



CRESP Update

Savannah River

Volume 3 ■ Number 6 ■ November 1998

Task Group Reports

Ecological Health	4
Exposure Assessment.....	5
Health Hazard Identification	6
Outreach and Communication	6
Social, Land Use, Demographic, Geographic, and Economic	7

Other Notes

Report from CRESP-University of Washington	7
-----------------------------------------------------	---



CRESP Headquarters

CRESP-EOHSI
Charles W. Powers, Ph.D. ■ Executive Director

CRESP-EOHSI

Environmental and Occupational Health Sciences Institute
170 Frelinghuysen Road
Piscataway, New Jersey 08855-1179
Voice 732-445-0520 ■ Fax 732-445-0959

CRESP-UW

University of Washington
Department of Environmental Health
PO Box 354695
Seattle, Washington 98195
Voice 206-616-4874 ■ Fax 206-616-4875

Management Board

Elaine M. Faustman, Ph.D.
Bernard D. Goldstein, M.D.
John A. Moore, D.V.M.
Charles W. Powers, Ph.D.

The Complex Matter of Stakeholder Participation in CRESP Research

A Look Back

By Charles Powers, Ph.D.
Executive Director
Consortium for Risk Evaluation with Stakeholder Participation

CRESP is proud of its evolving role in providing data that helps facilitate effective progress by the Savannah River Site in its cleanup program in a way that is consistent with the other evolving Site missions and by clarifying (through research) the issues of greatest concern to the very diverse communities affected by Site activities.

CRESP made a firm initial commitment to listening to the issues of greatest concern to the SRS Citizens Advisory Board (SRS-CAB) and trying to anticipate data needs related to those concerns, to provide requested input when it had relevant information and in seeking the advice of CAB members as the protocols for its evolving studies

when those CAB members express interest in a CRESP study issue.

Two from many examples where CAB or a CAB member views have shaped the research protocols are:

- the study of the incidence of leukemia mortality in Site workers where the CAB's interest led us to focus on seeking to identify whether there might be any association with tritium exposure (Data Characterization, Analysis & Statistics. (1997, May). *CRESP Update: Savannah River*, 2(3), 2.); and

- in the suggestions made by many CAB members about who eats Savannah River fish and how they cook it, information that shaped the Joanna Burger fish consumption study (Ecological Health Task Group. (1998, May). *CRESP*

CRESP Task Group Leaders at EOHSI

Data Characterization, Analysis, and Statistics
Dan Wartenberg, Ph.D.

Ecological Health
Joanna Burger, Ph.D.

Exposure Assessment
Paul Lioy, Ph.D.

Health Hazard Identificaiton
Lynn Fahey McGrath, Ph.D.

Outreach and Communication
Lynn Waishwell, Ph.D.

Remediation Technology
David Kosson, Ph.D.

Social, Land Use, Demographic, Geographic, and Economic
Michael Greenberg, Ph.D.

Worker Safety and Health
Michael Gochfeld, M.D., Ph.D.



If you . . .

. . . **want to get CRESP Update: Savannah River regularly**, send your name, mailing address, city, state, and zip code plus area code and daytime telephone number to —

CRESP Update: Savannah River
EOHSI-PERC Room 236
170 Frelinghuysen Road
Piscataway, NJ 08855-1179

. . . **would like information about CRESP or any of its activities**, contact —

Lynn Waishwell
Director of Outreach and
Communication Task Group
Voice 732-445-0920
Email lwaishwe@eohsi.rutgers.edu

. . . **want to read about CRESP on the web** or access previous issues of this newsletter, our URL is —

www.cresp.org

Update: Savannah River, 3(2), 1.), a study which in turn facilitated consensus among the site regulators about issuing a fish advisory rather than one of them having to resort to a major remedial program that would have been able to address fish contamination in awkward and inefficient ways.

This type of interaction is long standing; CRESP is happy to have provided early review of the draft Waste Management Programmatic Environmental Impact Statement, a document which, as a CRESP presentation to the CAB in January 1996 pointed out, would have the fundamental implications for the Site and its citizens, implications which are now so central to the discussions the Environmental Restoration and Waste Management Subcommittee (ER&WM) has launched this Fall. The CAB's Recommendation No. 16 emerged from data developed in this CRESP report. Additionally, the recent decision by the Future Use and Risk Management Committee to launch a two-year, multi-pronged effort to understand, specifically in the SRS context, the many meanings of risk (safety as compared to health risk; risk as defined by CERCLA as compared to DOE orders) is an exciting development. The SRS-CAB is taking a uniquely active role in this effort. That this initiative, entitled the Risk Management Working Group (RMWG), taps a need is demonstrated by the very large turnout to its meetings. CRESP researchers' charter

participation in the subcommittees of that Working Group has helped us work creatively with the Group, **from** providing initial general information about risk as the Group began its work (a document that incorporates Dr. Goldstein's response to the CAB's initial and follow-up questions is available from the CRESP office) **to** a study completed over the summer (and now being reviewed for publication) comparing the calculations of safety as compared to health risks done in direct response to the fundamental questions generated by the Working Group.

