

# CRESP UPDATE: SAVANNAH RIVER

Vol. 2 No. 4  
July 1997

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## Economic Impact of Land Uses

by Lynn Waishwell, Ph.D.

What will be the impact on local economies if new businesses come into the area? How will the local communities be affected by changes in the DOE/SRS budget this year or in the next ten years? How has SRS/DOE influenced local economies in the past? Is the economic influence of DOE at SRS similar to that of other DOE sites? The questions can now be addressed by the use of economic forecasting models refined by the Social, Land Use, Demographic, and Economic Task Group of CRISP-EOHSI.

The Task Group has adapted and refined two economic forecasting models for use at SRS and other DOE sites. One economic model developed at West Virginia University answers the question, "Was the presence of SRS/DOE a major benefit to the community or did it have a negative impact on the economy?" The Task Group answered this question by looking at the changes in income, population and jobs across all weapons sites to be as objective as possible. Each site may have a different pattern, and it is very important to be able to compare the economic impacts across sites. Not surprisingly, the Task Group found that when DOE was putting a lot of money into a specific site, the economy tended to improve, but when DOE did not put new money into the site, local economies did not improve. The Task Group focused on specific counties near SRS and found that Allendale and Burke

have not historically benefitted from DOE funds as much as other adjacent counties. This is useful for planners and concerned stakeholders trying to analyze the future impact on local economies as the level of DOE spending changes.

The other economic forecasting model, the Regional Economic Modeling Information System (REMI), has two major functions that are of use to stakeholders and land use planners. REMI can estimate the economic impact of bringing new business into the area. For example, if a new \$100 million manufacturing plant was built in the SRS region, REMI can predict the impact on various parts of the economy including construction, service, and commercial sectors. This is useful in determining what kind of companies would best benefit the local economies in the future. While REMI can best estimate the impact of large scale companies that would put at least \$100 million into the community, it can also estimate what would happen if more resources were put into other sectors, like education, rather than business. For example, REMI can answer the question, "What would happen to local economies if we spent \$10 million on building a local community college?"

A second major function of REMI is to estimate the impact of changes in the DOE budget on local economies. If the annual \$1.6 billion budget of SRS was reduced to \$400 million, how would it affect construction, service, and commercial sectors of the economy? The answer to this question would be useful to planners, regional economists, community leaders, and state and local representatives who are trying to plan for the future.

The Social, Land Use, Demographic, Geographic and Economic Task Group is anxious to apply these models to scenarios of interest to stakeholders and is currently

### CRISP UPDATE: SAVANNAH RIVER

*CRISP Headquarters:  
EOHSI  
UMDNJ/RU  
Charles Powers, PhD  
Executive Director  
681 Frelinghuysen Road  
Piscataway, NJ 08855-1179  
Phone: 732-445-0520  
Fax: 732-445-0959*

*CRISP West:  
University of Washington  
Department of Environmental  
Health  
PO Box 354695  
Seattle, WA 98195  
Phone: 206-543-9394  
Fax: 206-616-4875*

*Management Board:  
Bernard D. Goldstein, MD  
John A. Moore, DVM  
Gilbert S. Omenn, MD, PhD  
Charles W. Powers, PhD*

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developing scenarios for several stakeholders. Any organization or person with a realistic scenario is encouraged to contact Mike Greenberg, Task Group Leader.



## Ecological Hazard Identification Task Group

The Ecological Task Group continues its work in three main areas: 1) attitudes and perceptions of stakeholders concerning ecological resources, 2) bioindicators and biomarkers, and 3) remediation and restoration. Our overall objective is to develop risk methods that can be used throughout the DOE complex to understand how ecological resources and their use by stakeholders are impacted by DOE activities. This includes assessing the influence of remediation and restoration on future land use considerations.

Ecological resources. Our overall goal is to understand how stakeholders value ecological resources, and how they think the SRS land should be used in the future. The Task Group interviewed three different groups of people: a general group of hunters and fishers, hunters and fishers who used SRS, and the general public living at various distances from SRS.

Our first series of interviews were conducted at the Palmetto Sportsman's Exhibit in Columbia, followed by interviews at the Mayfest Celebration. While 285 hunters and fishers that we interviewed at Palmetto indicated that they hunted and fished an average of over 40 days a year, only half believed the fish and deer from SRS were safe to eat. When asked what future land uses of SRS were most preferred, keeping SRS a National Environmental Research Park and maintaining hunting, fishing

and camping on site received the highest scores. The land use options least preferred were nuclear waste storage and housing. People living closer to SRS were more willing to have the site used for factories, residential, and nuclear production than were those living farther from the site. Information obtained at the Mayfest Celebration from people who were not specifically hunters and fishers confirmed many of these findings.

