FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE MEETING
Arlington, Virginia
May 19, 1999

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WELCOME/OPENING REMARKS

Walt Kovalick, U.S. EPA/TIO, welcomed the attendees and opened the meeting of the Federal Remediation Technologies Roundtable by reviewing the agenda for the day. Dr. Kovalick gave an update on Roundtable activities since the last meeting noting the publication of the technical proceedings from the Fall 1997 Roundtable meeting on DNAPLs. He also noted the press conference announcing the publication of cost and performance case studies held in November 1998 and the upcoming conference on subsurface remediation optimization taking place in St. Louis, for which over 600 were already registered. Johnnie Shockley, U.S. Army Corps of Engineers, reviewed the schedule for the CERCLA Education Center training course on field-based technologies. Dr. Kovalick introduced James Owendoff, U.S. Department of Energy, chairman for this meeting of the Federal Remediation Technologies Roundtable.

CHAIRMAN'S REMARKS

Mr. Owendoff thanked everyone for coming and noted that, with regard to the agenda, there is consensus among the Roundtable member-agencies on cost and performance reporting, no consensus on performance measures for federal technology assistance programs, and consensus on containment systems; hence, he would limit his remarks to performance measures. The question for the agencies on performance measures is how well are they implementing their programs, which in turn requires the agencies to address how to get cleanup contractors to use new technologies. A key to solving this need is to ensure that RODs, rather than limiting technology options, are written to allow market forces to settle on technological solutions. Given this, the issue for the member-agencies becomes finding ways to provide incentives in their cleanup contracts that allow market forces to operate more effectively.

MANAGEMENT ISSUES

Update on Cost and Performance Data Reporting

John Kingscott, U.S. EPA/TIO, gave on update on the issuance of cost and performance data reports. The number of reports available on-line has reached 140, which can be found on the Roundtable website in a keyword-searchable format. Mr. Owendoff asked whether they are seeing the reports used to bolster confidence in technology applications and whether demand for more reporting exists. Mr. Kingscott said they only know the number of hits on the website; as for how the reports are used, the answer lies with the user community, as may be represented by groups like the ITRC. Dr. Kovalick said electronic outreach tools like TechDirect cover dissemination of products like the reports, and the feedback on TechDirect and other tools has been very positive. However, such tools can only "force-feed" information. Education of contractors on technologies remains a considerable barrier to implementation, as does the need for contractors to receive assurances from RPMs and regulators that new technologies will be accepted. Bob Furlong, U.S. Air Force, added that getting private vendors and waste site problem-owners to provide data for the reports has been another significant barrier. Private vendors consider their data proprietary and are reluctant to let federal agencies take the lid off their machines to see how they work; problem-owners tend to be reluctant to discuss anything.

Mr. Owendoff voiced his support for the issuance of more cost and performance reports. Donna Kuroda, U.S. Army Corps of Engineers, added the reports also are a source for researchers. Materials found on the Roundtable's website have been used as academic course materials. For the future, Mr. Kingscott said there are as many as 30 DoD reports in the pipeline, 50 DOE reports, and 40+ EPA reports. Contractor scope of work model language to include cost and performance data reporting requirements at the outset of site work is under development.

BUSINESS SESSION: PERFORMANCE MEASURES FOR FEDERAL TECHNOLOGY ASSISTANCE PROGRAMS

Performance Measures: Department of Energy

Gerald Boyd, U.S. Department of Energy, said DOE's investments in innovative technologies have come under intense scrutiny, hence the interest within DOE in performance measures for these investments. DOE has prepared a Path to Closure document that provides data and schedules, including baseline summaries, for 409 projects within the DOE complex. DOE's program as outlined in the Path to Closure document is based on four themes: DOE's program is solution-driven, comprehensive, integrated, and credible. From the Path to Closure document, DOE is able to prioritize and develop work packages for cleanup projects and other activities, including investment in innovative technologies.

