

# Rocky Mountain Regional Hazardous Substance Research Center (RMRHSRC)

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# What is the RMRHSRC?

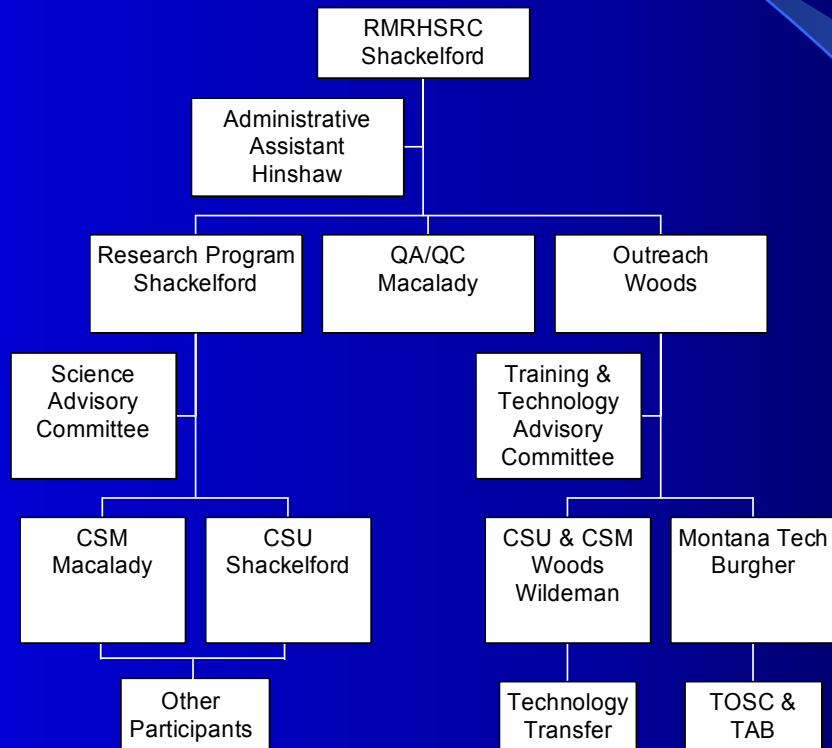
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- One of 5 EPA sponsored HSRCs representing EPA Region 8 states and the Rocky Mountain Region
- Consortium of participants from CSU and CSM with other individuals throughout US and Canada
- Funded at \$ 3.8 M for 5 years (~ 80% research & ~ 20% outreach and tech transfer); self supporting thereafter
- Research focusing on remediation of mine waste sites
- Grant (vs. contract)
- Official beginning Nov. 1, 2001.

# Principal Participants

- **Colorado State University:** Departments of Civil Engineering, Chemical Engineering, Microbiology, Fisheries and Wildlife Biology, Environmental Health, Biology, & Rangeland Ecosystem Science
- **Colorado School of Mines:** Departments of Chemistry and Geochemistry, Environmental Science and Engineering, Geology and Geological Engineering
- **Montana Tech:** Outreach Activities
- **Additional Research Collaborators:** Purdue University (Midwest HSRC), Louisiana State University (South/Southwest HSRC), Oregon State University (Western Region HSRC), Montana State University, University of Wisconsin, University of Waterloo, University of Wyoming, & the USGS

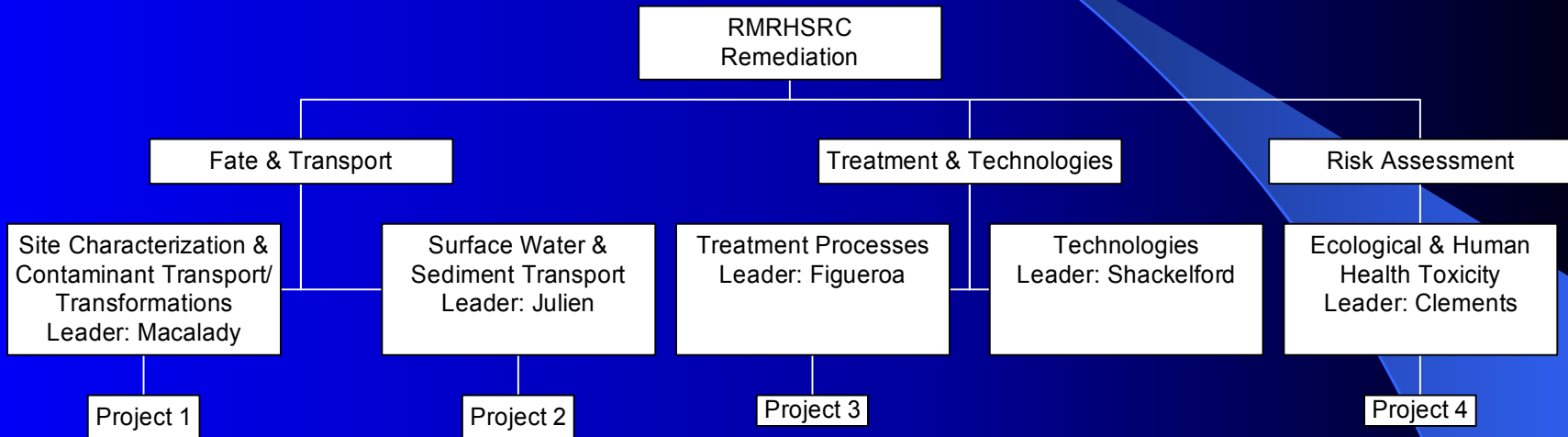
# Administrative Structure of RMRHSRC



# Goal of RMRHSCRC Research

To extend our knowledge of the geochemical, biological, hydrological/mineralogical and engineering aspects of environmental problems associated with mining and mine wastes and, based on this knowledge, develop new or improved methods or technologies that are cost effective and lead to clean ups that protect human health and the environment.

