



C R E S P

CRESP UPDATE *Hanford*

THE CONSORTIUM FOR RISK EVALUATION WITH STAKEHOLDER PARTICIPATION IS FUNDED BY THE U.S. DEPARTMENT OF ENERGY TO PROVIDE RESEARCH AND DEVELOPMENT OF RISK-BASED DECISION-MAKING TOOLS FOR USE IN THE CLEAN-UP OF THE NATION'S NUCLEAR WEAPONS COMPLEX. WINTER 1999

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for
Risk Evaluation
with
Stakeholder
Participation

HANFORD WORKERS STUDIED FOR BERYLLIUM DISEASE

by Deirdre Grace*

Dr. Timothy Takaro, Technical Director of CRESP-UW's Worker Health and Safety Task Group, and colleagues have determined that workers at the Hanford Nuclear Reservation may be at risk from exposure to beryllium used to seal fuel rods for the reactors that produced plutonium.

Beryllium is a strong, lightweight metallic element used not only in connection with weaponry, but also in the aerospace industry and, increasingly, in the manufacture of consumer goods like golf clubs and bicycles.

Beryllium becomes a problem when its particles are delivered to the lungs. For reasons that are not yet fully understood, beryllium particles elicit a strong immune reaction there. Although significant beryllium exposure was thought to have been eliminated by the 1950s through the redesign of manufacturing processes, Dr. Takaro's and other recent research suggests even the extremely low doses workers may currently be exposed to during clean-up activities may pose risks at Hanford. The acute berylliosis caused by high levels of beryllium has essentially been eradicated, but Dr. Takaro and his team have identified correlations between the current low levels experienced by some workers and a condition known as *chronic beryllium disease*, or CBD. The relationship is not a straightforward one: CBD's long latency (up to 25 years), its tendency to be misdiagnosed as sar-

coidosis, and its rare and complex nature combine to make the connection between beryllium exposure and CBD difficult to understand.

Dr. Takaro emphasizes the complexity of studying occupational diseases. "It's critical that the first case – or 'sentinel event' – is diagnosed correctly with a disease like CBD," he stated in a recent interview. "Once CBD has been correctly identified, our challenge becomes looking at the surrounding occupational population and figuring out whether other people have been exposed and what kind of risks they may face." Although in rare, extreme cases, CBD can kill within a few years, most people respond well to treatment once diagnosed and continue to live for decades with the help of medication. Increasing the urgency of this research is the discovery that a small number of people appear to be genetically predisposed to develop a sensitivity to beryllium even if exposed to extremely low quantities of the substance, such as a single, low-dose event.

THE FACT THAT CURRENT STANDARDS ARE NOT PROTECTIVE HAS ENORMOUS IMPLICATIONS FOR WORKERS.

To gain a greater understanding of who might be at risk for this condition, CRESP-UW Worker Health and Safety and Human Health Identification task groups have been researching genetic

Please see "Beryllium," page 2.



BERYLLIUM (CONT'D)

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biomarkers for information on genetic differences across populations. One biomarker, Glu-69, has shown a high correlation with CBD development, but other genetic factors yet to be studied are involved as well.

Dr. Takaro notes that the current OSHA standards were set in 1943 with only a fraction of the information we have today

and are in great need of updating. "The fact that current standards do not protect has enormous implications for workers," he said. "Not just at Hanford, but across the US at other former weapons facilities and anywhere else beryllium is used."

Dr. Takaro can be reached via email at ttakaro@u.washington.edu.

This article has been adapted from one authored by Pat Coburn, appearing in the upcoming Winter 1999 issue of the UW Department of Environmental Health's Environmental Health News.

CRESP is a university-based national organization created to provide information for risk-based cleanup of complex contaminated environments. CRESP was formed in response to a request by the Department of Energy and the National Research Council for the creation of an independent institution for integrating risk evaluation work. As a result of a national competition, a five-year cooperative agreement was awarded to CRESP in March, 1995. *CRESP Update: Hanford*, published quarterly, is one method CRESP uses to disseminate its research to interested parties.