The Task Group also interviewed people who attended the Aiken Horse Show in March, 1997, as well as fishers and hunters who actually used the Crackerneck hunting unit on SRS. These results will be available soon. This work is conducted in collaboration with W. Gibbons at the Savannah River Ecology Laboratory (SREL).

We are also interviewing people who are fishing along the Savannah River to understand fishing behavior and consumption patterns of local people. We are asking how often and where they fish, what species of fish they eat, how often they eat fish, and how the fish is cooked. As part of this study we are also collecting fish from the Savannah River and samples from fisherman for later analysis of contaminants.

Currently we are interviewing people who live by the Idaho National Engineering and Environmental Laboratory near Idaho Falls, Idaho and asking them about recreation use of this site and how they value ecological resources. We want to compare the methods we developed at SRS by interviewing people from other sites, and to see if the recreational rates and valuation of ecological resources are

similar.

Biomarkers and bioindicators. The Task Group continues its work to identify several indicator species. Indicator species are plants or animals that reflect a measure of environmental degradation, and are used to describe the overall health of the environment and risks to humans. Currently these indicator species are mourning doves, wood ducks, and raccoons. We have found that the levels of contaminants in mourning doves on SRS are relatively low, except for cesium, and do not pose a human health problem. Levels of cesium in dove meat suggest that it would not be wise to hunt doves that have been foraging on the Par Pond during a draw-down.

Our work with wood ducks indicates

that there is a difference in the amount of mercury female wood ducks deposit in eggs of a clutch, with the greatest amount deposited in the first egg. This information is useful in designing biomonitoring schemes for SRS.

We have initiated a study with raccoons aimed at determining whether there are differences in mercury levels at different locations of SRS, and whether the levels of mercury pose a health hazard to the raccoons or to people who might eat raccoon meat. In the initial phases, we are collecting raccoons (and their hair) from several sites on SRS in a

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pilot study. This work is in collaboration with I. L. Brisbin at SREL and with CRESP faculty at the University of Washington.

These studies have used individual species to determine whether there is a risk from contaminants or other stresses. We are using the Index of Biotic Integrity (IBI) to examine effects on larger communities and are refining the IBI for fish communities in streams at SRS. This work is done in collaboration with J. Snodgrass (currently living near SRS) and with J. Karr at UW.

We also are developing an IBI for use with amphibians on SRS. This is particularly important for SRS, where many of the key ecological habitats are wetlands. Further, since amphibian populations are declining world-wide, it is of some importance to develop risk methodologies to use with them.

Restoration and remediation. This work continues to examine the ability of seedlings of native species to grow on contaminated SRS soil (such as fly ash soil) through the natural cycle, or whether other methods might be required to revegetate these regions. Our work has indicated that the native plants can grow on these soils, but may need some help during germination. Fly ash soils are often compact and it may be difficult for the seeds to penetrate the soil surface. This work is done in collaboration with R. Sharitz and G. Wein of SREL

We are also continuing to work with the Exposure Assessment Task Group of CRESP-EOHSI to develop models for understanding how contaminants move through the ecosystem. Initially we are concentrating on models for fish and birds because they often are at the top of aquatic and terrestrial food chains.

We welcome any comments or suggestions concerning either the design of the research, or additional topics which are of particular interest.

## Occupational Health & Safety Task Group

The Task Group is developing an interactive system for use on the Internet that will provide for the tracking of training and experience of remediation workers. Workers will input information on their job, specific tasks and hazards encountered on to a form. Workers will then be able to use the data base to compare hazards on similar jobs and identify specific problems related to their particular jobs. Workers often have first hand familiarity with safety hazards or chemical exposures, and this system will collect this type of information as a supplement to the Health and Safety Plans required of DOE, its prime contractors and construction subcontractors.

Designed for use complex-wide, this system will be field-tested first at SRS. It takes advantage of new computer technology to protect the confidentiality of individual entries. It can also serve as a registry for remediation workers.

The Task Group is also working on identifying biomarkers that will point to an increased risk of disease. A biomarker is something that can be measured in the human body, for example, blood lead levels or DNA mutations. Biomarkers can also provide information on genetic susceptibility or genetic effects of chemicals. This work is a practical application of the Human Genome Project funded by DOE which is aimed at mapping all of the human genes with respect to their locations on chromosomes.

