

Technical Review Committee (TRC) Meeting Notes
Sept. 27-28, 2004
Table Mt. Inn
Recorder: Roseann Thompson

11:00 am

Present: Albert Ilges, Ziad Chowdhury, Abe Chen, James Leckie, Fernando Cadena, Roseann Thompson, Abbas Ghassemi, Thomas Robison, Michelle Fry, Marc Edwards, Yu-Jung Chang, S. Deb Misra, Malcolm Siegel

Logistics discussed, dinner, hotel, etc...

Partnership structure discussed. Organizational charts and funding information is located in Section I of the notebook that was handed out. The flow charts indicate how the partnership is set up. As the project moves forward, the partnership members will take on additional duties. Different portions of the project require more effort at different times.

Input that the partnership is looking for includes choosing/evaluating technologies, input on the cost model and training programs. Also our goal is to assist small and rural utilities and offer solutions that are appropriate technology for their use and is cost effective. As well as some input on when and how much effort should be put toward different portions of the project. When should research stop and we concentrate on pilot tests only? When should the training program be ramped up?

FY03 – 4 million

AwwaRF – 1million + 750K

Sandia – 1.8 million

WERC – 375K

FY04 – 3 million

AwwaRF - \$850k +500K

Sandia - \$1.42 million

WERC - \$525K

Next year? The plan is for a 5 year program.

Indian Health Service has some funds. In NM, Sandia has been working w/Jemez Pueblo.

August 2003 meeting (some info included in the notebook). This meeting identified the initial research needs and should be looked at as a reference as we break down into discussion groups.

AwwaRF has been contracting with researchers – 8 projects. Marc Edwards, Bruce Thomson, Patrick Brady and Tom Sorg were involved in choosing the 8 projects. They were careful to not overlap w/technologies that EPA was using in their pilot program. The confidential stamp does not apply at this time as the projects were funded.

Original plan was that there would be a multiple issue of an RFP similar to the one in the handout.

Need the TRC to consider – is the approach sound? Should the level of funding be the same? For the 03 RFP the time frame was kept small. This was a fast track and had a tight schedule and the budgets were kept small to get the projects done quickly. For those projects that look successful from the 1st eight project, which ones should be funded for phase 2? Should we issue a 2nd RFP, how much \$ should be spent on the 2nd round and how much should be spent on implementing a second phase of the 1st eight projects that look promising? Which ones should be funded? Co-contaminates need to be discussed and if the technologies address them. The pilot sites were picked based on multiple contaminants.

Michelle Fry has info on how this problem regionally and will forward the info to rethomps@nmsu.edu for passing out to TRC members. And info on the co-contaminate issue will be sent to the same address for dissemination. EPA has some info on co-contaminates.

Need for consistent research and funding should continue. The funding should be more of a straight line and not drop off. The smaller utilities really need help in getting very low cost technologies lined up and they need a mechanism for continued maintenance. The states may need to put together a program to help them. The toughest communities to address the arsenic contaminant issue are those that have very low contamination and feel that they don't need to jump in and fix it. There is a potential for waivers and time extension will potentially be available for some communities. And each community will have to address this issue on their own.

SNL presentation

Pilot Demonstrations of Arsenic Removal Technologies (Malcolm Siegel's slides).

Discussed what Sandia/partnership has done to date and the upcoming NM

Environmental Health Conference. Pilot studies, how they were selected, which groups supplied equipment/man hours to install, etc. column testing,

Questions arouse -

Should there be a project proceeding the pilot scale? Can the small systems be surveyed for water chemistry and then choose the sites for pilot scales? Are we excluding sites because the sites don't have water chemistry? How are deleterious effects on water systems going to be addressed? Will there be a study? The EPA program doesn't study this.

