
Roger M. Cooke	Problems with Empirical Bayes
Harry F. Martz	Response to "Problems with Empirical Bayes"
<b>ARTICLES</b>	
Roger E. Kasperson	Six Propositions on Public Participation and Their Relevance for Risk Communication
David W. Gaylor James J. Chen	Relative Potency of Chemical Carcinogens in Rodents
Stuart M. Brown Abraham Silvers	Chemical Spill Exposure Assessment
Alan Q. Eschenroeder	The Spread of a PCB Spill on a Soil Surface
Thomas R. Stewart	Judgment and Analysis in Oil Spill Risk Assessment
Theodore S. Glickman	A Methodology for Estimating Time-of-Day Variations in the Size of a Population Exposed to Risk
V. Kerry Smith	Benefit Analysis for Natural Hazards
Roger M. Cooke	Monte Carlo Sampling for Generalized Knowledge Dependence with Application to Human Reliability
Stephen W. Lagakos Frederick Mosteller	Assigned Shares in Compensation for Radiation-Related Cancers
<b>COMMENTS</b>	
Lester Lave	Who Needs Causation Probabilities?
David Rosenberg	The Uncertainties of Assigned Shares Tort Compensation: What We Don't Know Can Hurt Us
Fritz A. Seiler	Assigned Shares and Combined Insults
Louis Anthony Cox, Jr.	Technical and Policy Issues in Assigned Share Calculations
<b>RESPONSE</b>	
Stephen W. Lagakos	Lagakos and Mosteller's Response to Comments on "Assigned Shares in Compensation for Radiation-Related Cancers"
<b>SOFTWARE REVIEW</b>	
Eli Stern	Review of the Portable Computing System for Use in Gas Emergencies
<b>BOOK REVIEW</b>	
S. Chrystal Cook	On Recent Books

## BENEFIT OF SRA-BCSP LIAISON PREDICTED

Robert E. DeHart II, the 1986 president of the Board of Certified Safety Professionals of the Americas, Inc., which has headquarters in Savoy, Illinois, sees a great opportunity for "cross-pollination" between safety professionals and risk analysis professionals.

Responding to a request from SRA President Lester Lave to describe the activities of the BCSP for SRA members, DeHart says that the BCSP is a peer certification board for practitioners in the safety profession. It has four sponsoring agencies: the American Industrial Hygiene Association, the American Society of Safety Engineers, the Society of Fire Protection Engineers, and the System Safety Society.

Persons who qualify to become Certified Safety Professionals (CSPs) "use a knowledge of engineering and the various physical and human sciences in the development of procedures, processes, specifications, and systems to achieve optimal control and evaluation of hazards detrimental to life, health, and property." CSPs may specialize in occupational safety and health, product safety, system safety, fire protection, and industrial hygiene.

### Functions of BCSP

The specific functions of the BCSP, which was organized in 1969, are to evaluate the academic qualifications and experience of safety professionals, administer examinations, and issue certificates to those meeting the board's criteria.

The BCSP is also an active participant and leader in the Intersociety Forum and the Joint Council for Health and Safety Education and Accreditation. The Intersociety Forum is an informal organization of the major societies and organizations in the safety and health professions. The Joint Council is an activity of concerned safety and health-related societies and organizations for assisting and encouraging post-secondary educational institutions in developing curricula to educate health and safety practitioners and integrating health and safety into other curricula. In 1981, the BCSP published the "Curricula Guidelines for Baccalaureate Degree Programs in Safety" for guidance to post-secondary institutions in safety curriculum development.

### CSPs in Risk Analysis

According to DeHart, CSPs are routinely involved in risk analysis, although few engage in the formal modeling and statistical assessment associated with rigorous risk analysis studies. Most, however, need to be aware of the techniques and limitations of risk analyses in order to interpret and use their results. CSPs are primarily involved in the *control* of risk rather than in the *analysis* of risk, but risk analysis is essential to understanding the problem and prescribing the appropriate controls.

An exception to this general rule is the system safety specialist, who applies a number of hazard analysis techniques to identify potential hazards in a system and assess their probability of occurrence. Many of the hazard analysis techniques used are variations of risk analysis methodology or make use of previously performed risk analyses. Others who might be directly involved in formal risk analysis are CSPs involved in product safety, in toxicological studies, and in studies for the processing industry.