This new CAB initiative on risk responds to specific CAB motions and discussion about the importance of outreach that achieves interaction about site risks with a wider public and is consistent with the findings of CRESP's study of the risk perceptions of 1,671 randomly selected residents who live in the 14 counties which surround the Site.

That study, made feasible through collaboration with the University of South Carolina's School of Public Health, Institute of Public Affairs, and Georgia Southern University with whom CRESP established subcontract relationships, is a cornerstone of the evolving CRESP effort to relate its work to perceptions of risk documented to be present in the less knowledgeable but very interested local publics to whom the CAB has consistently stated an intention to reach out. The CRESP study found few respondents used governmental

agencies or community organizations as a source of information but that they do rely on other mechanisms.

We found that respondents to the study identified newspapers as a frequently used or credible source of information to which they looked.

That was a finding which drove additional CRESP research into an examination of the nature of information provided by this important source of communication. We were particularly concerned to determine whether the newspaper coverage provided any significant discussion or interpretation of the concerns about the site that the public we had interviewed had expressed. Since plans for the future of SRS differ so importantly from that of Rocky Flats and since there are active studies of the feasibility of bringing Rocky Flats material to SRS, last Spring we did a comparative analysis of the site information made available about risks to citizens near both sites through local newspapers. This study concluded that health and safety risks were not often discussed in local papers, though the economic impact and risks of site decisions was very often characterized in local SRS newspapers. Further, since CRESP had identified risk perceptions and sources of information of local residents, we have conducted a small study to examine the sources of information used by the CAB to develop its more detailed understanding of Site issues.

And finally, CRESP at the suggestion of site personnel, and because of the continuing request to CRESP of many citizens in and outside the CAB to explain different ways to interpret the risk implications of scientific data, made an effort to convert the data available through the Site's monitoring program into a short brochure that illustrates several different ways that the same basic data can be used to describe risk. Elements of that study are being used in the work of CRESP researchers with the CAB's RMWG. The results of all three studies, which together involved expenditures of under \$30K, can, like all finished CRESP studies, be obtained through the CRESP office.

To be sure, the CAB is not the only place with whom CRESP seeks to communicate with the local public. In fact, CRESP has been requested to make more presentations in the past two years to the SRS-CDC Health Effects Committee than to the CAB and its subcommittees. And it has established ongoing relationships with local public planners and others through a series of studies to seek information on the economic risks for EM site communities that would be the consequences of different decisions by DOE about the size and nature of its funding. (Those studies were, in fact, generated by several national studies CRESP has completed and published on the comparative impact of different fundamental

DOE decisions on major DOE communities.) This information has been shared not only with local citizens but requested by congressional subcommittee staffs.

It remains the case that different groups of stakeholders see the center of CRESP work dependent on their roles and responsibilities. Some are more interested in technical studies. Recently, the Region 4 USEPA asked CRESP to explain findings from nine highly technical studies found on the CD-ROM where the full breadth of CRESP's current work is described in 137 posters. For example, the Agency wanted an explanation of posters entitled "The Impact of Mass transfer Rate Limitations, Including Pore Diffusion and Heterogeneity, on Soil Vapor Extraction Remediation Strategies" (recently published as a Ph.D. thesis and described in a presentation to the ER&WM Subcommittee at an earlier stage) and "Background Soil Quality and Relationships Between Surface and Subsurface Soil Samples for the Savannah River Site", and "Sorption of Cesium-137 in savannah River Site Soils". Because, according to DOE-SRS personnel, these studies lie just beyond the narrow focus of current regulatory studies, CRESP's ability to conduct independent work of national significance can open paths of mutual interest in both the regulatory community and the Department and may well point the way to more effective, efficient and protective regulatory approaches.