# Research Focus Areas



# Focus Group 1: Site Characterization and Contaminant Transport/Transformation

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- **Site Characterization:** development of more rapid and cost-effective methods to accurately characterize transport and fate of metals and other toxic chemicals from mining sites
- **Transport:** development and validation of models used to improve our ability to predict impacts resulting from mine wastes
- **Transformation:** improving our understanding of the roles of chemical, physical, and biological transformations in controlling the mobility of metals and other toxic chemicals

# Focus Group 2: Surface Water and Sediment Transport

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- Development of watershed-specific water quality management plans for the purposes of implementing waste load allocations for point sources typical of mine-waste related Superfund sites

# Focus Group 3: Treatment Processes

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- Both abiotic and biologically mediated processes that can be used to treat mine waste streams, including acid mine drainage
- Emphasis is on *in situ*, cost-effective treatment of metal mixtures versus single metal waste streams

# Focus Group 4: Technologies

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- **Treatment Technologies:** emphasis is on *in situ* passive treatment systems that clean the contaminated medium (e.g., ground water) without continual inputs of materials and energy (e.g., engineered wetlands and permeable reactive barriers)
- **Prevention and Control Technologies:** emphasis is on development of technologies that prevent and/or control the generation of leachate that contains metals and other toxic chemicals, such as acid mine drainage (e.g., stabilization/solidification, blending and layering, alternative earthen final cover systems)

# Focus Group 5: Ecological and Human Health Toxicity

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- Emphasis is on assessing the impacts of mine wastes on human health and the environment for the purpose of improving risk-based assessments for remediation applications
- Also serves to screen the relevance and effectiveness of ideas and technologies generated through Center research  
Through the use of more conventional toxicological methods

# Current Research Projects

| Project No. | Title/Investigators   |
|-------------|---|
| 1           | <i>Redox Transformations, Complexation and Soil/Sediment Interactions of Inorganic Forms of As and Se in Aquatic Environments: Effects of Natural Organic Matter</i> /D. Macalady (CSM), D. Ahmann (CSM), J. Westall (OSU), J. Garbarino (USGS), and J. Meyer (U. Wyo.)                 |
| 2           | <i>Fate and Transport of Metals and Sediment in Surface Water</i> /P. Julien (CSU), B. Bledsoe (CSU), and C. Watson (CSU)   |
| 3           | <i>Metal Removal Capabilities of Passive Bioreactor Systems: Effects of Organic Matter and Microbial Population Dynamics</i> /L. Figueroa (CSM), D. Ahmann (CSM), T. Wildeman (CSM), K. Reardon (CSU), K. Carlson (CSU), C. Shackelford (CSU), S. Woods (CSU), and D. Blowes (Waterloo) |
| 4           | <i>Evaluating Recovery of Stream Ecosystems from Mining Pollution: Integrating Biochemical, Population, Community, and Ecosystem Indicators</i> /W. Clements (CSU), and J. Ranville (CSM)   |

# Outreach Activities

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- **Technology Transfer:** Conferences, Workshops, Short Courses, Field Demonstrations, etc.
- **Tailings and Mine Waste Conference at CSU and associated short courses/workshops:** TMW '94, '95, '96, '97, '98, '99, '00, '01, '02 (9 consecutive years)

# TOSC & TAB

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- **Technical Outreach and Services for Communities (TOSC)**: assisting communities in dealing with environmental problems
- **Technical Assistance for Brownfields (TAB)**: same as TOSC except for brownfields only

# Examples of TOSC & TAB Activities

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- Coordinating and/or conducting Superfund Job Training and brownfields training activities for community action groups
- Providing technical short courses on relevant topics (e.g., brownfields, “Ground Water in Tribal Lands”, etc.)
- Significant effort in terms of sites on Native American lands (TOSNAC)

# Management and Operational Objectives

- Engage the industry:
  - 1) through personal contacts (12 RMRHSRC investigators have identified 51 personal contacts);
  - 2) professional interactions (e.g., annual TMW Conferences).
- Involve local, state, regional, national, and international stakeholders.
- Emphasize field demonstrations; 24 active field sites.
- Serve as an independent focal point for all stakeholders (industry, consultants, regulators, states, communities, etc.)

# More Information

- RMRHSRC web site:  
[www.engr.colostate.edu/hsrc/](http://www.engr.colostate.edu/hsrc/)
- All HSRCs' web site: [www.hsrc.com/](http://www.hsrc.com/)
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