



SCHOOL OF ENERGY RESOURCES

Report of the In-situ recovery of Uranium Research Program to
The Joint Minerals, Business, and Economic Development Interim
Committee

September 30, 2011



 UNIVERSITY OF WYOMING

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This report provides a summary of the Uranium Research Program for Fiscal Year 2011. It provides background on the program, a list of research projects selected for funding by the program in 2011, and the balance of funds remaining in the program.

Background

In the 2009 General Session, the Legislature of the State of Wyoming appropriated \$1.6 million to the University of Wyoming, School of Energy Resources (SER) for activities related to the development of uranium through in-situ recovery (ISR) in Wyoming. SER has used that appropriation toward the following outreach and research activities:

- September 22, 2009 - Uranium Extraction Workshop, Cheyenne, WY
- October 2009 –Research Priorities for In-Situ Uranium Recovery in Wyoming – report of findings
- *Public Opinion in Wyoming about In Situ Uranium Recovery*, WYSAC. (2010). Wyoming Survey & Analysis Center, University of Wyoming.
- August 4, 2010 – The Future of Uranium Production in Wyoming – A Public Forum on In-Situ Recovery, Laramie, WY
- Analysis of Remediation Strategies for Radionuclide-Contaminated Soils in Uranium Mining – graduate student research project in progress
- University of Wyoming College of Law summer internship program – law student research project in progress detailing the implications of Wyoming obtaining agreement state status from the Nuclear Regulatory Commission

Accounting for the efforts and projects listed above, approximately \$1.4 million of the original \$1.6 million appropriation remained to fund research projects. The legislation authorized SER to use the funds, “under the direction of the University of Wyoming Energy Resources Council and in consultation with the Wyoming mining industry,” in part, to develop a research program for uranium that, “shall focus on optimizing the economic recovery of the resource through ground water restoration, research on waste water management and the development of a seminar to educate the public and the industry about uranium and uranium extraction,” (Legislature of the

State of Wyoming during the 2009 General Session – Chapter 159 Section 339 c iii, and 2011 General Session Chapter 88 Section 350 (a) (i)).

On March 31, 2011, in accordance with the legislation, SER issued a request for proposals (RFP) for research focused on in-situ uranium extraction with a proposal submission deadline of May 6, 2011. Proposals for the ISR of Uranium Research Program were solicited from academic institutions and private industry and were evaluated competitively based upon their probable benefits to the State of Wyoming in areas broadly related to ISR of uranium. The RFP accepted funding requests of \$50,000 - \$400,000 with demonstration of a 25% match. It also stated that the results from all projects are to be made available to the public and be presented at a workshop to be held in November 2013. In addition, all projects must be completed by the fund reversion date of June 30, 2013.

The ISR of Uranium Research Program RFP listed specific areas of research identified in the September 2009 workshop and August 2010 public forum. These areas focus on specific challenges and opportunities to enhance cost effective strategies for ISR of uranium in Wyoming. The research areas identified were:

- Exploration and ore body delineation.
- Ore body characterization and uranium recovery.
- Water management, treatment and disposal.
- Cost efficient aquifer restoration technologies and practices.
- Investigation of the impact of existing regulatory requirements on the economics and timing of ISR uranium projects in Wyoming.

2011 In-situ Recovery of Uranium Research Program Funding Recommendations

Eight proposals requesting a total of \$1,668,622 were submitted by the deadline and each was reviewed and scored by two independent outside reviewers. The proposals recommended for funding from the ISR of Uranium Research Program are listed below. Total funding for these projects is \$826,849, which will come from the ISR of Uranium Research Program (Table 1).

1. “Enhancing Bioremediation of In-Situ Uranium Aquifers Through Uranium and Carbon Isotopic Tracing of Biologic Activity,” submitted by University of Wyoming, Kevin Chamberlain, Principal Investigator. This project focuses on studying restoration of uranium aquifers using bioremediation at the Cameco Smith Ranch-Highland Ranch in-situ uranium mines near Douglas, WY. The applicant has requested \$100,000 in funding and are providing an outside match of \$25,000 for a project total of \$125,000. This project is estimated to take 24 months to complete.
2. “Testing the Chemical and Biological Efficacy of Cupric Oxide Nanoparticles to Remove Contaminants from Uranium ISR Produced Water,” submitted by University of

Wyoming, Suzanne Clark, Principal Investigator. This project used cupric oxide nanoparticles to remove arsenic from production bleed water. The effectiveness of this contaminant removal process will be compared to other water decontamination systems currently used in the industry. The applicant has requested \$100,000 in funding and are providing an outside match of \$25,000 for a project total of \$125,000. This project is estimated to take 24 months to complete.

3. “Field Evaluation of the Restorative Capacity of the Aquifer Downgradient of a Uranium ISR Mining Site During Mining Operations,” submitted by Los Alamos National Laboratory, Paul Reimus, Principal Investigator. This project proposes to predict the degree of natural attenuation of uranium and other constituents of concern as groundwater migrates downgradient of an ISR operation. This will be done at a field site at the Cameco Smith Ranch-Highlands Ranch in-situ uranium mine near Douglas, WY. The applicant has requested \$399,400 in funding and are providing an outside match of \$100,000. This project is estimated to take 24 months to complete.
4. “The Mineralogy and Provenance of Wyoming Uranium Roll Front Deposits and Their Significance to In-Situ Recovery Mining Processes,” submitted by University of Wyoming, Susan Swapp, Principal Investigator. This project will use various analytical methods to identify and characterize uranium deposits and their sources. The applicant has requested \$227,449 in funding and are providing an outside match of \$92,400. This project is estimated to take 24 months to complete.

Summary: The total cost to fund these four proposals is \$826,849, leaving \$579,499 in the ISR of Uranium Research Account.

In Situ Recovery of Uranium Research Program Account Sunset Date

Funds from the In Situ Recovery of Uranium Research Account sunset on June 30, 2013. These funds could be redeployed through another RFP process. However, the proposal selection and approval process can take up to four months, and it can take an additional three months to execute the contracts. If a new RFP is issued in 2011, researchers would only have a year to complete their projects before the funds revert. A recommendation has been proposed by the ERC to extend the sunset date of these funds to June 30, 2014 to accommodate broader program interest and more robust research projects.

Table 1. 2011 ISR of Uranium Research Program Funded Projects

Proposal Title	Submitted By	Funding Requested	Outside Match	Outside Match Source	Total Funds	Technology Areas
Enhancing Bioremediation of In-Situ Uranium Aquifers Through Uranium and Carbon Isotopic Tracing of Biologic Activity	University of Wyoming	\$100,000	\$25,000	Cameco	\$125,000	Aquifer Restoration
Testing the Chemical and Biological Efficacy of Cupric Oxide Nanoparticles to Remove Contaminants from Uranium ISR Produced Water	University of Wyoming	\$100,000	\$25,000	University of Wyoming, Colorado State University	\$125,000	Aquifer Restoration
Field Evaluation of the Restorative Capacity of the Aquifer Downgradient of a Uranium ISR Mining Site During Mining Operations	Los Alamos National Laboratory	\$399,400	\$100,000	Cameco	\$499,400	Aquifer Restoration
The Mineralogy and Provenance of Wyoming Uranium Roll Front Deposits and Their Significance to In-Situ Recovery Mining Processes	University of Wyoming	\$227,449	\$92,400	University of Wyoming	\$319,849	Exploration and Ore Body Delineation
Totals:		\$826,849	\$242,400		\$1,069,249	