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U.S. EPA Environmental Technology Verification (ETV) Program Materials Management and Remediation (MMR) Center

Summary of the Remediation Stakeholder Committee Teleconference
Tuesday, June 30, 2009

Present at Role Call: Any Dindal (Battelle), Andrew Bullard (Battelle), Angela Fisher (GE), Brian Lewis (CA DTSC), Dave Wandor (Dow), Eric Stern (EPA, Region 2), Heather Rectanus (Battelle), Jim Harrington (NY DEC), Kenneth Feathers (CT DEP), Leslie Karr (Navy), Louis Maccarone (RI DEM), Maria Gordon (Battelle), Marvin Unger (HydroGeologic/SERDP/ESTCP), Michael Smith (VT DEC), Robert Phaneuf (NY DEC), Ramona Darlington (Battelle), Russell Sirabian (Battelle), Stephanie Fiorenza (BP), Teri Richardson (EPA), Timothy Christman (OH EPA), Tom O'Neill (NJ DEP). Observer: Randy Parker (EPA).

Introduction of New Participants

Maria Gordon (Battelle) asked the two new stakeholders on the call--Eric Stern and Marvin Unger--to introduce themselves and describe their work and interests. Tim Buscheck (Chevron) will be joining the Committee but was not able to be on the call.

Welcome

Teri Richardson (EPA) welcomed Eric Stern and Marvin Unger as the newest stakeholders of the MMR Center and thanked everyone for their input and involvement.

ETV MMR Center Update on Activities

Referring to the slides provided to all participants, Amy Dindal (Battelle) provided an update on what the Center has accomplished since the last meeting of the Remediation Committee (March 18, 2009):

- An external MMR Center SharePoint has been set up so that stakeholders can easily access information such as meeting agendas and slides, technical information on technologies of interest, stakeholder contact information.
- The Materials Management Committee met (March 31, 2009) and identified priority areas: tire recycling, electronics recycling, sorting technologies, manufactured soils, and materials evaluation.
- To introduce a targeted audience to the existence and mission of the MMR Center, Battelle staff attended and made presentations on the ETV MMR Center at the ITRC Spring Meeting, the ASTSWMO Mid-Year Meeting, the Texas CEQ Trade Fair & Conference, and the Battelle Bioremediation Conference.
- Staff have been talking to potential collaborators and vendors to generate interest in verification testing.
- The March 18 Remediation call produced a list of potential remediation technologies to explore. The Center staff pursued those in which stakeholders had the greatest interest:

fracturing, pressure pulsing, electron donors, in situ chemical oxidants, in situ chemical reductants, and reactive caps. Other areas are still on the radar (such as emerging contaminant remediation), but the ETV MMR Center has to prioritize and focus on those areas with the highest potential for resulting in verification testing.

Discussion of Progress in Priority Remediation Technology Categories

The stakeholders were able to follow the presentation on slides received before the teleconference.

- **Fracturing**

Ramona Darlington (Battelle) summarized her efforts at establishing contacts with potential vendors: Pneumatic Fracturing Inc. (PFI) and FRx. Deborah Schnell (PFI) is waiting to hear back on the progress of sites in CA and IL. FRx has not replied to either phone or e-mail approaches. Brian Lewis (CA DTSC) offered to help PFI find a site in California. Dave Wandor (Dow), who has had experience working with FRx, will try to get a response from them to Ramona's questions from a colleague who has worked with them closely. Dow is interested in having both hydraulic and pneumatic fracturing tested at a site in Canada. Dave Wandor says they will be able to work towards committing after seeing the new fiscal year budget due out in September.

- **Pressure Pulsing**

Russ Sirabian (Battelle) reviewed Primawave technology and its applications (substrates, oxidants, reductants). The technology has already gone through Canadian third party testing. There is potential for a field test at a Navy site in the spring 2010. Primawave would be applied to enhance delivery for electron acceptor injection. The vendor is willing to supply in-kind support for equipment and personnel, but additional funds are necessary to prepare the ETV test plan and verification report in order for this to become an ETV verification test.

Discussion: Jim Harrington (NY DEC) commented that additional demonstration of the technology at a petroleum site in New York produced moderate success. To demonstrate effectiveness, it needs to be tested without and then with the device while monitoring the achievable rate of fluid injection. A test procedure can be developed where multiple injections and multiple wells are used to evaluate the increase in injection rate of water-soluble compounds. Looking at differences in distribution is more difficult (permanganate has colors, others need tracers).