At root, however, it is important to recognize that CRESP and the SRS-Citizens Advisory Board have different fundamental missions even though the activities needed to achieve them may be identical. The sole purpose of the CAB is to advise the Department of Energy, EPA and South Carolina DHEC about its collective views of site cleanup problems. CRESP has a different mode of operation (research) to serve a different beneficiary: the many publics, national and local, who are affected by the policies and activities of the Department of Energy. Happily, we believe that both can achieve their different missions by working synergistically and collaboratively — and that is why we have never missed a full CAB meeting since July, 1995.

Ecological Health

The mission of this Task Group is to develop methods for understanding biodiversity at all levels. That includes individuals, population, community, ecosystem, and landscape. This information is necessary for compliance, cleanup, remediation and restoration. We are also interested in developing monitoring schemes that help evaluate clean-up. And we look for other problems that are the result of human activity harmful to the environment.

The Task Group works in

projects that range from tiny organisms to those that take in whole landscapes. This includes our work with indicators such as mourning doves, wood ducks, and raccoons. Since they represent different levels of the food chain, we can track concentrations of contaminants as they move up the chain. These species were selected because they are common on DOE sites, are indicative of species and population effects within ecosystems, and are consumed by humans. This development of indicators can help assess both ecological and human health.

The group also looks for changes in ecosystem and landscape effects that reveal physical, chemical, and biological disruptions caused by DOE activities. Both CRESP-EOHSI and CRESP-UW are engaged in developing and modifying the Index of Biotic Integrity (IBI) for fishes and amphibians (CRESP-EOHSI) and for plants and insects (CRESP-UW). The development of these IBIs is extremely important since they help evaluate upland habitats from an ecosystem level.

Two other projects of CRESP-EOHSI investigate ecosystem and landscape effects: 1) Habitat alterations and small reservoir effects on fish assemblages, and 2) Using landscape ecology measurements for assessing ecological risks.

Joel Snodgrass of CRESP-EOHSI, in conjunction with University of Georgia's Savannah River Ecology Laboratory, is leading a study on habitat

alterations and small reservoir effects on fish assemblages at the Savannah River Site. The investigators sampled fish in small streams before and after a nuclear cooling reservoir was constructed on one of the streams. They looked to see if the construction had any effect on fish assemblage structure. Fish were sampled before the construction of Steel Creek in 1985, and again in the spring of 1997. This project is important because it may be possible to develop a methodology for assessing physical and chemical disturbances to streams where cooling reservoirs are built. Disruptions like this are present not only on DOE sites, but at other industrial sites throughout the U.S.

Results indicated that fish assemblages experienced a greater change in Steel Creek than in comparable but undisturbed streams. In Steel Creek, upstream species guilds (groups of similar species) decreased, and downstream guilds increased in abundance after reservoir construction. To test whether these differences were due to water quality or contaminants now present, we caged one species of fish in Steel Creek and another in a similar but unchanged stream for 39 days. The researchers found that there were no meaningful differences in growth or survival. This suggests that changes in species diversity were not due to present water quality differences.

Steve Bartell from The Cadmus Group, Inc., is assessing ecological risks with landscape ecology

metrics at Oak Ridge Reservation in Tennessee. The development and operations of DOE facilities have physically altered both local and regional landscapes. Urbanization, stimulated in part by DOE's presence, was the main cause of off-site alterations. In this study we examine historical landscape changes both on Oak Ridge and nearby landscapes. We digitized U. S. Geological Survey quadrangle maps from the early 1940s and 1990 to assess spatial changes in land use during this 50-year period. Analyses of these indices show that during those 50 years the landscape has become more forested and less fragmented within Oak Ridge. In contrast, outside the Oak Ridge boundaries, continued urbanization has produced a highly fragmented landscape. The major changes within Oak Ridge occurred primarily from early 1940s to 1953, while changes outside the site were continuous.

One of our major objectives was to figure out which factors would tell us the most about the effects of human activities. The most useful metrics were percent occupied by a particular patch type (e.g., swamp, field, forest), total patch edge, and other measures of closeness. Future portions of the study will examine the relationship between larger scale alterations and habitat suitability for selected species of wildlife on Oak Ridge. This methodology is very promising because it can be

put to work at other DOE sites or other disrupted landscapes. This permits comparisons among different DOE sites as well as within a geographical region.

Another objective is to understand how people use ecological resources. We are particularly interested if those resources pose potential hazards to humans. To that end, we interviewed people at the Sportsmen's Classic in Columbia. The results will help determine the relative importance of self-caught game and fish to their diet. Specifically, we will be better able to understand the risk from eating fish or game if we can learn what percent of their diet is composed of such foods. We expect to have these results by the end of the year.