Mr. Boyd said DOE invests about $200 million annually in new technologies. In the early days of DOE's investment in new technologies, performance was measured by the number of demonstrations and bench-scale tests. Later, DOE used tiered performance measures that focused on demonstrations that met site-specific needs and were ready for implementation. However, DOE saw that, while the new approach may have been an improvement over simple baseline measures, they may be implementing a large number of technologies with only marginal benefits. DOE has now moved onto an approach that examines four parameters to measure performance. The revised approach still uses the project baseline summaries and "counts beans," but now adds in qualitative and value-added components. The new approach will be implemented on a trial basis in FY2000, with full implementation scheduled for FY2001. Mr. Boyd said applying metrics to the four measures is the most significant issue facing DOE at this stage, especially for evaluation of life-cycle cost savings. A workshop on the issue was scheduled for (May 20).

Performance Measures: U.S. Air Force

Bob Furlong said the Air Force invests about $5 million annually in new technologies. Their focus for measuring performance is on successes, defined as technologies at the proof-of-concept stage and for which the AIR Force has developed protocols for implementation. The Air Force focuses on mature technologies that meet particular cleanup needs. Their previous focus on demonstrations and bench-scale projects has now been taken over by SERDP/ESTCP. The Air Force program has plans to expand into pollution prevention and compliance technology areas.

Protocols for implementation have been developed for bioventing, natural attenuation, and bioslurping technologies. Mr. Furlong noted that the Air Force tends to deploy relatively few technologies many times over since their cleanup problems tend to look the same (fuels and solvents in plumes). The Air Force has not tracked learning curves at its sites, but that need is seen as less pressing since they

implement few technologies. Likewise, there is no database across the services to show where innovative technologies have been deployed and whether costs per deployment are decreasing.

Mr. Furlong said the Air Force, like other bureaucracies, faces common "use up the budget" issues that can impede sound, long-term decision-making. Metrics for performance imposed on the DoD services by the Base Realignment and Closure (BRAC) program lean heavily toward incentives for transferring properties. DoD services tend to see investments in items like innovative technologies as taking money away from items such as personnel. Appropriations for research and development across the services tend to be small.

Mr. Furlong said the Air Force has cut off investment in new technologies, principally because their site contamination problems are relatively homogenous and the Air Force believes it has access to the technologies required to meet cleanup needs. It plans to rely on the private sector in the future for refinement of technologies to meet their needs. The Air Force research laboratory effort in this area is nearly non-existent. Mr. Boyd said the reliance on the private sector may be dicey since private vendors have not been willing to invest in research and development without some measure of federal support and buy-in to ensure sales at the end of the process. He added that DOE does not necessarily believe that detailed tracking of deployments is needed. DOE does it because of the scrutiny its program is under. The level of scrutiny is also driving DOE's effort to develop better performance measures so that they can show real effectiveness more efficiently.

Performance Measures: U.S. Navy

Rob Smith, U.S. Navy/NAVFAC, said the Navy's research and development effort is supported by NFESC at Port Hueneme and administered by SERDP/ESTCP. Performance of the Navy's investment in new technologies is measured case-by-case, with a focus on technical performance, implementation, and cost avoidance. Program-wide, the Navy uses a cost-to-complete index as a baseline measure. The Navy also uses a cost-building tool to develop project budgets. Mr. Smith said the Navy tends to analyze work/years rather than cost/benefit, but is moving toward performance-based contracts for its cleanups.

Dr. Kovalick asked about incentives for RPMs who are left in the position of saying "here is an innovative technology that will save this much money, so send me less money." How do the services deal with that situation? Mr Furlong said the Air Force allows that the savings remain in the "area" where they are achieved, where they can be used for something else. In response to another question, Mr. Smith said the Navy uses metrics to measure savings with regard to cost-to-completes only at the program level. James Jenkins, U.S. Army, said the Army's cost-to-complete measures have decreased based on better information and improved technologies, though savings attributed to technologies are lumped into "better way of doing business" measures. Mr. Boyd seconded Dr. Kovalick's point, noting that DOE is trying to create incentives for contractors that are at odds with the way contractors want to do business. For example, DOE has yet to find a contractor interested in completing a project in less time.

Performance Measures: Environmental Protection Agency

Bob Olexsey, U.S. EPA, briefed the Roundtable on EPA's approach for measuring the performance of its investments in new remediation technologies. The discussion focused on EPA's Superfund Innovative Technology Evaluation (SITE) program, operated by EPA's laboratory in Cincinnati. The SITE revised its program a few years ago and now serves as a broker matching near-commercial scale technologies with suitable test sites. SITE also involves third party verification organizations to assure the credibility of demonstration data. The SITE program emphasizes technologies that lower cleanup costs.

