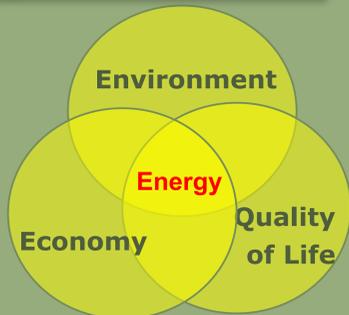


Environmental Impacts of Uranium Mining

U. S. Geological Survey Central Energy Resources Team-Uranium Research Group
with research partners in the USGS CR-Mineral Resources and Crustal Imaging and Characterization Teams

Facing Tomorrow's Challenges: Science Strategy, 2007-2017

"As the only *integrated natural resources research bureau* in the Federal Government, the USGS has a substantial role to play in helping the economy remain strong, the environment remain healthy, and the quality of life in the United States remain high now and into the future." *



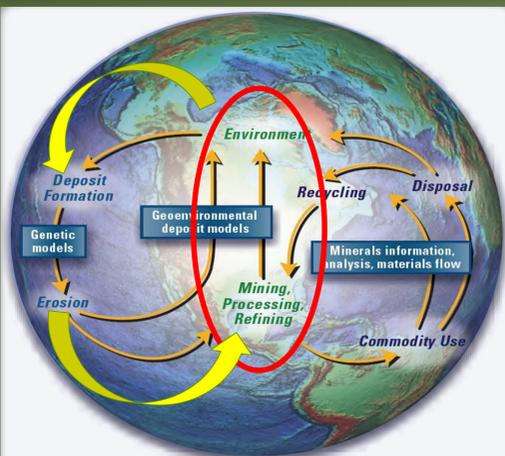
Future of Energy and Minerals Resources Environmental Impacts Challenge Availability



"...The Nation will have to plan for evolving and unanticipated future energy and mineral requirements within the broader environmental perspective of sustainability..." *



Achieving Sustainability: Life Cycle Investigations of Uranium Mineralization to "Close the Loop"



In order to move toward sustainability in energy mineral extraction, "we can take a multidisciplinary approach to understand the life cycle of energy and mineral resources." *

- occurrence/formation
- extraction methods
- waste products

In-Situ Recovery Uranium Mining

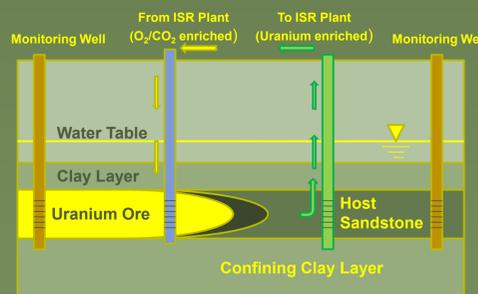


A.J. Gallegos, Uranium Miner at Kerr McGee Mine (1978)

Most uranium mining has shifted away from conventional underground mining (top left) and milling to a potentially more sustainable In-Situ Recovery (ISR) Method (lower left and below).



ISR Wellfield (2008)
<http://www.uraniumproducersamerica.com/situ.html>



Research Goal: Assess Environmental Impacts of ISR and "Close the Loop"



Data Gathering

Defining Mining Practices

Restoration Practices

Identifying Environmental Impacts

Field studies-Long Term Effects

Basic Research

Uranium-Iron Sulfide Interactions

Uranium Isotopes

Role of Humates and Organics

Arsenic, Selenium, Radium

Innovative Projects

Geochemical Models

Waste Stabilization

Isotopic Indicators of Contamination

Leaching Alternatives



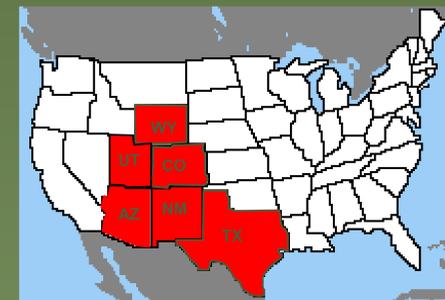
Technology Transfer and Education

"The USGS energy and minerals resource research will be broadened to contribute more comprehensively to discourse and decisions about future natural resource security, environmental effects of resource use, the economic vitality of the Nation, and management of natural resources." *

New Mexico State University Grants Campus
Community College Field Office

- Ask a Scientist about U
 - Scientists as Mentors
 - Bi-Monthly Column on Uranium and the Environment
 - Enhancing Regulator Expertise Program†
 - Student Uranium Multi-Cultural Assessment Team †
- † Project under development

Project Areas



Current Project Areas include the most significant Uranium Producing Regions in the United States found in UT, WY, CO, AZ, NM, and TX

UTAH:

Fry Canyon- BLM geologic, geochemical, and geophysical studies of contaminant (i.e. uranium) migration in surface/ground water and sediments

WYOMING:

Powder River Basin - Apply innovative iron sulfide technology to achieve post-mining ground water restoration (lab) and impacts of multiple energy resource extraction on regional hydrology

COLORADO:

Grover Field Site-Examine historical records for ground-water restoration

ARIZONA:

Tuba City- Delineate uranium contamination from natural and anthropogenic sources

TEXAS:

Examine historical records for ground-water restoration at ISR sites

NEW MEXICO:

Provide community education and technical support for development of Environmental Technology and Uranium Education Programs at New Mexico State University Grants Campus

*Reference

U.S. Geological Survey, 2007, Facing tomorrow's challenges—U.S. Geological Survey science in the decade 2007-2017: U.S. Geological Survey Circular 1309, 69 p., available at <http://pubs.usgs.gov/circ/2007/1309/>

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