In addition to participating in a major biomarker meeting in Charleston in early May, the Task Group is

examining the precision of methods for applying biomarkers. For example, the simple procedure of testing a urine sample for chemicals can produce variable results depending on how much liquid a person has had to drink. This is important to understand when a worker exposed to chemicals during remediation goes for a medical examination.

Other projects underway or planned for SRS include an investigation of injury rates among different types of environmental jobs, and the implementation of a registry of environmental management workers. We welcome additional information or suggestions.

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

The Social, Land Use, Demographic, Geographic and Economic Task Group met with Chris Noah from Westinghouse and Chuck Borup from DOE in June to discuss the Task Group's activities. The Task Group reached a verbal agreement to assist them with designing a land use plan for the SRS site that will also be shared with the SRS/CAB. Initial efforts will concentrate on the process. The Task Group has also agreed to develop estimates of the economic impacts of plans to develop technology to manage plutonium and tritium on the sites. Work on economic models is detailed in Dr. Waishwell's lead story in this issue of CRESP Update.

## Stakeholder Communication Task Group

The Stakeholder Task Group recently began analyzing the information obtained from the SRS Risk

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Communication Profile study. Telephone interviews were conducted with 1,672 residents from counties adjacent to SRS: 27.8% were African American, 10% white, 40.3% were male and 14.6% reported having a SRS employee living in their home. The average age of people who were interviewed was 46. One major focus of this interview was to learn how people gained information. SRS residents reported using television as their primary source of information and government agencies and computers as their least used sources. SRS residents also rated the credibility of specific sources of information. Professional contacts, such as doctors and lawyers, were rated as the most credible and newspapers were rated as least credible. Over the next month, further analysis will be conducted concerning SRS residents survey responses. Residents perceptions of trust and risk associated with SRS will be the focus of this analysis. This study is conducted in cooperation with the Univ. of South Carolina, School of Public Health and Georgia Southern Univ.

Lynn Waishwell, Director of Outreach and Communications, presented a workshop at an invitational conference, People of Color and Disenfranchised Communities: Environmental Health Summit in Waveland, Mississippi. She continues to attend the SRS/CAB and the SRS/CDC Health Effects Subcommittee meetings. She has also begun an analysis of the way local newspapers describe events which occur at SRS.

## CRESP-University of Washington

A two day workshop entitled, "Scientific and Engineering Challenges in Remediation of Contaminated Soil and Groundwater" was held at the University of Washington (UW) on May 29-30, 1997. The workshop was coordinated by

Tim Takaro, Technical Director of the CRESP-UW Occupational Safety and Health Task Group. Drawing from groundwater and risk experts from around the nation, the first day featured presentations and discussion on remediation technology that occurs at the original site of contamination. Ways to evaluate human health risks related to those potential remediation techniques were also discussed. The second day of the workshop covered issues such as monitoring, characterization, fate, and transport. Approximately 70 participants, including a mix of regulators, academic and industry scientists and Department of Energy managers discussed field based applications of remediation, risk evaluation techniques, and new remediation techniques still under study. The conference concluded with a discussion led by John Barich of the Environmental Protection Agency regarding the EPA's outlook for new groundwater and soil remediation technologies. Participants came away from the workshop with a clearer view of the current problems at active remediation sites and a vision of how future research might be directed towards these challenges.

## Other Notes

### CRESP Annual Meeting

CRESP's Annual Meeting was held June 25 - 27 at Pack Forest, a camp operated by the University of Washington's College of Forestry. The setting provided a rustic but effective environment for CRESP scientists and invited guests to meet and discuss current CRESP research and future needs. The 12 guests facilitated extensive dialog throughout the meeting on the relevance of CRESP research to current regulatory and management

decision making. These guests included three representatives from SRS, regulators from US EPA, state representatives from Washington and South Carolina, DOE representatives from headquarters and local offices, and a spokesman from an Indian Nation.

Two major themes emerged from guests' comments. Before the annual meeting of CRESP, they had known little of the scope, diversity and relevance of CRESP's research to their own work. Guests also felt that consistent efforts to draw the disparate talents of CRESP to the decision making agenda of stakeholders, regulators, and management at DOE sites will enhance CRESP's effectiveness and allow the results of its research to be fully utilized.