SITE estimates that through its efforts and the implementation of SITE-backed technologies at NPL sites, savings of $2.1 billion will be achieved. This measure is based on an analysis of RODs signed between 1993 and 1997 that provided a baseline: cost savings were delineated across 46 technologies described in 71 RODs. The cost savings estimate was validated after a series of dealings with the Office of Management and Budget (OMB). Mr. Olexsey noted the difficulties associated with quantifying benefits such as risk reduction, but did cite some figures on the number of jobs created by developers involved in the SITE program who then had their technologies picked up and implemented at sites.

Performance Measures: U.S. Army Corps of Engineers

Marcia Davies, U.S. Army Corps of Engineers, said the Corps' mission is based on project execution rather than research and development. She described the Corps' project review procedure, which includes performance measures for feedback and program improvement. Macro-measures apply to each Corps division, and each division develops a budget for civil works programs, a budget for military works programs, and a budget to support other federal programs, including Superfund site cleanups. Performance management and planning use milestones for guidance. The Corps also has a process for verifying technologies. Mr. Boyd asked whether the Corps has a sign-off process for selecting technologies. Ms. Davies said the process varies district by district. Each has an innovative technology advocate, but there is no standard sign-off process.

The Corps uses remediation system evaluations keyed to five year reviews under Superfund to identify and implement potential cost saving technologies during O&M. These evaluations usually cost around $20,000 and yield savings of around $500,000. The Corps is in the process of reviewing new ordnance and explosives remediation technologies, instituting a "lessons learned" program, and working on improving its cost estimating system. The Corps is a strong backer of the Roundtable's cost and performance data reporting effort, and is putting reporting requirements into its statements of work.

Performance Measures: General Discussion

Dr. Kovalick asked whether any of the member-agencies has a system or method for determining whether more or less money should be put into research and development of innovative technologies. Mr. Jenkins said the Army is working on a six-year master plan that includes a break-out for research and development another for field demonstrations. He noted that basic research is more likely to be funded than demonstrations, but the means of measuring benefits remains a key component missing from the process, especially since within DoD, budget procurement is often a matter of robbing Peter

to pay Paul. The emphasis within DoD is on getting RPMs to implement remedies and get sites off the NPL, which falls outside the research and development chain.

Action Item:

- Mr. Boyd recommended continuing the discussion of performance measures for federal technology assistance programs at future Roundtable meetings, starting with the Spring 2000 meeting.

SPECIAL DISCUSSION

Proposal for a Workshop to Document Cooperative Efforts to Develop New Technologies

Mr. Boyd proposed that the Roundtable convene a workshop to document cooperative efforts to develop new technologies. He noted that multi-agency integration of federal support of environmental research and development has not been achieved. Such integration exists in every other sector. Mr. Boyd said he felt it was important to examine whether the member-agencies have integration goals, if so, whether they are being met, and if not, what those goals should be. He said he sees plenty happening, but no expression of shared interest or benefits. Documentation of cooperative also would provide OMB and Congress with information and examples of federal agencies working together. The workshop product would be a paper on cooperative efforts that identifies the common vision of the member-agencies. In response to a suggestion, Mr. Boyd said DOE will take the lead in outlining the priorities for the workshop.

Action Item:

- DOE will draft and distribute a white paper describing priorities for a proposed Roundtable workshop to document cooperative efforts to develop new technologies.

TECHNICAL SESSION: CONTAINMENT SYSTEM TECHNOLOGIES

U.S. EPA

Ken Skahn, U.S. EPA/OERR, briefed the Roundtable on EPA's revision of its guidance on landfill caps. Dave Carson, U.S. EPA/ORD, gave a presentation on landfill cover options. He noted that 35% of NPL site remedies include containment systems. The initial goal for the systems was to achieve hydraulic containment. Techniques have been refined since then to bolster the long-term effectiveness of the systems. As concerns about slope stability and shear performance grew, new materials like geosynthetic clay liners (GCLs) were tested and shown to meet these concerns. Mr. Carson reviewed an EPA-sponsored test of GCLs stretched over 3:1 and 2:1 slopes to measure performance. On the 3:1 (15º) slope, there was relatively insignificant stretching or shearing of the GCL. Results on the 2:1 (30º) slope showed much more stretching and some shearing.