### Information Exchange Needed

DeHart feels that safety professionals need a greater knowledge of risk analysis methodology, and risk analysis professionals might benefit from more knowledge of control technology in the assessment of the effects of various control measures. Since the BCSP is a certification board rather than a membership organization, it is not directly involved with research and information exchange; however, its sponsoring organizations are involved in these activities, and the BCSP can be instrumental in bringing the various professions together.

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## CLARK UNIVERSITY OFFERS NEW COURSE

Clark University's Center for Technology, Environment, and Development has announced that it will offer a new course in environmental law during the fall semester. The course will focus on relevant case law for toxic torts and recent developments in federal and state environmental legislation. Paolo Ricci of A. D. Little, Boston, program chairman for the 1986 SRA Annual Meeting, will teach the course.

## COMINGS & GOINGS

**Raymond F. Boykin**, formerly of Monsanto, St. Louis, Missouri, has joined Pickard, Lowe and Garrick, Inc., as a senior consultant. His new address is 2260 University Drive, Newport Beach, California, 92660, Phone (714)650-8000.

\* \* \* \* \*

**Kenneth G. Brown**, formerly with a contractor at NIEHS, has joined Research Triangle Institute in Research Triangle Park, North Carolina. He is chairman of RTI's newly formed Risk Assessment Coordinating Committee, intended to provide a cross-disciplinary capability in risk assessment. His new address is PO Box 12194, Research Triangle Park, NC 27709, Phone (919)541-6000.

\* \* \* \* \*

**Robert Fensterheim** has left the Chemical Manufacturers Association to join the American Petroleum Institute as a senior regulatory analyst. His new address is 1220 L St., NW, Washington, D.C., 20005, Phone (202)682-8478.

\* \* \* \* \*

**Michael Gough** has recently joined Environ Corporation. He was formerly with the Risk Science Institute. His new address is 1000 Potomac Street, Washington, D.C., 20007, Phone (202)337-7444.

\* \* \* \* \*

**Cathy St. Hilaire** is the new director of the ILSI Risk Science Institute. She was previously with Environ Corporation. Her new address is 1126 16th St., NW, Washington, D.C., 20036, Phone (202)659-3306.

*EDITOR'S NOTE: Comings & Goings will be a regular feature of this newsletter. If you have changed jobs recently or have other news of interest to the society, please send the information to Lorraine Abbott or Michael Gough at the addresses shown on the back page.*

## GENERAL COMMUNICATION HINTS

The National Conference on Risk Communication held in Washington, D.C. in January and reported on by Richard C. Schwing of the General Motors Research Laboratories (see *RISK newsletter*, March, 1986) yielded the following general communication hints:

Remembering the following quotes provided by Richard Schwing from the recent Washington, D.C. Risk Communication Conference may assist you in future communications:

"Since there are so many stakeholders or publics, know your intended audience and their interests and language."

"Paint pictures with words for print or radio and use photographs and graphics for TV."

"To patronize the public in any way is the worst action available."

"We do a good job of communicating fear and a poor job of communicating risk."

"Authority figures are needed and it is usually not the scientist."

"If you are in a crisis, it is too late to communicate—especially something like risks."

"Risk communication is achieved by means of a long-term partnership between the 'source' and the 'channel.' It is not an as-needed situation."

"The model for communication is a channel, not a shield (a filter is not appropriate either)."

"Engineers tend to talk to the public in jargon but colloquially to one another. This is verified by the Kemeny Commission at TMI."

"Too much checking on the facts has ruined many a good news story." (Aphorism of journalism cited by Chief Justice Warren Burger.)

"We live in an age in which intelligence may not be able to simplify truthfully." (Edward R. Murrow, 1959, in *Reflections on Science in the Media*, by June Goodfield.)

## MISCELLANY

In an article of earth scientists' studies of natural hazards, *Science News* (Vol. 129, No. 22) reported that Eugene M. Shoemaker of the U.S. Geological Survey feels that the most significant hazards to mankind can result from our failure to recognize impending disasters (such as a large asteroid heading toward the earth) or our misinterpretation of a natural event. He is particularly concerned about the small bodies (10 to 20 meters in diameter) that enter the earth's atmosphere every few decades. The energy

they deposit in the earth's atmosphere (1 to 10 megatons of TNT) could be mistaken by some "less technologically savvy countries as a nuclear explosion and trigger the more violent action of humans."

\* \* \* \* \*

As of May 19, 1986, the Society for Risk Analysis had a total membership of 1,251. Of these, 1,140 reside in the United States and 111 live in foreign countries.