Questions for the group from Malcolm-

Malcolm will send to Rose

Abbas discussed WERC's role. Outreach education/training. Different communities require different training. Non-traditional approach is required. Multiple prong approach – Traditional for larger communities that may have a full time water person, non-traditional for smaller communities that have volunteers or part time people – those that

don't have the vehicle to addend traditional training. – 2 types of training for this group – on-site using their equipment and a “bat” mobile that we can bring the equipment to them and let them try the different types of equipment. At this point most of the training will be an interactive web tool. WERC needs input on this and how best to get the tech transfer to the small systems. The Design Contest will augment the pilot scale systems. Maybe should spend money on training a few experts that can be called upon to answer small system owners questions and not train everyone?

Fernando Cadena: Cost Model – series of slides showing what we don't know and what We assume needs to be added to the model.

Need input from TRC on many aspects of creating this model. What are the most important things to include, information on costs and where technologies are successful and not, what keeps a system from working, how accessible should the model be? Made for everyone or only for experts? Should performance prediction be included in the model? – should this be isolated from the rest of the model at this point? Who will be using this model?

Should look at pumping capacity and not flow rates. Need to consider the configuration (average vs. well flow). Temperature is an important impact on the system and at this point the existing models do not have a temperature impact. Should we limit the model to individual users or small systems? Should we even continue improving the model? Should this wait until the pilot tests are completed for feedback? How are we really helping a small community that doesn't have a technical background? Need something that does a better job in predicting. Potential problem in that it may cause more confusion. 2 models? One that could be easy for a small rural user – a simple guide. A second tool that can be used by experts that can be updated as we learn more and more. Based on the existing models, these folks wouldn't think of using the existing models w/out a site visit/site information/column test.

Is it relevant, if so how, what areas should we be considering? How broad should the cost model be given the funding.

Group discussion:

Moderators: Abbas, Albert, Malcolm

Relevance of cost model, how deep and how broad, are the parameters sufficient, insufficient? Short term objective going into the pilots? Should it be what we have now and a new one made after the pilots?

Can it be called a decision support model? Maybe need to look at what people know and what they are likely to know such as region located in, size of system, then direct them to other people in the area to find out what another group is using. More of a technical support/help desk model with information that discusses range of costs, who is using them, funding available, what agencies to go to, deliver technical support – where can they go w/out hiring a consulting firm. A clearing house function that can be easily available to give them directions, provide literature.

Range of costs – where do we get a range of cost? Some communities have systems in place and there will be more installed in the future. Need to keep collecting the information.

Start where Ziad left off, update that and get it down to the point to narrow down the options. Then they can do a site specific test or be able to look at other sites to get it down to 2-3 promising alternatives.

Can do a technology suitability score for regions of the country. Malcolm used the example of 3 utilities in southern NM – each had chosen very different technologies even though water was similar because they had different expectations of future expenditures. Need a follow-up on these 3 sites – need to know how they turned out and need to remember how the decisions were made to install the systems. Need to look at how the decisions may have benefited from the correct decision or do all systems work just fine?

Maybe have a page that tells them what testing needs to be done to use the model. What is the minimal amount of input.

Building related costs can depend on location – very different costs across the country. Sun shade in Arizona, Reno NV building had to blend into the country side. So Abe Chen left the building costs out of their model. Maybe need a line item in the program have the local people input building costs and land costs into the model. Some states require reclamation of backwash and others don't require it. DOE has costs across the country and there are national databases and the information can be integrated to make it very smart.

Either that or use it to put people in touch w/the right people.

Cost model could be just for creating a safe number for a budgetary purpose. But it should consider technology selection. At this point w/out any meaningful pilot study inputs it is not real.

Is it relevant for a small community? And the 1st layer should be a general cost. Cheat sheet? Can they be given a range? The second layer would be the model that would narrow down the type/cost of a system.

Is it better to have a common template so that this becomes an add-on tool for a grant application? Maybe each regional EPA needs to hire a small advisory group to handle this.

The 1st level should be to offer a suite of technologies and indicate which water chemistry conditions that the systems will work on. Then do the bench scale/pilot scale tests to decide which technologies will work. If you have no idea what the chemistry of the water is can't really make a suggestion as to how much anything will cost. Hesitant to try to do too much as the uncertainty can be so large.