Mr. Carson reviewed EPA's waste containment facility project which examined the hydraulic performance of geosynthetic composite cap materials at 192 landfill caps and 17 surface impoundments across 50 sites. The study found that HDPE geomembranes have a half-life of nearly 1000 years provided the material is buried away from oxidation sources and remains unstressed. The project concluded that geomembranes require protection from oxidation sources and that slopes and

ramps are key construction factors. EPA also has examined the performance of vegetative covers in arid and semi-arid climates using unsaturated flow models.

EPA's plans to continue assessing performance of containment systems and materials and investigate the basic mechanisms of systems. EPA sees a need for a database of system performance. To forward these plans, EPA is participating in the multi-agency Alternative Cover Assessment Program (ACAP), which is gathering staff and resources currently. Nine host sites for ACAP performance tests have been identified.

U.S. Department of Energy

Scott McMullin, U.S. DOE, gave a presentation on DOE's efforts to develop and refine subsurface barrier containment systems. DOE is assembling a toolkit of information on containment systems ranging from covers to subsurface barriers, and is also participating in ACAP. DOE has put together a compendium on CD-ROM of its research and development work on covers and other containment systems. DOE's goal is to develop 1000-year covers and systems for dealing with uranium mine tailings.

Three existing systems which DOE has employed are impermeable subsurface barriers (slurry walls), cryogenic barriers, and diaphragm barriers. New digging techniques allow slurry walls to be installed down to 300 meters for bedrock keying. Cryogenic barriers for containing tritium are mobile and inexpensive. Diaphragm barriers offer the advantage of requiring far less soil disturbance. DOE also has looked into viscous liquid barriers for situations where digging is not an option and has issued a new procurement for a subsurface barrier to be placed beneath a waste site using horizontal digging techniques. The new procurement is scheduled to be awarded in June 1999 with a field demonstration to take place next year at the Y-12 complex at Oak Ridge. DOE also is demonstrating permeable reactive barriers at the Rocky Flats site.

DOE is committed to a verification and performance monitoring program that will satisfy regulators. This includes monitoring barrier installation and using tools such as electrical resistivity tomography to detect problems in subsurface systems. DOE employs the field-portable SEA TRACE system to delineate problems that occur. The system can identify holes in a barrier down to one centimeter. DOE also is involved in development of airborne sensors to monitor systems during flyovers.

U.S. Army Corps of Engineers

Greg Mellema, U.S. Army Corps of Engineers, briefed the Roundtable on the Corps' findings with regard to containment systems as part of its five-year review program for NPL sites. The Corps' review program includes trend analysis and identification of potential cost savings. As described above, the reviews cost about $20,000 to $25,000 per site and usually yield substantial cost savings.

Common deficiencies found at landfill sites during the five-year reviews include surface runoff control, slope erosion, vandalism, animal burrows, weed control that affects cap integrity, differential settlement, slope stability, poor drainage, poor layer design, and flawed soil characterization. From the reviews, the corps has drawn several lessons learned. Containment systems require adequate review and preparation prior to installation, an experienced review team to ensure design integrity, and equate documentation to allow effective investigation of problems that arise. The Corps has developed 24

different checklists for various systems, which are available at the following website: w3.environmental.usace.army.mil.

WRAP-UP

Dr. Kovalick asked whether the member-agencies are investing in containment system technologies. On the DoD front, SERDP/ESTCP is involved in some demonstrations, but otherwise most of the work is considered applied engineering. The Air Force is involved in a couple of permeable reactive barrier demonstration projects, but is not investing much in new systems.

The Air Force agreed to take the lead and chair the next Roundtable meeting. Technical presentations at that meeting will cover optimization and monitoring of natural attenuation for chlorinated solvents and other contaminants, including explosives. Mr. Furlong noted that the Air Force has developed a protocol for monitored natural attenuation, but has encountered some difficulties with regulators in implementing the protocol.

The meeting adjourned.

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