## CALENDAR OF EVENTS

—September 1-5. INTERNATIONAL SYMPOSIUM ON RADIOTHERAPY IN DEVELOPING COUNTRIES—PRESENT STATUS AND FUTURE TRENDS, Vienna Austria. Sponsored by International Atomic Energy Agency. Contact: IAEA, PO Box 100, A-1400, Vienna, Austria.

—September 3-5. COURSE ON RISK ANALYSIS IN ENVIRONMENTAL HEALTH, Harvard School of Public Health. Course will emphasize carcinogenesis and will introduce the problem of risk analysis in the context of calculating risks when data are uncertain. Methodologies for risk evaluation and interplay of risk evaluation and risk assessment will be discussed. Fee: \$525. Contact: Office of Continuing Education, Harvard School of Public Health, 677 Huntington Ave., Boston, MA, 02115 (Phone 617-732-1171).

—September 5-6. INTERNATIONAL CONFERENCE ON INDUSTRIAL CRISIS MANAGEMENT, New York University, 100 Trinity Place, New York, NY 10006. Organized by NYU's Graduate School of Business Administration and Institute of Environmental Medicine, Industrial Crisis Institute, Inc., and The Trinity Center for Ethics and Corporate Policy. Discussions will focus on crises caused by nuclear and chemical accidents, environmental pollution, product injury, and occupational health problems. Fees: \$355 before July 15, \$395 thereafter. Contact: Paul Shrivastava, Schools of Business, NYU, Room 611, Tisch Hall, 40 W. 4th St., New York, NY 10003 (Phone 212-598-2204 or -2205).

—September 8-12. SYMPOSIUM ON CHEMICAL PHENOMENA ASSOCIATED WITH RADIOACTIVITY RELEASES DURING SEVERE NUCLEAR PLANT ACCIDENTS, Anaheim, California. Sponsored by the American Chemical Society and the U.S. Nuclear Regulatory Commission. Contact: S. J. Niemczyk, ACS, 1454 18th St., NW, No. 112, Washington, D.C. 20036.

—September 15-17. TOPICAL MEETING ON RADIOLOGICAL ACCIDENTS: PERSPECTIVES AND EMERGENCY PREPAREDNESS, Bethesda, Maryland. Sponsored by American Nuclear Society's Environmental Sciences Division, the U.S. Nuclear Regulatory Commission, the U.S. Department of Energy, and the Federal Emergency Management Agency. Contact: C. V. Chester, Oak Ridge National Laboratory, PO Box X, Oak Ridge, TN, 37831 (Phone 615-574-5813).

—September 22-26. FIRST INTERNATIONAL CONFERENCE ON RISK ASSESSMENT OF CHEMICALS AND NUCLEAR MATERIALS, University of Surrey, Guildford, United Kingdom. Organized by the university's Robens Institute of Industrial and Environmental Health and Safety in conjunction with the Department of Psychology and J. C. Consultancy Ltd. Contact: J. Williams, Robens Institute, University of Surrey, Guildford GU2 5XH.

—September 22-26. FOURTH DECENNIAL REVIEW—CELL AND TISSUE CULTURE INTERNATIONAL CONFERENCE: MOLECULAR MECHANISM IN THE REGULATION OF CELL BEHAVIOR, Hershey, Pennsylvania. Convened by the Tissue Culture Association. Contact: Executive Director, Tissue Culture Association, 1910 Montgomery Village Avenue, Suite 300, Gaithersburg, Maryland 20879 (Phone 301-869-2900).

—September 23. MEETING OF SRA-EUROPE STEERING COMMITTEE, Surrey, U.K. See story in this newsletter.

—September 28-October 1. CONFERENCE ON THE INTERACTION OF RADIATION THERAPY AND CHEMOTHERAPY, Williamsburg, Virginia. Sponsored by the Intersociety Council for Radiation Oncology. Contact: Suzanne Bohn, American College of Radiology, 925 Chestnut St., Philadelphia, PA, 19107 (Phone 215-574-3181).

—October 5-11. 13th WORLD ENERGY CONFERENCE, Cannes France. Contact: E. Ruttley, Secretary-General, WEC, 34 St. James Street, London SW1A 1HD, United Kingdom (Phone 01-930 3966-8).

—October 14. MEETING ON PUBLIC PERCEPTION OF RADIATION, London, United Kingdom. Sponsored by the Society for Radiological Protection. Contact: J. H. Martin, Department of Medical Physics, Building 15, Park Wynd, University of Dundee, Dundee DD1 4HN, Scotland, UK (Phone Dundee 23181, Ext. 4438).