Give them a road map/guidance of how to investigate the options. Questions that you would ask a community: What is their technical background?, They often don't know what questions to ask. Anything that directs them down the right road. Don't want to oversell the tool. Want to make sure that they understand the options that they have. Water Chemistry, site configuration, do they have sewer?

The Navajo Nation EPA does not endorse any technologies they tell them what is available.

Need to help the communities get \$ and guide them through the State Revolving Fund (SRF) process – requires an engineer on board. Community outreach tool would be great but to help the water supplier cost, tech selection, bid specifications. Joe has a PE and he wants to serve his client, but is not an arsenic guy so he can look at the tool.

Need to view it as a roadmap. Ask very basic questions, based on their response they may need to do some water quality, from this find appropriate technologies, which may lead them to discussions w/other communities using a technology, then to pilot testing, and then to funding sources and help with obtaining grants. Maybe the tool can also be a clearing house, database of questions that can be asked of utilities. Many utilities are more worried about what they need to pay now rather than later.

Are the degrees of concern independent of geographic? Are there generic questions? Are some of the questions not generic? Cultural issues? Ease of use? – not really – except when you try to put bottled water on the table or point of use technologies. Individuals may object to POU.

Is there a value of having a model that is very broad? Or a model has a comparison of adsorptive medias? Coagulation/filtration is easiest – easy to use, hard to screw up, easy to permit, proven technology, if have a sewer it is easy, but if don't and have to treat on-site it can get very complex. They have been pretty successful w/modification of existing on site technologies but feel that it is easier to stay away from membranes.

Modifying water chemistry:

Modifying pHs for small communities is very touchy. However it does need to be considered.

Can modify iron and definitely needs to be prescreened.

Assume chlorination in place and not dealing with arsenite

Need to keep partial treatment, blending in the model. Splitting the treatment can be very successful.

The model is not the be all and end all – just a guide.

Albert: Bench Scale future

Research on how to spend 500k and 950k on future bench scale operations. Need to determine which current bench scales should be progressed to a 2nd phase and how much should be spent on new bench scale. Need to finish phase 1 and that will happen in about 7 months from now. It will probably be a year from now to finalize the phase 1s.

Spending is not based on FY basis but on when the projects should finish. More \$ for new bench scales will be available in 3-6 months.

If all 8 bench scales are successful, all could be funded.

Hopefully some phase 2 projects will be funded and won't have to wait for FY05 funds but will be able to use some of FY04 funds. Need some recommendations on Phase 2 spending and new phase 1 funds. 5 of the current technologies are new medias. 3 are addressing other components of arsenic treatment i.e., residuals stabilization. If the phase 1 results show enough promise the technology would be eligible to move onto a pilot scale project.

Currently have 2.3 million (950 + 500) 850 should be available when the phase 1 projects are ready to be moved into phase 2.

Should we issue a similar RFP for new bench scales as included in the notebooks?

Should we change the RFP?

Results from the August 03 meeting:

1. Non-treatment
2. Modify existing system
3. Broadly include stabilization, fate, long term stability of management of waste and co-contaminates
4. minimize liquid waste
5. modification of existing technologies:
 - a. hydrodynamics of media (uniformity coefficient)
 - b. Modified activated carbon
 - c. Sulfide based media
 - d. Extension of life of current media (optimum performance of additives)
6. need real time arsenic detector
7. easily disposable media
8. modification of surface charge on media
9. develop protocol for media assessment
10. beneficial use of residuals
11. solid phase oxidation materials

Close discussion ~5:30 PM

Sept. 28, 2004

7:30 am

Albert Ilges, Thomas Robison, Abe Chen, S. Deb Misra, Fernando Cadena, Malcolm Siegel, Abbas Ghassemi, Roseann Thompson, Yu-Jung Chang, Marc Edwards, Michelle Fry, Ziad Chowdhury