OUTREACH AND COMMUNICATION

TRIBAL RISK ROUNDTABLE SUMMARY AVAILABLE; WEB SITE UPDATED

by Michael Kern

The Steering Committee for *The Risk Roundtable: Evaluating Risk from a Tribal Perspective* is pleased to announce the availability of the *Roundtable Summary*.

The Risk Roundtable was held early last year, in Pendleton, Oregon to bring together tribal representatives from across the region and nation, along with federal and state agency representatives, in an educational forum hosted and co-sponsored by the Confederated Tribes of the Umatilla Indian Reservation and co-sponsored by CRESP. The purpose was to discuss how tribes can use tribally-appropriate risk tools and methods in recognition of the fact that many important regulatory decisions are now being made on the basis of risk evaluation. Twenty-three tribes and tribal organizations were represented, along with 14 federal and state agency representatives.

The *Summary* is designed to provide those who did not attend with the most important discussion points, lessons learned, and "take-home messages" provided at the Roundtable. The Roundtable Home Page has also been updated.

The *Roundtable Summary* can be downloaded from the Risk Roundtable Home Page at

<<http://cresp.sphcm.washington.edu/roundtable/>>, along with a report on strategy sessions for tribal representatives conducted at the Roundtable by the Council of Energy Resource Tribes. The updated Home Page also includes contact information and links for all sponsoring and supporting organizations and links to other sites of relevance to the Roundtable mission and purpose. Documents are also available by calling (206) 616-3719, or e-mailing <mkern@u.washington.edu>.



HANFORD OPENNESS WORKSHOPS TO CONTINUE IN 1999

by Michael Kern

The Hanford Openness Workshops (HOW) will convene for a second series in 1999. CRES P and its organizational partners have again committed in-kind support to continue working with stakeholders to address barriers to information and open decision-making in the Department of Energy. In 1998, CRES P hosted four workshops, lending technical expertise and facilitating the events. This year, five workshops will take place.

WE ENCOURAGE DOE-
RICHLAND AND DOE-
HEADQUARTERS TO
EMBRACE THESE CONCEPTS
AND FULFILL SECRETARY
O'LEARY'S
COMMITMENTS.

The HOW are designed to help the Department of Energy (DOE)-Richland Operations Office (RL) and DOE-Headquarters (HQ) resolve issues impeding the availability of information important to public understanding and decision making at the Hanford Nuclear Site in eastern Washington, while protecting national security or privacy information.

The HOW are a collaboration among regional public interest groups, citizen representatives, Native American Tribes, DOE-RL, the Washington State Department of Ecology (Ecology), the Oregon Office of Energy (OOE) and CRES P. After holding four workshops from October 1997 through May 1998, participants released a report in August 1998 communicating major topics of discussion, conclusions reached and 51 recommendations for DOE-RL and DOE-HQ on implementing and practicing openness.

The 1998 workshop series and report have been well received. The Secretary of Energy Advisory Board's (SEAB) Openness Advisory Panel (OAP) held its first-ever field meeting in Richland, WA in February 1998, in part because of the important model the OAP thinks the HOW represent. In September, the Hanford Advisory Board

(HAB) Chairperson brought copies of the 1998 HOW Report to a meeting of Chairs and Vice Chairs of Site-Specific Advisory Boards (SSAB) from across the DOE complex, where it was received with considerable interest. Perhaps its most important endorsement took place in December when the regional participants of the Hanford Advisory Board issued a consensus advice supporting the HOW and its recommendations. The advice ends with the statement, "We encourage DOE-RL and DOE-HQ to embrace these concepts and fulfill Secretary O'Leary's commitments."

