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Ecological Hazard Identification Task Group

This Task Group has projects underway which develop individual, population and ecosystem bioindicators of degradation and ecological risk. Other projects develop methods to aid in restoration and remediation of ecosystems. A third set of projects focuses on understanding how people value local ecological resources.

Bioindicators. The Task Group studies biological organisms such as birds or animals that can reflect the amount of degradation of the environment. This is achieved by studying samples of their tissues, their behavior, and their health. These organisms are called bioindicators because they can indicate the amount of degradation to the environment. Good bioindicators should be able to be used in a wide range of ecosystems, and be sensitive to a wide range of changes that may occur in the environment. The most useful indicators tell us something about both ecological and human risks. The Ecological Hazard Identification Task Group studies bioindicators at the individual, population, and community level.

The individual-level projects of the Task Group include using herring gulls to assess behavioral and physiological effects of pollutants, and using mourning doves to develop biokinetic models to help predict potential hazardous effects under different land management scenarios. For example, by measuring the levels of cesium and heavy metals in doves exposed to the draw-down soils of Par Pond, we can examine the potential effects of drawing down L Lake. We can use actual site specific data from SRS to predict real effects on the populations of mourning doves, a species locally hunted and eaten.

The population-level projects involve developing bioindicators using organisms in different levels of the food chain. We are developing the following as potential bioindicators: mourning doves, wood ducks, raccoons, opossums, and slider turtles. Mourning doves are the most frequently hunted organism in the U.S., but they are relatively low on the food chain. Wood ducks are also extensively hunted locally, and are local residents. Raccoons and opossums are higher on the food chain, so a substantial part of their diet is animal matter. They are also hunted extensively, particulary by some people of limited economic means. Slider turtles eat both plants and animals, and have a longer life span. This combination of species allows us to assess potential risks to both animal populations and humans, and allows us to examine species at different levels of the food chain. Further, these are all species that people recognize and care about. These projects are being conducted in collaboration with faculty at the Savannah River Ecology Laboratory including L. Brisbin and W. Gibbons.

The community-level projects focus on adapting the Index of Biotic Integrity (IBI), a measure of biological conditions, to use in examining the effect of habitat degradation on fish and frog

communities at SRS. We are testing the IBI's applicability to indicate the level and types of degradation, if any is caused by nuclear activities and associated physical disruptions. We are also expanding the IBI to be more inclusive of landscape scale issues, so we are incorporating more information about geographic features of the places data were collected. This project is done in collaboration with the Savannah River Ecology Laboratory, and involves J. Snodgrass and G. Meffe, as well as J. Karr (University of Washington) who developed the IBI. The IBI work at SRS is part of a larger project to develop IBIs that can be used to evaluate the effects of human activities, including physical disruptions as well as contamination. J. Karr is developing IBIs for plant and insect terrestrial communities at Hanford in Washington.

Restoration and Remediation. The second objective of the Ecological Hazard Identification Task Group is to develop new methods of restoration and remediation of specific ecosystems at SRS.

The potential for restoration of the land at SRS through identifying seeds or plants that would do best on degraded soils is being studied. Once the potential for restoration is understood, a timeline for natural and assisted restoration can be developed.

Our initial experiment involved growing three native species of plants on fly ash soil and comparing these plants to ones grown on typical soils from land adjacent to SRS. The purpose was to determine the cause for delayed natural growth on these barren soils. Potential causes of delayed growth are the inability of plants to root or grow on fly ash soil, a difficulty with penetration of the soil by the germinating seeds, or a lack of seed dispersal to the barren soils. Our preliminary data suggest that growth of plants is not a problem, but that either soil texture or a lack of seeds may be preventing more rapid spread of plants onto the fly ash soil. These experiments are being conducted in collaboration with R. Sharitz from the Savannah River Ecology Laboratory.

Further projects will experiment with native plant species on soils with different concentrations of radionuclides to determine the levels of contaminants in seeds and fruits. Understanding the levels of contaminants that are absorbed by plants from soils is important because the seeds and fruits have the potential to be carried off site by the birds and mammals who eat them.

Value of Ecological Resources. The third major objective of the Task Group is to understand the value people place on ecological resources. So, we must understand who uses these ecological resources, how they are used, and how recreational activity is prioritized with other potential land uses.

