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Center Name, Institution, and Center Director:  Rocky Mountain Region Hazardous Substance Research Center, Colorado State University and Colorado School of Mines, Charles Shackelford, Director

Identifier used by Center for Project:  Technical Transfer Activities

Title of the Project:  Technology Transfer Activities of the RMRHSRC

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Type of Research:  Technical transfer activities


Objective of Research:  Technical Transfer of Treatment Processes for Mining Wastes

Progress Summary/ Accomplishments

Project Goals, Objectives, and Approach

To set the goals, objectives, and approach for technology transfer, it was important to identify the primary customers for our center activities. From the start of the center in November 2001, it has been decided that activities would focus on abandoned mine lands (AML). This makes our primary customers the federal and state agencies that deal with abandoned mine lands. Consequently, technology transfer has focused on these agencies before it reaches out to industries or other public agencies that deal with active mining operations.

A number of factors make the choice of concentrating on AMLs the place to start. First, the superfund sites in the United States that contain mining sites all contain AMLs. Also, in the respect that all technologies that are developed for AMLs would have to be low cost, low maintenance solutions, these would naturally be attractive to other parties. Finally, one of the problems with developing innovative treatment technologies is convincing regulators to accept the risk of trying such solutions. If this center can work with the state and public agencies in developing such technologies, then regulatory acceptance in other situations will be more straightforward.

With these customers in mind, the goal of technology transfer within the RMRHSRC is to take the research results gained within our center, bundle them with related technologies developed in other research settings, and then disseminate the results and develop these technologies through the demonstration phase and to full-scale operations. For some of the other HSRCs working on
organic contaminants in water and soil this goal has been achieved and this has helped these centers to gain some self-sufficiency.

Certainly this goal will not be met immediately. So the working objectives of technology transfer contain activities for laying the foundation for technology development. They include:

1. To contact the primary agencies that have to deal with AMLs, determine their primary technical needs for dealing with these sites, and then make certain that these needs are included in the yearly request for proposals. The agencies include: the US EPA, the Bureau of Land Management, the U. S. Forest Service, the National Park Service, and the Office of Surface Mining.

2. To contact committees and societies whose activities are closely related to ours, explain to them the activities of our center, and find out how we can cooperate and provide assistance. Committees and societies with which we should make continuous interaction include: the American Society of Mining Reclamation (ASMR), the Acid Drainage Technology Institute (ADTI) metals mining group, the National Association of Abandoned Mine Land Programs, the Environmental Division of the Society of Mining Engineers, and MSE Technology Applications.

3. To find public and private organizations with which we can bundle results and find joint ways to present and promote our technologies.

4. To find situations where we can go to the demonstration phase either with our own results or with related technologies that have been developed by other organizations.

The approach for meeting these objectives requires informing individuals within agencies, committees, and societies of the activities of RMRHSRC. If the person falls in the customer category, find out what they consider to be the primary technical needs for remediating AML sites. If the person represents an organization with which we should cooperate, determine how that cooperation could be achieved. If the person represents an organization that is developing related technologies, then determine how we can help bundle our technical expertise with theirs so that it stands a better chance of being taken to the demonstration stage. As this information is accumulated, individuals and organizations are recruited to combine with our center to plan and carry out presentations and workshops for societies and agencies in the hope that situations can be found for demonstration programs. It is clear that this approach involves making considerable contacts, preferably as personal visits. Fortunately, many of the individuals to be contacted are in the Denver area. However, the technology transfer budget does contain a considerable travel allotment for trips to meetings. It is the opinion of the principal investigator that the activities carried out during this period and those that are planned for the next project year reflect these goals, objectives and approaches of the technology transfer portion of the center.

This Year’s Activities

A. Related to objective 1 on contacting agencies that are primary customers, the following activities were conducted:

- I have been in continuous contact with personnel from Region 8 of the EPA throughout the year. Some of these meetings concerned sorting out the TOSC and TAB functions with the people in Region 8 who carry out these activities. Also, meetings with superfund coordinators on priority site activities were conducted. The activity on
assessing mine waste piles in the Russell Gulch area in the Central City Superfund site was a result of these contacts.