CRESP researchers provided summaries of their current research in a poster format for participants to review. These 102 posters provided the grist for application of the central theme of the conference: integration of CRESP's cutting edge research to assure its direct and concrete use in resolving the key problems facing DOE site cleanup. To date, 51 CRESP-supported studies have already been accepted for publication in journals credible to scientific communities. Principal Investigator Bernard Goldstein opened the meeting with this theme and with an emphasis on the importance of maintaining the highest quality of research. Co-Principal Investigator Gilbert Omenn reinforced this approach in the final presentation.

The meeting began with selected speakers presenting an overview of some of the cutting edge research that has occurred in the past two years. Participants from various Task Groups and guests then joined one of five breakout sessions. The topics of these breakout sessions reflected particular areas of concern for CRESP over the next several years. The breakout groups met twice during the annual meeting and provided a summary report to the group. The sessions were:

- Being A Value Added - How Well Are We Communicating?-
- Ecological Risk - Stepchild of the

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Risk Trilogy- How Can CRESP Improve the Process?

- Web and GIS Risk Evaluation Tools- Fancy Toys, Working Tools, or Vehicles for Public Communication?

- Selecting Exposure Assessment Approaches - Utility and Limitations of Innovative Tools  
- Biomarkers - Sounds Good, But Can This Dog Really Hunt?

Evening sessions provided further opportunities for speakers to offer insight into the potential future direction of CRESP and for dialogue among CRESP researchers and invited guests.

## EOHSI Seminars

March 12, 1997, Dr. Joel Snodgrass, CRESP Ecological Hazards Identification Task Group from CRESP/EOHSI, presented "Incorporating the IBI and Ecological Risk Methodologies and Policies."

April 3, 1997, Dr. Tom McKone, Exposure and Risk Analysis Group Leader, Lawrence Berkeley National Laboratory, presented "Confronting Persistent Multimedia Pollutants: Exposure, Uncertainty, and Risks."

April 24, 1997, Dr. Milton Russell, Joint Institution for Energy and the Environment, University of Tennessee, presented "The Changing Role of Economics in EPA Decision Making."

April 23, 1997, Bill Griffith, Ph.D. and Alan Smith, CRESP-University of Washington, presented "The CREAT Risk Information Tool."

April 25, 1997, Dr. Mildred McClain, Citizens for Environmental Justice, presented "Environmental Justice at the Crossroads: 'Risky Business'."

May 8, 1997, Dr. Gordon Hassing, Proctor & Gamble, presented

"Environmental Risk Assessment at Proctor & Gamble."

June 12-14, 1997, Symposium on Dietary Factors in Cancer Prevention.

## CRESP Presentations

May 15, 1997, David Kosson, Ph.D., Rutgers University, presented "Risk Communication: Addressing Public Concerns about Risk Controversies" at the Toxicology Risk Assessment Symposium, National Library of Medicine, Bethesda, Maryland.

May 16, 1997, Charles Powers, Ph.D. CRESP Executive Director, presented "CRESP: Testing Ground for the President's Commission on Risk Assessment and Risk Management" at the Toxicology Risk Assessment Symposium, National Library of Medicine, Bethesda, Maryland.

May 3, 1997, Lynn Waishwell, Ph.D., Director of Outreach and Communication, presented "Risk Assessment" at the People of Color and Disenfranchised Communities Environmental Health Summit, Gulfside United Methodist Assembly Retreat Center, Waveland, Mississippi.

## **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**

*Data Characterization/Statistics*  
Dan Wartenberg, PhD

*Ecological Hazard Identification*  
Joanna Burger, PhD

*Exposure Assessment*  
Paul Lioy, PhD

*Health Hazard Identification*  
Michael Iba, PhD

*Occupational Safety and Health*  
Michael Gochfeld, MD, PhD

*Remediation & Technology*  
David Kosson, PhD

*Social, Land Use, Demographic, Geographic & Economic*  
Michael Greenberg, PhD

*Stakeholder Communication*  
Audrey R. Gotsch, DrPH

## **CRESP UPDATE**

If you would like to be added to the mailing list for this publication, please send your name, address and telephone number to:

CRESP UPDATE  
EOHSI-PERC Room 236  
681 Frelinghuysen Road  
Piscataway, NJ 08855-1179

## **CRESP INFORMATION**

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If you would like information about CRESP or any of the activities described, contact Lynn Waishwell, Director of Outreach and Communication at 732-445-0220. She would be happy to facilitate your dialogue with Task Group Leaders.