Bench scale recommendations continued/03 workshop research concerns

12. Innovative pH control for Pre and Post arsenic treatment
13. Innovative process methods to reduce competitive effects
14. Impact of intermittent operations on arsenic removal technologies
15. Development of a continuous on-line arsenic monitor – Michelle Fry has experience w/a company that has a monitor that shows a lot of promise. Instrument very easy to use and maintain. Not appropriate for raw surface water or processed water. Good as a “finish” water. Cost? May be priced for 20k? Strip kits? Test kits – all over the place. Unreliable for anything below 10.
16. Arsenic residuals – stabilization – AwwaRF funded one as part of the pilot tests, long term stabilization, Arsenic extraction, Arsenic as part of TCLP? Should that be a priority of this project or the EPA? Is EPA looking at this? POU issues
17. non-treatment alternatives for arsenic mitigation Well modification and rehabilitation, blending for arsenic rule
18. In Situ Treatment for Arsenic, Aquifer storage and recovery, Immobilization of arsenic in aquifer
19. Developing new media – powdered materials? - didn't get any proposals last year using powdered materials.

The August 03 meeting wanted the RFP to be very open. The RFP sounded like it was structured around media – can the RFP structure be changed? It sounded like it was for treatment technologies –maybe open the language a bit? It was meant to be a blanket for all technologies? Maybe not as big as a response as should have been? How about taking unsolicited proposals? Have the submitter state the scope and the impact that it can have. Maybe identify topic areas as part of the RFP - identify priorities.

Suggestions:

Phase 2 \$ should come from next year's \$, take some money from this year and make it for unsolicited ideas. The rest of the money should be used to fund specific priority areas. Ideas: an RFP to pull documentation together for small utilities to apply for \$, an RFP to look at downstream effects of arsenic technologies, Arsenic leaching from corrosion by products, on-line monitoring equipment, and treatment for co-contaminates, innovative operational approaches to reduce combative effects – about 1 million to fund these issues and ½ million to fund unsolicited proposals. Specifically for bench scale studies and the piloting testing has to be focused for quick implementation. Funding should be focused on the priorities. Should our priorities drive research or should innovation be allowed. Maybe need to reset priorities but allow innovation. 3 pots – open the door to things we

didn't think about, solve problems that we know we have, part way to a solution so need to keep funding those – what fraction should be put in each of the pots?

What about a mobile unit (a suggestion from 03 meeting) - might work really well for very rural areas such as those that S. Deb Misra is familiar with. Fernando was surprised that there weren't any proposals – as AS treatment is a very site specific problem and it would be hard to have a mobile treatment. Is this a business that would have value?

Money wise – currently available 1.45 million, another 865k in about 3-6 months. Phase 2 projects will need some funding. Need to allocate some funds for future – how should we proceed? Tom: is there a way to estimate phase ones that will be taken to phase 2? – not at this point...

Maybe put out an RFP to fund 8-9 new proposals, take the difference in that to create a separate RFP to fund more specific things that match the priorities.

3 phases? Innovative, directed and phase 2 – what if 20% goes to completely innovative (high risk), 50% toward directed research our priorities, and 30% of total pot (1.45 million and 865K) toward phase 2.

Unsolicited – 20%– 500K or 500k

Solicited – 50% – 1 million or 1.4 million

Continuing – 30%– 800k or up to 400k

Maybe 2-3 of the 8 continuing should really only need 400k? or if the 800k is not needed we can use it for more solicited studies. So make it “up to 400k” instead

Maybe 200k in unsolicited, more in solicited and use any left over from continuing to solicited...

Agreed upon:

Unsolicited – 500k - 100k each?

Solicited –1.4 million

Continuing – up to 400k

Pilot priorities – 1) prediction and modeling – how is a material going to perform? 2) ? 3) improved processes better automation and better sensors. A bit different from the EPA pilots – how they will perform for a specific community. DOE pilots different as they want to be able to make predictions.

Bench Scale – Priorities

Unsolicited

Create a problem statement:

Clearly identify that are looking for innovative solutions to controlling small rural communities. Technology delivery should be focused on small community delivery to meet MCL. Non-transient, non community systems. Stay away from giving examples.