—October (exact date to be announced). SEMINAR ON THE RISK ANALYSIS OF LARGE ENGINEERED SYSTEMS, Newport Beach, California. See story in this newsletter. Contacts: B. John Garrick or Ray Boykin, Pickard, Lowe and Garrick, Inc., 2260 University Drive, Newport Beach, CA 92660 (Phone 714-650-8000).

—November 2-5. 7th ANNUAL MEETING OF SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, Radisson Mark Plaza Hotel, Arlington, Virginia. Theme—Environmental Data: Significance in Decision Making. Contacts: Ida L. McDonald and Richard E. Tucker, Dynamac Corporation, The Dynamac Building, 11140 Rockville Pike, Rockville, MD, 20852 (Phone 301-468-2500).

—November 9-12. 1986 ANNUAL MEETING OF THE SOCIETY FOR RISK ANALYSIS, Park Plaza Hotel, Boston, Massachusetts. See story in this newsletter.

—January or February, 1987. MEETING OF ADVISORY COMMITTEE OF SRA-EUROPE, Paris, France. See story in this newsletter.

—April 6-8, 1987. SECOND ANNUAL SRA COURSE ON RISK ASSESSMENT/RISK MANAGEMENT: CARCINOGENESIS. Arrangements to be announced in subsequent newsletters. Contacts: Elizabeth Anderson, President, ICF-Clement, 1515 Wilson Blvd., Suite 700, Arlington, VA, 22209 (Phone 703-276-7700); Curtis Travis, Bldg. 4500S, S204, Oak Ridge National Laboratory, PO Box X, Oak Ridge, TN, 37831 (Phone 615-576-2107).

—May 25-29, 1987. 5th INTERNATIONAL CONFERENCE ON APPLICATIONS OF STATISTICS AND PROBABILITY IN SOIL AND STRUCTURAL ENGINEERING, Vancouver, Canada. ICASPs are held at 4-year intervals and run by a permanent International Scientific Committee. Exchanges between academics and practitioners and between soil and structural engineers will be encouraged. Summaries of submitted papers (1000-2000 words) due September 30. Contact: N. C. Lind, Chairman, ICASP5 Conference, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1.



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Katie Ingersoll, *Production Assistant*

**Society Officers:**

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Paul Deisler, *President-Elect*, 1985-86  
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Steven Swanson, *Treasurer*, 1985-87  
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**Members of SRA Council:**

M. Granger Morgan, 1986  
Pieter-Jan Stallen, 1986  
Arthur C. Upton, 1986  
Vincent T. Covello, 1987  
Samuel C. Morris, 1987  
M. Elisabeth Paté-Cornell, 1987  
B. John Garrick, 1988  
Peter Barton Hutt, 1988  
Talbot Page, 1988

**Society Secretariat:** Richard J. Burk, Jr., *Executive Secretary*, Society for Risk Analysis, 1340 Old Chain Bridge Road, Suite 300, McLean, VA, 22101, (703)790-1745

**Note:** Contributions to the newsletter should be mailed to one of the following addresses:

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1000 Potomac Street  
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Mrs. Lorraine S. Abbott  
Editor, RISK newsletter  
1303 Wilson Road  
Knoxville, TN 37912

## ARE YOU TALKING ABOUT SRA?

All SRA members need to be helping the Membership Committee by telling their colleagues about the society. Facts to remember:

—SRA was formed soon after a group of scientists met in 1980 to consider the questions of health and safety risks and risks to the environment. All felt that their individual professional societies were inadequate for addressing the broad questions of risk that span the traditional disciplines and therefore that a new society was needed to handle these matters.

—The major aims of SRA are to promote knowledge and understanding of risk analysis techniques and their applications; promote interaction among those engaged in risk analysis; and disseminate risk analysis information and concepts and advance the state-of-the-art in all aspects of risk analysis.

—SRA members are from the health sciences, engineering, the physical sciences, the social sciences, economics, and other fields.

—SRA publishes a quarterly journal, *Risk Analysis*.

—SRA has four classes of membership: regular, honorary, student, and sustaining.

—Persons interested in becoming SRA members should write to Society for Risk Analysis, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101. (In Europe, address inquiry to: P. J. Stallen, Centre for Technology and Policy Studies, TNO, PO Box 541, 7300 AM Apeldoorn, The Netherlands.)

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