Our data indicate that many people living in South Carolina spend over 20 days a year in a variety of recreational activities, including photography, hiking and camping, fishing and hunting, and bird-watching. This kind of information is essential to making good decisions about future land use and remediation. These projects are being conducted in collaboration with W. Gibbons at the Savannah River Ecology Laboratory.

The methods developed here can be used at other DOE sites to assess the importance of ecological resources and functioning ecosystems to stakeholders. We are currently developing the survey instrument for use at the Idaho National Engineering and Environmental Laboratory.

Exposure Assessment Task Group

The Exposure Assessment Task Group continues to make progress on the development of the Exposure/Dose Modeling and Analysis System (EDMAS), a computer based tool which is the centerpiece of this Task Group's work.

Computer software is being developed that will link existing groundwater contaminant transport models with the microenvironmental modeling component of the EDMAS. Groundwater contaminant transport models are mathematical models that describe the movement of chemicals, typically environmental contaminants, through soil. The movement of contaminants is facilitated by the movement of groundwater. The microenvironment refers to a region of space around a human or ecological receptor. One important benefit of this software development is that it will facilitate the estimation of human exposure to groundwater contaminants such as trichloroethylene and tritium.

A Watershed Modeling/Exposure Assessment Workshop is being organized by the Exposure Assessment Task Group, in collaboration with the Remediation
Technology Task Group, Department of Energy (DOE), contractors, stakeholders, and others. The workshop is scheduled for Fall 1997, and will address issues related to exposure, to contaminants in groundwater and surface water.

Health Hazard Identification Task Group

Activities of the Health Hazard Identification Task Group are aimed at identifying potential health hazards associated with exposure to contaminated DOE sites. Several studies are planned. One study will assess how much of a contaminant, for example metal salts or radionuclides, can be absorbed into the body. This will be accomplished by feeding contaminated soil from SRS to live animals. In additional studies, the ability of the contaminants to cause harm to genes will also be evaluated in live animals and on the cellular level.

Genetic damage by chemicals is a critical mechanism of cancer causation. Understanding the extent of genetic damage that can be caused by eating contaminated soil will add to our understanding of health risks for humans and animals.

Occupational Safety and Health Task Group

The Occupational Safety and Health Task Group is conducting a comparison of the structure and function of occupational health and safety services at several DOE sites. Particular focus is on the availability of these services to the environmental management workforce. Understanding the extent of occupational health and safety services available to the management workforce is important because many managers will be involved in the characterization of waste sites.

Occupational health and safety services, including industrial hygiene, safety, radiation protection, occupational medicine and training, need to be integrated with each other and made available to new subcontractors.

The Task Group will examine the extent these services are reaching the new subcontractor workforce which will be coming on site. The planning of a registry of remediation workers will also be developed which will facilitate the tracking of workers, their training, and any health outcomes. This registry will also facilitate future epidemiologic studies.

In addition, the Task Group is developing a worker-based task/hazard analysis system which shows great promise for involving workers in improving health and safety efforts at environmental management operations. It will be an interactive system available on the Internet.

Social, Land Use, Demographic, Geographic and Economic Task Group

The Social, Land Use, Demographic, Geographic and Economic Task Group has begun experimenting with a multi-regional economic model which calculates the economic impacts of potential changes in the budget of the Department of Energy on the local economy. We have found some interesting linkages among major DOE sites. The initial results show that an increase in investments for environmental management at one of the big DOE sites (Savannah River, Hanford) had positive impacts at the other major sites. Impacts on smaller sites, in contrast, are negative. We are preparing a report that will summarize the model and provide an example or two for CRESP researchers.

The land use survey of planners from communities near SRS is completed and a Task Group member, Karen Lowrie, is currently writing an initial paper to summarize these findings.

Stakeholder Communication Task Group

Last October, the Stakeholder Communication Task Group of CRESP-East began a study in which 1,671 people who live in a fourteen county region surrounding the Savannah River Site were surveyed. Residents were asked questions concerning their perceptions toward environmental health, management, remediation and education. The survey, the Risk Communication Profile Instrument, is a questionnaire that was developed and reviewed by stakeholders and environmental experts. Researchers at the University of South Carolina and Georgia Southern University conducted the telephone interviews in both Georgia and South Carolina counties. All the interviews have been completed and the analysis of the data has begun.

In the data analysis, SRS residents' perceptions of environmental risk, trust, control and neighborhood quality will be examined. In addition, the analysis will also focus on SRS residents' sources of environmental information, the perceived credibility/accuracy of the reported information sources, and the frequency of use of information sources.