- In February and again in November, I had extensive meetings with Joe Galetovic of the Office of Surface Mining. As many of you know, Joe represents many other organizations besides OSM. I determined his technical concerns on AML sites and submitted these to Charles Shackelford for inclusion in the requests for proposals. The issue concerning lowering of total dissolved solids in mine drainages is a specific concern of OSM.
- In March 2002, I had a number of conversations with Karl Ford concerning the activities of the National Science and Technology Center of the BLM. Topics focused on activities in Leadville and what he considered the research needs of the BLM with respect to AML sites. The research concerns were submitted to Charles Shackelford for inclusion in this year’s request for proposals.
- In April 2002, I served as a reviewer for the Mine Waste Technology Program proposals for the EPA. As well as ranking the 36 proposals, I am using the list of organizations as a good source of contacts for possibilities for bundling technologies.

B. Related to objective 2 on contacting and interacting with related societies and committees, the following activities were conducted:

- I have been involved in the activities of ADTI throughout the year. I helped them in preparing an informational poster to be used at meetings. This March, I was involved in the meeting to continue the editing of the workbooks that the ADTI are publishing. Linda Figueroa and I have taken on the responsibility of editing the Mitigation and Treatment handbook.
- Throughout the spring of 2002, I assisted the staff at CSU in designing and initiating a website and in designing and publishing a center brochure. Both these publicity vehicles are finished and are being used.
- In June 2002, I attended the Annual Meeting of ASMR and presented a paper on the activities of RMRHSRC. Also, I arranged for a symposium on RMRHSRC activities and for the Workshop on Assessing Mine Wastes for the Billings Symposium / ASMR Conference in June 2003.
- In September, I participated in the Zn/Cd Symposium in Coeur d’Alene, Idaho. I presented a State-of-the-Art talk on biological treatment and helped in a workshop on using these techniques for the treatment of Zn and Cd in the Coeur d’Alene basin.
- I attended the Annual Meeting of the National Association of Abandoned Mine Land Programs (NAAMLP) in Utah in September and presented papers on the activities of the RMRHSRC and on passive treatment of mine drainages. While at the meeting, I assessed how best to interact with the state AML agencies. It appears that the best approach is through the state agencies and not through the national organization. This route will be pursued next year.
- At the NAAMLP Conference in September, I caught up with Gilles Trembley of MEND, Canada. He said that they are mounting an initiative on abandoned mine lands and is looking towards cooperation with our center in future activities.
- Besides these activities, I have given talks representing RMRHSRC at the University of Wyoming, at the Contaminated Soils, Sediments and Water Conference in San Diego, and at the Heap Leach Closure Conference in Elko, Nevada.
C. Related to objective 3 on combining our results with those of other organizations, the following activities were conducted:

- Throughout the Spring, Jim Ranville and I have been interacting with people from the USGS with regard to work that both of us have been doing on assessing the hazards of mine waste piles and stream sediments. This has resulted in a proposal submitted to the center last June and also this March. Also, our center is committed to combining with the USGS to present a workshop on mine waste piles at the Billings/ASMR Conference in June 2003.

- I negotiated a partnership between Jim Gusek of Knight Piesold and Barnaby Watten and Phil Sibrell of the USGS, Kearneysville, WV. This combine presented a proposal and presentation to the committee that is trying to find an innovative method for treating the St. Michael’s mine discharge, a high flow, severe chemistry mine drainage in southern Pennsylvania. In October, we made a final presentation to the Upper Alleghenies Conservancy on project. The Conservancy is assessing the possibility of funding the project.

- In a proposal that was submitted to the National Petroleum Program in Wyoming, I bundled passive treatment with the phytoremediation research that is being conducted at the HSRC site at Purdue University. Unfortunately, that proposal was not funded.

D. Related to objective 4 on finding situations for going to the demonstration phase, the following activities were conducted:

- Throughout the Spring, I have been exploring schemes with Karl Ford of the BLM on how we could get some demonstration treatment projects started on AML sites controlled by the BLM. These conversations on how the activities of our center related to the activities of the BLM resulted in the submission of a joint demonstration proposal to our center and to the BLM in June of 2002.