Very broad statement. Objective delivery of water that meets the arsenic MCL to small users. Focus on technical and business solutions. Should be technically oriented? Concept has to be testable, provable and have the potential to become commercial

Multiple contaminants

Solicited

- 1) Multiple contaminants
- 2) Help in obtaining grants
- 3) Arsenic treatment, secondary impacts,
- 4) Release of Arsenic from D.S.
Potential consequences of media disposal
Simplified screening of co-removal, co-disposal
- 5) Technology Development - This should no longer be a big umbrella solicitation as the unsolicited projects would capture the things that we are not considering.
- 6) pH control – “idiot proof” automation, use carbon dioxide for pH control instead of acid – is it a treatment control topic, there are systems that exist for pH control using CO₂. process control, materials – maybe this should be a pilot?
- 7) Arsenic surrogates for different treatment technologies
- 8) Development of tools to do field test for media evaluation (RSSCT)
- 9) Tools for Prediction of media performance
- 10) non-treatment alternatives
- 11) ASR – may be more appropriate outside this call – a large system problem.
- 12) Residual issues/stabilization options, adequacy of regulatory controls.
- 13) In finished water finding Arsenic 3 and 5 in media

Continuation – depends on what comes out of the study

Education/outreach

2 questions –

3rd item – cost benefit/decision model and where it needs to go, move toward.

Audiences - person who runs the system, regulators, and existing engineers – suggested that regulators be the 1st target as they will be working w/operators and approving systems. The best use would be educating the system owners/operators as the best way to get them to comply. EPA should be stepping up to the plate to do the training but will this really happen? Usually the small communities have an engineer that accompanies them on the visits. Even cities and small towns and nursing homes and churches have engineers that accompany them. Need to target more than just the operators. Maybe 2 or more packages developed for training – one toward engineers, one for owners/operators and one for public. The packages would have the cost tools as well as flyers/books that would be geared toward the different target audiences.

Regarding sustainability, regarding cost, where should it be located? “.net” suggested. Most cost effective way to provide a host. Runs off a PC but it can be accessed by anyone. Need internet access. – using a disk or a CD “shrink wrap” will cause problems – won’t have to update individuals uses. If make CD available need to make it very clear that the CD will become obsolete.

What language should we use? Excel? Visual basic? -- visual basic preferred. Do we want to provide the tools so that they can tweak it or a black box? Black box – maybe also supply a tweak able one for educational institutions. Don’t want the public tweaking it – make it as simple as possible for them. Make the source code available for downloading.

Back to brainstorming list to prioritize the solicited/unsolicited projects

Unsolicited -

Multiple contaminants (regulated)

Contaminants not regulated

Constituents

Should this be removed from unsolicited? And really not put this into the unsolicited – remove this focus and leave the request very, very open.

Plan to fund 5 projects up to 100k.

Research ideas include but are not limited to the following:

If this idea is really good don’t need to address any of these –

Affordable

Applicability to small system sizes (250 connections or less) including households

Easily deployable

Easily manageable to operate and maintain

Outsourcing options/circuit rider

Water efficient

Energy efficient

Capable of meeting NSF

Innovated and created solutions sought

In the RFP make sure that the IP information is stated right up front. The links in the existing RFP makes it sound like DOE owned all the IP. Needs to be clarified.

Solicited – focused on treatment technology

Drop methods for obtaining grants – make WERC do it?

Remove “technology Development” # 5

7 and 6 should be put on the bottom of the list.

Multiple contaminants – regulated, un-regulated and regulated outside of water regulations – need to consider how the DS will be impacted. – may not be the best use of new technologies but for already available technologies.

#3 and #4 can be combined if you limit the scope to corrosion.

“Method to control removal performance” may be a good title for a sensor

To be continued

Malcolm – Pilot scale

Exercise – prioritize and weight criteria to get sense of what is most important – 1 least important, 3 most important. Wants to be able to assign a score to each site for site selection. On a separate sheet of paper break down the water chemistry as what is most important.