- **Bioremediation**

Russell Sirabian (Battelle) presented information on the Planteco BioMat technology.

--**Planteco Microbial Mat Technology.** Layers of cyanobacteria, purple autotrophic bacteria, and other microorganisms are held together with slime to create a mat that removes contaminants from the environment via multiple reactions (anoxic, metabolic, etc.).

Discussion: Marvin Unger (HydroGeologies/SERDP/ESTCP) pointed out that this was similar to wetlands, just sidestepping regulations that would be applicable to wetlands. It would be applicable only to certain regions, and at certain times and temperatures/climates. The vendor claims it can be used in Alaska, but you need to put in a greenhouse. Russell Sirabian agreed that it requires sunlight to work. Ken Feathers (CT DEP) referred to an Upjohn site in Connecticut where groundwater was pumped into RBCs (rotating biologic contactors). It took about 12-18 months to clear the contaminants. The Planteco Microbial Mat sounded like a refined version of the RBC. Russell replied that 12-18 months is too long, and that the Planteco Mat works much faster.

Heather Rectanus (Battelle) presented information on four potential in-situ groundwater bioremediation vendors:

--**JWR Bioremediation**: Lactoil Soil Microemulsion, WILClear Lactate Concentrations, CHITOREM Chitin Complex, Accelerite bioremediation nutrient

--**EOS**: EVO Formulation, Bac9 Culture, AquaBupH

--**RNAS**: Newman Zone, Neutral Zone, O₂ Zone.

Discussion: Marvin Unger remarked that ESTCP has already generated a lot of data on electron donor technologies and would be willing to make it available to the MMR Center stakeholders. Angela Fisher (GE) asked whether it was field evaluation or lab data.

--**Ram Environmental Technologies**. Main product is RamSorb, hydrocarbon adsorbent powder with hydrocarbon digesting culture. Looking for potential testing sites.

Discussion: Leslie Karr (Navy) asked whether testing was on new spills or weathered. The Navy has an interest in the application. Jim Harrington said that there were lots of vendors around with this sort of technology. Angela Fisher suggested that we find out how this one is different.

- **Reactive Caps**

Andy Bullard (Battelle) provided a comprehensive overview of Battelle's history with the vendor AquaBlok Ltd./Adventus Group, the products available from the vendor (organoclay; reactive material-amended organoclay, such as ZVI, GAC, EHC, minerals, rubber; funnel and gate), and a list of treatment materials potentially applicable for various contaminants. He is in very preliminary discussion with the Navy about a potential testing site (Bremerton Naval Complex).

Discussion: Jim Harrington (NY DEC) has a pilot site (50 ft x 50 ft) near Poughkeepsie, NY, which will provide preliminary data this summer. He will share that data when it becomes available. Teri Richardson (EPA) has posted the AquaBlok EPA SITE demonstration report to the ETV MMR SharePoint. Eric Stern (EPA, Region 2) said there is another location in New York City. The EPA is working with the NY DEC in Brooklyn on the Gowanus Canal (dredging and capping). He'll have results in about 2 months. Randy Parker (EPA observer) asked whether that is a dynamic environment. Eric replied that it is 1.8 miles long, straight line, producing groundwater concerns. Water from the East River at one end, and at terminus shoots out water. There is very little impact, scouring, or tidal flushing. The Gowanus Canal has several turning basins that may be appropriate for capping demonstrations. Amy Dindal summed up that John Collins of AquaBlok is interested in the ETV program.

- **In-situ Chemical Oxidation**

Ramona Darlington said that Vironex is interested in ETV verification of ISCO (persulfate and/or peroxide) at active gas stations. FMC has agreed to supply chemicals and support Vironex in the development of a safety plan. To identify possible test sites, Ramona has initiated discussions with several oil and gas companies. A collaboration with BP is the most promising. Ramona will coordinate discussions with BP and Vironex. In addition, there is a Navy RPM in CA interested in testing ZVI, ISCO, or bioremediation techniques at chlorinated and fuel spill site. Battelle will contact vendors interesting in testing at this Navy site once more information is gathered from the RPM.

Discussion: Stephanie Fiorenza (BP) said that Vironex uses a lot of persulfate, has gotten a lot of good validation data. She didn't think it would be easy to verify at active gas stations. Ken Feathers asked how long would ISCO activities take. Jim Harrington replied: 30,000 gal in a week, with a second injection necessary a month later. Ken said that according to Connecticut legal requirements, he has only a 30 day window to complete the remediation.