For more information, contact Joanna Burger at <burger@biology.rutgers.edu> or 732-445-4318.

Exposure Assessment

Of the 17 different projects in which the Exposure Assessment Task Group is currently involved, four deal specifically with modifying or developing models that simulate environmental processes such as weather patterns, groundwater flow rates, contaminated dust, etc.—ways that contaminants can come into contact and become absorbed into one's body.

In the first of the four projects, researchers are evaluating and refining existing models that describe how fine particles may become suspended in air, drift with the wind, and finally settle down some distance away.

Fine particles may become airborne during remediation activities when heavy-duty vehicles driving through the site raise dust and it is blown away.

The concern about fine airborne particulate matter (PM) that contains contaminants is that the material can be inhaled, it can deposit on skin, and it can be eaten. This concerns both onsite workers and offsite populations as well as those who hunt animals for food. When this project is complete, the Task Group expects to be able to furnish answers to questions like these: 1) What are the factors and mechanisms affecting resuspension/deposition of soil particles? Are current methods adequate? and 2) How does wind and traffic movement affect particle resuspension?

In the second project, CRESP researchers also evaluate models that predict the atmospheric transport and dispersion of airborne contaminants on a larger scale. If contaminated material were released into the atmosphere, the prevailing wind patterns at SRS would carry the particles away. How far and in what direction would depend on prevailing meteorological conditions. The models under investigation estimate transport of contaminants from 10 to 300 miles. When this project is

complete, we will have a better idea of how variations in input to these models affect predictions. For example, how does a sea breeze superimposed on the regional wind flow affect dispersion patterns.

In the third and fourth projects, the Task Group is working in collaboration with the Remediation Technology Task Group. The two groups are examining data on how contaminants in groundwater adhere to soil. This adherence slows movement of the contaminant plume, but also makes the groundwater more difficult to remediate. Laboratory experiments have raised questions about the assumptions commonly made in groundwater contaminant transport models. Studies with detailed soil-groundwater interaction models indicate that the estimated time for remediation may be grossly underestimated. In order to get a more accurate idea of the actual time needed, the researchers will refine the models, identify database gaps that affect results, and evaluate all models thoroughly.

The results will show how different model assumptions play out on short- and long-term predictions of groundwater concentration levels. These answers are important because this information directly affects decisions made in assessing risk and in the management of remedial action.

These studies bear directly on work underway at the F- and H-Areas at SRS. In addition to

obtaining information needed for decisions about remediation, the site-specific results will also help settle questions concerning a groundwater modeling system that is as close to the real world as possible. How close do existing approaches come to such a system? And are their data gaps that would affect a thorough evaluation of the model?

For more information, contact Amit Roy at 732-445-0108 or <amitroy@fidelio.rutgers.edu>.

Health Hazard Identification

The Task Group has been working with the Savannah River Site to measure bioavailability of soils at SRS. Soil samples have been taken from the L-Burning Rubble Pile (LBRP) with the help of Blake Hart, WSRS and Jerry Nelson, DOE. Soil samples will be screened for bioaccessibility of metals found at LBRP. Dr. Paul Liroy, Exposure Assessment Task Group Leader, and his colleagues at EOHSI have developed a procedure to extract metals from soils using biological fluids. This procedure more closely resembles whether metal contaminants are affected by human and animal body fluids. This method can provide a better estimate of exposure to metals and can improve our understanding of the risks associated with metals at this site, since risk cannot

occur if materials are not accessible to vulnerable tissues.

For more information, contact Lynne Fahey McGrath at <lmcgrath@eohsi.rutgers.edu> or 732-445-3287.

Outreach and Communication

Lynn Waishwell, CRESP-EOHSI and Dierdre Grace, CRESP-UW, Outreach and Communication Task Group recently interviewed most of the CRESP task group leaders to learn of the ways in which they have worked with stakeholders to conduct research on questions of concern. The results of the interviews were reported at the International Association of Public Participation held in Tempe, AZ, last month. The session was well attended with many representatives from a variety of federal, state, and other agency organizations that are connected with DOE. Interest was expressed in learning of CRESP's experience engaging traditional researchers in a stakeholder-driven approach. Currently Lynn and Dierdre are completing the interviews.

For more information, contact Lynn Waishwell at <lwaishwe@eohsi.rutgers.edu> or 732-445-0220.