The purpose of this study was at least fivefold: (1) to identify acceptable vehicles for public education, outreach and risk communication at SRS; (2) to determine the impact of targeted risk communication techniques on risk perception among SRS residents; (3) to examine perceptions of trust, public policy and degree of control among SRS residents; (4) to identify determinants of perception of risk and neighborhood quality among SRS residents; and (5) to examine the relationship between risk perception and potential hazardous waste management and remediation activities at the SRS. Over the next few months, all the information obtained from this study will be analyzed and the results presented.

Dr. Lynn Waishwell, Director of Outreach and Communications, has been attending the SRS-CAB meetings and recently attended the CDC-SRS Health

Effects Subcommittee meeting in Augusta, Georgia. She also attended the Environmental Education Association of South Carolina annual meeting at Santee State Park near Charleston, South Carolina.

CRESP-West

In February, for the first time in 57 years, Seattle hosted the annual meeting of the American Association for the Advancement of Science (AAAS). CRESP-West staff were active participants in the five full days of concurrent sessions, special symposia and plenary lectures. Many of these sessions were on environmental topics.

In addition to attending the meeting, CRESP-West staff organized several sessions. CRESP, particularly its commitment to involve stakeholders, was the subject of a presentation by Management Board member Gilbert Omenn in the session "Science-Based Risk Management in Regulatory Agencies: Assessing Risk Commission Recommendations." CRESP-West investigators, Elaine Faustman and Richard Fenske, organized a session, "Risk-Influenced Decision Making at DOE Sites: Time for Holistic Thinking?" They assembled a diverse panel of contributors from around the country, including Carol Henry from DOE and Russell Jim of the Yakama Indian Nation.

John Kissel, who heads CRESP-West's Exposure Assessment Task Group, convened another session called "Pathways of Exposure to Contaminants in Surface Soils." Finally, on the last afternoon of the last day, Ecological Health Task Group members James Karr and Ellen Chu (along with Laura Westra from the University of Windsor) led a session on ecological integrity. Ecological health and ecological risk were important themes in this session, as was the current development of an index of biological integrity (IBI), a terrestrial counterpart of Karr's aquatic index by the same name for assessing biological conditions at Department of Energy sites.

Several opportunities have resulted from media attendance at these meetings, including an invitation to discuss ecological integrity by a British journal, Nature, and interviews with the Canadian
Broadcasting Company and UW's syndicated radio broadcast reporter.

Other Notes

CRESP ASKED TO CONDUCT REVIEW OF DOE/EM BUDGET PROCESS

In a letter signed on March 10, CRESP Principal Investigator, Bernard Goldstein, received a request from DOE Assistant Secretary for Environmental Management Alvin Alm that CRESP conduct an independent review of the risk data and measures utilized in the Project Baseline Sheets developed to support projects in the Department's 10-Year Plan and suggest how additional information requested and gathered could be utilized in the final 10-Year Plan now scheduled for September 1997. In 1996, CRESP conducted similar reviews both of the Risk Data Sheets through which similar risk material was gathered in last year's EM budget, formulation efforts, and through its Peer Review Committee of EM's overall effort to link risk to budget priorities. (See CRESP Update, September 1996, Vol. 1, No.5). These two 1996 reviews and a recent CRESP study, "Improving DOE/EM Risk Information: Content and Format" (revised version, January 27, 1997) can be obtained by contacting Lynn Waishwell, CRESP-East's Director of Outreach and Communications.

CRESP AND USEPA

On March 3, 1997, CRESP Principal Investigator, Bernard Goldstein and four others from CRESP-East, participated in a day-long seminar on research methods, goals and findings with the leadership and senior staff of the United States Environmental Protection Agency's (USEPA) research and development laboratory in Athens, Georgia. This laboratory currently focuses on exposure assessment technologies and issues. The purpose of the meeting was to determine how to promote active research collaboration between CRESP and the lab. Success in this objective would build on collaborative efforts such as those CRESP has already formed with Savannah Research, USC's School of Public Health, Georgia Southern University and the Oak Ridge Institute for Science & Education (ORISE) at SRS and several occupational health research organizations at Hanford. Also in attendance at the meeting in Athens, were EPA Region IV federal facility managers and both DOE and Westinghouse staff from SRS.