The continued support means the HOW can proceed with its Proposed 1999 Scope of Work, as outlined in the 1998 HOW Report. The preliminary schedule is as follows:

Workshop 1: February 10 – *DOE-RL Response to HOW Report/Planning for 1999 Workshops*, Richland, WA

Workshops 2 and 3: April 8-9 – *Creating An Open and Transparent Decision Making Process: Access to Public Documents and Creating An Open and Transparent Decision Making Process: Defining Criteria and Measurables*, Seattle, WA

Workshop 4: June 2 – *Tribal Openness Concerns*, Spokane, WA

Workshop 5: September 24: – *Is Openness Working?—A Progress Report From Stakeholders*, Portland, OR

For more information, contact CRES P Outreach Coordinator Michael Kern at (206) 616-3719, <mkern@u.washington.edu> or HOW Spokesperson Mary Lou Blazek, Oregon Office of Energy, at (503) 378-5544, <mary.l.blazek@state.or.us> or visit the HOW web site at <www.hanford.gov/boards/openness/index.htm>. Copies of the 1998 Report are available through CRES P or via the web site.



CRES P SENIOR RESEARCHER NAMED TO HANFORD EXPERT PANEL

by John Abbotts

In August, the Department of Energy appointed Dr. James Karr, Professor of Fisheries and Zoology, and leader of CRES P-UW's Ecological Health Task Group, as one of eight members of a Hanford Expert Panel. The Panel was formed to provide recommendations and advice to DOE on ways to reduce contamination of groundwater and the vadose zone (the area from the ground surface down to groundwater) at the Hanford site. The Expert Panel is a key component of the Hanford Groundwater/Vadose Zone Integration Project, which is tasked with developing a sitewide approach to managing the many Hanford projects that address impacts on soil, groundwater, and the Columbia River. The Panel, composed of scientists from universities, consulting firms, and the public sector, was given the charge to review "Hanford decisions affecting environmental, public health, and cultural consequences caused by contaminant movement." Professor Karr is the single member of the panel whose major area of expertise is ecological health.

The Panel is scheduled to meet several times a year, and has already issued its first recommendations. In a letter of November 23 to Dr. Ernest Moniz, DOE Under Secretary of Energy, the Panel praised the progress made by the Integration Project on its Long Range Plan and Draft Applied

PROFESSOR KARR IS THE SINGLE MEMBER OF THE PANEL WHOSE MAJOR AREA OF EXPERTISE IS ECOLOGICAL HEALTH.

Science and Technology Plan, but expressed two concerns. The Expert Panel recommended a budget of \$10 million this fiscal year towards meeting the Integration Project's science and technology needs, and further recommended that such funding should be under the control of the Integration Project.

Dr. Karr's research is described in part in a recent book, *Restoring Life in Running Waters: Better Biological Monitoring*, published by Island Press and co-authored by

Dr. Karr and Dr. Ellen W. Chu, a biologist and CRES P-UW's former senior editor. The authors argue that sustaining water resources and reducing ecological risk is as much a biological challenge as an engineering or chemical one. They describe the state of aquatic ecosystems and make the case for using indices that integrate many biological attributes to assess and communicate environmental health. This book also describes the efforts of Dr. Karr and co-workers to adapt an index of biological integrity (IBI) to terrestrial systems at DOE's Hanford complex. As the authors describe:

HANFORD IS A PARADOX. IT POSES AN ENORMOUS TOXIC-CLEANUP CHALLENGE. ON THE OTHER HAND, THE RESERVATION AND ITS SURROUNDINGS COMPRISE SOME OF THE STATE'S LARGEST CONTIGUOUS PATCHES OF NATIVE SHRUB-STEPPE VEGETATION

"Hanford is a paradox. On the one hand, it poses an enormous toxic-cleanup challenge to the Department of Energy ...; on the other, the reservation and its surroundings comprise some of the state's largest contiguous patches of native shrub-steppe vegetation and the last spawning run of chinook salmon in the mainstem Columbia River."

"[Consequently,] The Hanford area is ideal for testing potential metrics for an IBI because it presents a full array of kinds and degrees of human impact." (pp. 112-113)

Dr. Karr can be reached via email at jrkarr@u.washington.edu. More information on the Hanford Expert Panel is available by visiting the Hanford Homepage at www.hanford.gov.