Jim elaborated further that sometimes you need 3-4 injections in a year to complete the process. Connecticut permitting constraints won't allow more than 2 injections a year. Marvin Unger observed that kinetics on ISCO are fast: things happen in a hurry. There is the issue of rebound—need for reinjection as much as 6 times in a 2-year period. Kinetics are so quick but persulfate is promising because it results in a slower and more controlled reaction compared to other oxidants and this allows for better distribution. Delivery is always an issue and in some cases guar gum has been used as an enhancement.

Stakeholder Input to New Remediation Areas

Amy Dindal led the discussion on additional remediation technologies.

- **Asbestos in Soil Sampling Technology**

Environmental Quality Management, Inc. developed the Releasable Asbestos Field Sampler (RAFS), a mechanical sampling device that uses a raking motion to generate energy to release particulate matter from the soil and aerosolize any asbestos particles present. EPA OSWER/OSTRI would like an independent evaluation of the technology.

Discussion: Michael Smith (VT DEC) said that Vermont is interested but would not have funding support for this test. Brian Lewis said that California has naturally occurring asbestos. He will get in touch with their asbestos group.

- **Pressure Cycling for Vapor Intrusion**

The Navy is interested in evaluating this approach to manipulating building pressure in order to characterize and mitigate vapor intrusion.

Discussion: Marvin Unger mentioned that Arizona State University purchased a home above a plume outside a DoD facility and used sampling devices, real-time monitoring, and alarms to determine sources of vapor intrusion. Jim Harrington said that we need vapor intrusion guidance on how to investigate and mitigate it. Is it pressure cycling? Intermittent? Russell Sirabian explained that under positive pressure, we have VOCs (volatile organic compounds) from indoor sources but cannot get vapor intrusion under that condition. In the negative part of the cycle, we have contaminants coming from indoor sources as well as from vapor intrusion so the pressure cycling will establish what contamination is coming from vapor intrusion. Marvin added that we need a characterization study—whether business or home—seasonally, daily. How to characterize when there are so many sources (e.g., dry cleaning brought home)?

- **Other**

When asked what other remediation areas are of interest, Eric Stern spoke about ex situ stabilization, typically done with Portland cement. STS, a Canadian company, developed a stabilization process using polymer addition. Polymer was added for volume reduction; oxidation was for organic contamination reduction. Leslie Karr asked whether it was done on marine sediments or fresh water. Eric replied that it was fresh water, but New Jersey is interested in applying it to selected marinas. A stakeholder asked whether the waste would be delisted? Could it go into a landfill? Eric answered that it may be classified as hazardous, then treated for volume reduction. Andy Bullard said that based on his understanding of NJ regulations, leaching testing may need to be done on unamended sediment, but that he is unaware if these regulations are still in effect and/or if other such regulations exist in other states. A stakeholder asked whether volume reduction meant loss of water? Answer: Yes, this is a dewatering process.

As another topic, Brian Lewis mentioned the application of nanotechnology to study the health hazards of iron, and asked if any of the stakeholders were aware of such technologies.

Review of Action Items and Next Meeting

Amy Dindal reviewed the action items that developed in the course of the meeting:

- Brian Lewis: help PFI with CA site identification
- Dave Wandor: contact FRx to see if he can get them to respond to Ramona's questions
- Angela Fisher: look for petroleum sites for RamSorb
- Marvin Unger: summarize and post ESTCP data on electron donor work on External MMR Center SharePoint
- Jim Harrington: share preliminary data from pilot study using reactive cap near Poughkeepsie, NY
- Eric Stern: provide connection to Gowanus Canal site in Brooklyn suitable for testing sediment caps
- Stephanie Fiorenza: discuss potential ISCO test at gas station site
- Michael Smith: gauge interest in asbestos sampler from VT
- Brian Lewis: contact CA asbestos folks for input on asbestos in soil sampling technology
- Battelle: obtain technical data on RamSorb that shows how it is different from similar products on the market

Results on RamSorb to date: Information provided by the vendor on RamSorb was sent to all Remediation Committee members. We received responses from Leslie Karr, Jim Harrington, Marvin Unger, and Erica Becvar. All agreed that the vendor had not given substantive technical data, without which it was impossible to evaluate the product. Battelle will pursue further and report back to the Committee.

- All: look for site opportunities to test Planteco Microbial Mat technology.

The next meeting of the Remediation Committee will take place in the fall, on a date to be determined in November.

Adjourn

Respectfully submitted,

Maria Gordon
Battelle Stakeholder Coordinator