Social, Land use, Demographic, Geographic, and Economic

The Task Group has been working on two different projects that help understand public participation opportunities and economic development in the regions around nuclear weapons sites.

First, we continue to carry out a study of public participation in the remediation and redevelopment of the small sites in the DOE complex. These include places like the Mound Plant and Fernald site (Ohio), and the Formerly Utilized Sites Remedial Action Program (FUSRAP) sites, now owned by the Army Corps of Engineers. As part of this study, we will examine legislation that governs cleanup activities at the sites, focusing on public participation required in cleanup activities. Later in the study, we will evaluate how the sites are interpreting and implementing public participation requirements and whether they have been perceived as adequate by the local communities. In interviews, individuals have expressed confusion over the various meetings available from the various groups. The abundance of options can be confusing in the absence of some criteria on which to make choices.

Second, we are looking at economic issues important to communities near major weapons sites and asking: What are the prospects for economic recovery

for the region after a major downsizing of the facility? We have done an analysis of more than 40 cities and counties that have suffered a major economic decline due to the loss of a large industrial employer sometime in this century. We asked local officials in these areas two questions: 1) How long did it take the area to bounce back? and 2) What were the key steps needed for recovery to occur? Preliminary findings tell us that most of these areas have had a difficult time recovering. Lessons learned from this analysis will help examine the current economic development efforts in the major weapons site regions, including SRS, Hanford, and Idaho National Environmental Engineering Laboratory.

For more information, contact Michael Greenberg at <mrg@rci.rutgers.edu> or 732-932-0387 extension 673.

Other Notes

Report from CRESP-University of Washington

Members of the Social, Land Use, Demographic, Geographic, and Economic (SLUDGE) Task Group have completed the study of management and treatment of high level liquid waste in tanks at Hanford. Results of the study will

provide background and context for other projects and summarize scientific and regulatory issues concerned with liquid waste.

SLUDGE Task Group member Doug Mercer is preparing to conduct a survey of attitudes toward fairness in decision-making at the Idaho National Engineering and Environmental Laboratory (INEEL).

Joel Massman of the Remediation Technology Task Group is continuing work on removing carbon tetrachloride from groundwater with vapor extraction techniques. He and DOE-Richland representatives and contractors are planning new site studies and operating approaches.

The Ecological Health Task Group's Diana Kimberling continues work on identifying insect species collected at Hanford last spring as part of the Task Group's development of a terrestrial Index of Biotic Integrity. Mary Anne Hawke made a presentation last month to the Northwest Chapter meeting of the Society of Ecological Restoration in Tacoma, WA. She explained how to foster scientific collaboration on the internet. Task Group Leader Jim Karr has been investigating how the biological systems of rivers can guide landscape management. He has also worked on ways to integrate social goals with biological processes to benefit the health of landscape.

David Yamaguchi with the Data Characterization, Analysis, and Statistics (DCAS) Task Group has been studying the possibility that warming due to human activities

which raises evaporation and cloudiness is driving rising precipitation at Hanford and thus changing contaminant flow forecasts.

The Outreach and Communication Task Group has been working on two major reports. The recently-released Hanford Openness Workshops (HOW) report has been distributed widely and has been well received. The report is available in the CRESP offices or online at <<http://www.hanford.gov/boards/openness/index.htm>>. The Risk Roundtable report is also available as of November. More information

can be found on the Risk Roundtable website at <<http://cresp.sphcm.washington.edu/roundtable/>>.

Ram Hashmonay and Rob Crampton of the Exposure Assessment Task Group conducted air monitoring at Hanford using FTIR (Fourier Transform InfraRed — a technique for identifying and measuring hazardous air pollutants) at the AW and C Tank Farms and detected both ammonia and nitrous oxide. A follow-up visit to monitor the farms during active waste transfer operations is being scheduled. A modified version of a phone survey targeting behavioral patterns

relevant to soil exposure was recently pilot-tested at Gilmore Research Associates. John Kissel and Jeff Shirai monitored the trial and will follow-up with necessary changes before scheduling a second pilot-test.

Members of the Worker Health and Safety Task Group have recently been studying medical clearance at Hanford and how it relates to respirator use and work restriction.

For more information, contact Deirdre Grace at <dagrace@u.washington.edu> or 206-616-7378.

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. *CRESP Update: Savannah River* is one way to share research plans and programs with Savannah River Site stakeholders.

CRESP Update: Savannah River
EOHSI-PERC Room 236
170 Frelinghuysen Road
Piscataway NJ 08855-1179



C R E S P