CRESP-UW REMEDIATION PROJECTS MAY HELP GROUNDWATER/VADOSE ZONE CLEAN-UP

by John Abbotts

CRESP's Remediation Technology Task Group at the University of Washington is engaged in several projects relevant to contamination of the groundwater/vadose zone at Hanford and other Department of Energy (DOE) sites. The Task Group investigates both processes in use at Hanford and characteristics of chemicals, such as carbon tetrachloride (CT) and trichloroethylene (TCE), contaminants common to Hanford and other hazardous waste sites, including those of the Department of Defense.

Joel Massmann, Associate Professor of Civil Engineering, is collaborating with CH2M Hill and Bechtel, Inc., to investigate phenomena associated with transport and removal of carbon tetrachloride (CT) from the Hanford 200 West area via soil vapor extraction (SVE), the most common "pump

THIS WORK MARKS THE
FIRST TIME THAT VAPOR
EXTRACTION MODELS
AND TREATMENT MODELS
HAVE BEEN ANALYZED
TOGETHER IN A
SYSTEMATIC WAY.

and treat" technique. This method essentially uses a giant air-sucking vacuum cleaner to remove contaminant vapor directly from the soil, and then pumps it into a treatment process. Dr. Massmann and his graduate students have developed a computer model that can be used to describe the migration of CT vapors in the vadose zone. A current research objective is to use this model to estimate the extent of CT contamination in 200 West.

The research interests of David Stensel, Professor of Civil Engineering and leader of the Remediation Technology group, and John Ferguson, Professor of Environmental Engineering, include bioremediation through microbes that degrade chlorinated solvents to less toxic materials. This complements Dr. Massmann's work, because microbes can be used to treat the solvent vapors that are removed via SVE.

Professor Stensel's research group has identified conditions that enhance the bacterial degradation of carbon tetrachloride, a contaminant of concern at Hanford, and trichloroethylene, a contaminant at the Idaho and Savannah River DOE sites. CT and TCE projects involve collaboration with Dr. David Kosson, Professor of Chemical and Biochemical Engineering at Rutgers University and leader of the Remediation Technology Task Group at CRESPEOHSI (Environmental and Occupational Health Sciences Institute).

The remediation research thus aims to refine common extraction and treatment technologies by coupling two projects: mathematical modeling of soil vapor extraction scenarios, and mathematical modeling and design of biological reactors for treating the extracted gases. This work marks the first time that vapor extraction models and treatment models have been analyzed together in a systematic way. It also introduces a unique process that uses bacteria to treat contaminated gases coming directly from a vapor extraction system.

Recent scholarly products from the Remediation Task Group include Stensel and Bielefeldt, "Biodegradation of Chlorinated Organic Compounds," a book chapter in *Bioremediation of Hazardous Wastes: Principles and Practices*, Technomic, Inc., New York, 1998; Poulsen, T., J.W. Massmann, and Per Moldrup, "Effects of Vapor Extraction on Contaminant Fluxes to Atmosphere and Groundwater," *ASCE Journal of Environmental Engineering*, Vol. 122, No. 8, 1996 and Eller, Michael, J.W. Massmann, D.P. Schwaegler, and V.J. Rohay, "Enhancements for Passive Vapor Extraction: The Hanford Study," *Ground Water*, in press.

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REPORT FROM CRESP-EOSHI

The Social, Land Use, Demographic, Geographic, and Economic Task Group interviewed planning and development officials in the Rocky Flats, Colorado, area about issues facing stakeholders as closure of that site nears. In addition, the group continues with projects at SRS to identify leading economic indicators, the effects of expanded recreation, and economic effects of DOE's Accelerated Cleanup. The group is also looking at economic development efforts in regions surrounding several of the largest DOE sites.

The Worker Health and Safety is working under the leadership of UW's Mary Salazar to study occupational health and safety programs at ten DOE sites. The Task Group also continues to find reasons for concern about subcontract workers at sites where management and integrating contracts are in place. Under these agreements, prime contractors tend to exercise a hands-off policy and shift some of the responsibility for health and safety to lower tier subcontractors.



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