Return to ranking of topics for solicited proposals

Vote for favorite

Highest priority:

Secondary impacts

Copper, iron, lead corrosion, arsenic releases from distribution systems – should this be added to this subject? – requires a lot of funding guess is that it will take 300k for this one project. Is this important enough to spend the funds this way? Could the secondary impacts be looked at as proof of concepts projects? There is a concern that the systems could leach activated aluminum. Also biological development can be a problem in terms of health risk to the public, destabilization and operational concern about clogging/un-aesthetic water being produced. Could some of this be added to Malcolm’s site at Kirtland? Sounds like 2 projects bio-stabilization 100-150K and a corrosion (pH) project. 1st level laboratory study.

Reissue 03 technology development RFP –

a few people said they did not vote for this as they felt that the unsolicited proposals would cover this issue

Tie: Residuals and Tools for media evaluation

Has there been enough testing done that a model can be developed? Should this be part of also media evaluation? Set up a project continuation fund for media evaluation tools – 150k for a project need an evaluation of existing tools and then after a study of them release 150k. Fund should be done to set aside RSSCT work. New solicitation in hand and go for prediction model. Currently have to do a whole bunch of tests and isotherms. Will the prediction be accurate? May come out of pilot tests. What protocol is going to be selected? One way of doing it is to do scale ups – from small scale columns to larger scale columns – maybe talk to Bruce Thomson, and Paul Westerhouse to come out w/a project. Phase 1 use a surface complexation model and then use the results to create a RSSCT tool. Maybe make funding available to someone who can up with a more basic model?

Residuals – highest priority needs – if there is a small system focus, the long term stabilization in a landfill – instead maybe a paper instead on how states would view small amounts in a landfill – business models? Who will provide the services and do different states think that the residuals would be hazardous waste? Maybe look at beneficial re-use – road aggregates, under bed, etc.

Release of Arsenic from Distribution system –

move up to secondary impacts – really part of the same issue 150k

Tools for prediction of Media performance

Media response to pH variation – could be a lab test.

4 calls? pH control, direct control to adjust pH – maybe this is an operational problem and needs to be explored in pilot testing. Maybe this needs a separate column as an extension of the pilot test. Maybe this should be done in the lab where it can be intentionally changed. Currently has 20 ports in the pilot test – is it over designed. Discussion about specifics of tests.

5 topics need a small write up – 1st 4 can go out as part of the RFP

2nd impacts

Tech dev

surrogates

performance monitoring assistance

pH stability issues – pilot scale (done by SNL folded into the pilot program)

Education component – should consider what communities should do w/residuals - WERC

Malcolm –

Pilot scale studies

Survey results – most important to least important-

1. Water chemistry

pH, TDS, foulants FE, MN, silica, turbidity, and organics

competing ions (V, SO₄, etc).,

As(III)/As(V) and

other metals and radionuclides of concern/benefit

2. Arsenic concentration greater than 10
3. ability of community to handle deal w/residuals/treated effluent.
4. sufficient water quality data to assess variability,
5. Community support facilitating rapid deployment,
6. Size of system to be treated (<10,000 users)
7. Socioeconomic/cultural factors.

Out of 50 or 25 systems pick 5-10 systems that have water quality data.

Need clearly diverse regional sites. Pick 3 sites – maybe NH/VT, Michigan site, Florida site maybe CA site w/uranium.

Socorro pilot – remote site, warm water, want to compare 4 adsorptive media (Malcolm has slides on the objectives of this pilot test). What is the benefit of spending time on empty bed contact time? Will the capacity change? The schematic needs to be simplified. Don't need as many tests. Pick a single empty bed contact time at the high end of the manufacturer's suggested breakthrough to be on the safe side. Is there a benefit to going through exhausting? Need to be testing 9 months to a year. Serial testing is going to be tough – how about shorter columns? May need to do various column heights. Great design but can it be supported. Samples are expected once a week – will miss a lot – will miss the stability of the CO addition, if have on-line pH meter won't miss it...maybe turbidity – won't need if you have a pre-filter. Metal sampling? Chlorine consumption can change quite a bit.

In the notebook summary of the draft of the final pilot design, please check it and on a conference call SNL will get feedback.