CAROL HENRY VISITS CRESP-EAST

On February 21, Carol Henry, Associate Deputy Assistant Secretary of the Office of Science and Risk Policy at DOE and Project Manager of CRESP, spent a day with CRESP-East researchers learning of their activities. This meeting paralleled a similar seminar held at CRESP-West in Seattle on February 13. CRESP researchers first presented their research which characterized specific stakeholder concerns and perceptions. In the afternoon, CRESP researchers described current work related to the following themes: Economics and Land Use, Exposure and Remediation, Radionuclide Health Risks, Risk to Consumers and Ecosystems, and Risk to Workers. Each of these themes included research from several Task Groups and emphasized the interdisciplinary nature of the work focusing on key site issues.

CRESP Presentations

During January and February, several

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CRESP researchers made presentations to SRS-CAB Subcommittees and other organizations.

Lynn Waishwell, Director of Outreach and Communications of CRESP-East, presented "Risk and Risk Communication" to the Future Use and Risk Management Subcommittee on January 27, 1997 at Hilton Head, South Carolina. She described basic concepts of risk and risk assessment, and provided key questions to consider when developing a risk communication plan for a community.

Dan Wartenberg, Data Characterization Task Group Leader of CRESP-East presented, "An Update on CRESP's Extension of the SRS Worker Mortality Study," on February 27, 1997 to the Environmental Remediation and Waste Management Subcommittee of SRS/CAB. He will use death certificates and data collected at SRS to develop understanding of the relationship between worker exposure to contaminants and the cancer mortality patterns of workers.

Chuck Powers, Executive Director of CRESP, presented, "An Update of CRESP Research," on February 27, 1997 to the Environmental Remediation and Waste Management Subcommittee of SRS/CAB. He briefly provided an overview of CRESP and highlighted key themes of CRESP research.

Chuck Powers, Executive Director of CRESP, gave a presentation to the American Physical Society's Annual Meeting in Kansas City, Missouri on March 18, 1997. His talk focused on ways that risk concepts and research can augment efforts to both improve cleanup efficiencies (including mortgage reduction) and help better target compliance efforts for DOE's national EM program and at sites. This invited symposium addressed the history and prognosis for DOE cleanup from a managerial, scientific and regulatory perspectives. It was chaired by Environmental Management Advisory Board Co-chairman David Bodde and included addresses by James Fiori, DOE's Acting Deputy Assistant Secretary for Environmental Restoration, Frank Parker of Vanderbilt University, and Thomas Winston, Ohio EPA.

EOHSI Seminars

On January 16, Dr. Bernard D. Goldstein, Director, EOHSI, presented a seminar entitled, "Scientific and Policy Basis for Risk Assessment."

On January 17, Dr. Jacob J. Steinberg, Montefiore Medical Center, presented a seminar entitled, "How Interdisciplinary Science Can Help Advance Environmental Health and Policy."

On February 13, Dr. John Graham, Director, Harvard Center for Risk Analysis and President, Society for Risk Analysis, presented a seminar entitled, "Making Sense of Risk."

On February 28, David Barnhill, ScD, Tulane University Medical Center, School of Public Health and Tropical Medicine, presented a seminar entitled, "An Analysis of Concerns and Risk Perceptions Around Six Department of Energy Installations."

On March 12, Joel Snodgrass, PhD, Bureau of Biological Research, Rutgers University presented a seminar entitled, "Incorporating the IBI and Ecological Risk Assessment Methodologies and Policies." He lives and works full time in the SRS area.

CRESP

The Consortium for Risk Evaluation with Stakeholder Participation (CRESP) is a university-based national organization created specifically to develop a credible strategy for providing information needed for risk-based cleanup of complex contaminated environments, especially those for which the Department of Energy is responsible. The Consortium specifically responds to the request by the Department of Energy and the National Research Council for the creation of an independent institutional mechanism capable of integrating risk evaluation work. As a result of a national competition, a five-year cooperative agreement was awarded to CRESP in March of 1995. With the agreement of Citizens Advisory Board members, "CRESP UPDATE" is one approach that we are using to share research plans and programs with SRS stakeholders.

CRESP Task Group Leaders at EOHSI

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CRESP INFORMATION

If you would like information about CRESP or any of the activities described, contact Lynn Waishwell, Director of Outreach and Communications at 908-445-0220.

CRESP UPDATE

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