Next Year’s (4-1-03 Through 3-31-04) Activities

A. Related to objective 1 on contacting agencies that are primary customers, the following activities plan to be conducted:

- Make contact with representatives of the National Park Service and the US Forest Service to inform them of the activities of our center. Determine if we can be of any immediate help. Solicit from them their primary technical needs for dealing with AML sites, and then make certain that these needs are included in the yearly request for proposals. In particular, with respect to the US Forest Service, I had the opportunity in November to conduct a sampling trip to Forest Service lands in Southeastern Idaho. In this area a problem with selenium in water has occurred because phosphate mining. In conjunction with the project that Don Macalady has proposed, we plan to return to this area to determine how natural organic matter affect the fate and transport of selenium in affected watershed.

- Maintain the contacts with OSM, BLM and MWTP, especially with respect to determining their technical needs for inclusion in next year’s request for proposals.

B. Related to objective 2 on contacting and interacting with related societies and committees, the following activities plan to be conducted:

- Complete preparations for the mine waste pile workshop and the half day symposium on RMRHSRC activities for the Billings / ASMR Conference in June. All indications are that
the workshop will be most successful. Consequently, we are looking for another venue to present this material.

- Continue the editorial activities on the ADTI workbooks.
- Plan a passive treatment workshop for the ICARD meeting in July 2003. Also, at this meeting, inform people from other countries of the activities of the RMRHSRC. The plan is to also give the workshop on passive treatment at the Tailings and Mine Waste Conference at Vail in October.
- Make the public more aware of mining issues by developing FactSheets on the Envirotool website on Acid Mine Drainage, Heavy Metals, and Cyanide.
- Develop our website with better links to other mining and environmental websites. Also, investigate the possibility of initiating a website newsletter on mining issues. It is hoped that this can be done in partnership with Dirk van Zyl of the Mine Life Cycle Center.
- Determine what other centers are doing with respect to Technology Transfer and inform those centers of what we are doing. If possible, capitalize on the successful efforts of the other HSRCs.

C. Related to objective 3 on combining our results with those of other organizations, the following activities plan to be conducted:

- Establish a working relationship with MSE Technology Applications to see how we can bundle our research and development results and present them to organizations for possible demonstration projects.
- Continue working with the USGS on mine waste assessment and determine whether we can initiate some reconnaissance projects with the BLM or US Forest Service.
- In conjunction with Jim Gusek of Golder Associates design and conduct a workshop on passive treatment for the ICARD Conference in July and prepare to also give this workshop at the next Tailings and Mine Waste Conference in October, 2003.
- Look for opportunities to bundle the knowledge that the members of our center have on As and Se with some other organizations that are interested in the fate and transport of these two elements.

D. Related to objective 4 on finding situations for going to the demonstration phase, the following activities plan to be conducted:

- Continue to explore demonstration situations with the agencies that are the primary customers of the center. Include in this exploration MSE Technology Applications.
- Review the activities of the other HSRC centers to determine whether any of their activities would benefit from our expertise in treating metals contamination.

Publications

A. Publications primary to the RMRHSRC activities

B. Publications related to RMRHSRC activities

- Bednar, A.J., J.R. Garbarino, J.F. Ranville, and T.R. Wildeman, Preserving the
distribution of inorganic arsenic species in groundwater and acid mine drainage samples.
rock drainage: Advances in design and construction since 1988., Proceedings of 19th
Annual Meeting of American Society for Mining Reclamation, Amer. Soc. Min. Reclam.,
Lexington, KY, pp. 935-951.

Presentations

A. Presentations primary to RMRHSRC activities

Rocky Mountain Regional Hazardous Substance Research Center. 19th Annual Meeting
of American Society for Mining Reclamation, Lexington, KY, June, 2002.
Rocky Mountain Regional Hazardous Substance Research Center. 24th Annual Meeting
of the National Association of Abandoned Mine Lands Programs, Park City, Utah,
September, 2002.
- Wildeman, T. R., and J. J. Gusek, Biologic Treatment of Mine Drainage, Zn/Cd

B. Presentations related to RMRHSRC activities

and speciation methods for acid mine drainage. Hardrock Mining 2002 Conference,
- Wildeman, T. R., J. J. Gusek, B. Watten, and P. Sibrell, ESRB and pulsed limestone: A
semi-passive method for St. Michael’s AMD, Advanced AMD Treatment and
Technologies Symposium, Johnstown, PA, June, 2002.
rock drainage: Advances in design and construction since 1988., 19th Annual Meeting
of American Society for Mining Reclamation, Lexington, KY, June, 2002.
mine drainage. 13th West Coast Conference on Contaminated Soils, Sediments, and