

SUMMARY
FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE

System Planning Corporation Building
Rosslyn, Virginia
November 30, 1994

Introduction

Roundtable Chairman Dr. Walter W. Kovalick, Jr., Director of EPA's Technology Innovation Office (TIO), opened the meeting and welcomed all participants. Roundtable agencies represented included:

Tennessee Valley Authority (TVA)
U.S. Department of Defense (DoD)
U.S. Department of Energy (DOE);
U.S. Department of Interior (DOI);
U.S. Air Force (USAF);
U.S. Navy (USN);
U.S. Army; and
U.S. Environmental Protection Agency (EPA)

A complete list of participants is included as an attachment (Attachment 1) to this summary.

Dr. Kovalick welcomed Dr. Catherine Shea of the TVA Environmental Research Center. TVA has joined the Roundtable and will be represented by Dr. Harold Speidel, Manager, Biotechnology and Remediation.

Dr. Kovalick also distributed to participants a handout on the status of the Public-Private Partnership Demonstrations Project. (See Attachment 2.) The project involves working with Fortune 500 companies to demonstrate and evaluate new remediation technologies at Federal facilities. He said EPA is committed to facilitating seven demonstrations under this project by the end of FY96. He asked participants to contact Dan Powell, U.S. EPA/TIO, if they have any questions. Mr. Powell's telephone and FAX numbers and E-Mail address are shown in Attachment 1.

Dr. Kovalick pointed out to participants the copy in their meeting packets of EPA Administrator Carol Browner's memorandum on EPA's Policy for Innovative Environmental Technologies at Federal Facilities. He said TIO and EPA's Office of Federal Facilities Enforcement (OFFE) are working on an implementation plan and indicated that Roundtable agencies would be hearing more prior to the Spring 1995 meeting about how to increase the use and the pace of use of innovative technologies at Federal facilities.

He also pointed out the draft Roundtable "5-year report card" included in participant's meeting packets. He asked participants to review the draft, add appropriate names and telephone numbers, and return their comments to TIO by the end of the year. EPA would like to produce a completed 4-page flyer early next year. He said EPA intends to use the flyer as an insert in some of its newsletters and as a handout for meetings and trade shows. Dr. Kovalick said he would send a final draft to Roundtable

member agencies in February for review and comment. In addition, he said his memorandum will offer agencies an opportunity to “ride” TIO's print requisition and obtain copies for their own use.

Dr. Kovalick indicated that copies of EPA's publications related to procuring innovative technologies, which were discussed at the last meeting, had been set out on a table at the back of the room for participants to take as needed.

Completion of Interagency Guide to Documenting Cost and Performance Information for Site Remediation Projects

John Kingscott, U.S. EPA/TIO, briefly recapped the Roundtable's efforts to standardize the collection and reporting of cost and performance data for full-scale site cleanups. He said the strategy developed by the Cost and Performance Working Group was presented to the full Roundtable at its June meeting. The strategy calls for the use of standardized terminology to describe site background, site characteristics, treatment systems, and cost; identifies a baseline set of the most important performance data to be collected for individual technologies; and encourages documentation of the procedures used to measure matrix characteristics and design and operating parameters.

The Roundtable generally accepted the document, and Dr. Kovalick indicated that he would formally request each agency's concurrence on the strategy and ask for an indication of how and when each agency plans to implement it in preparation for an informal trade press event to announce the Roundtable agencies' agreement on a strategy for collecting cost and performance data. Cost and performance reports developed over the last year by EPA, the Air Force, and DOE would be used in this press event as examples of how to use the strategy.

Mr. Kingscott said the Working Group met in August to address a few remaining technical issues prior to a public announcement. The Working Group made a number of decisions during that meeting. These included deciding to:

Change the title of the document to *Interagency Guide to Documenting Cost and Performance Information for Site Remediation Projects* to reflect that the document is not a “strategy” as much as it is a procedural or “tactical” guide;

Expand the introduction and provide more information to ensure that the objective in developing the proposed procedures is clear;

Reformat tables focusing on desired matrix characteristics and operating parameters for various technologies and add incineration and solidification/stabilization;

Provide additional information to explain why parameters specified for various technologies should be documented;

Expand the discussion of cost elements in the Work Breakdown Structure;

Add a section on performance data that specifies the kinds of information that should be documented when reporting performance results and provide examples of what such documentation could look like.

Copies of the revised guide have been provided to all Roundtable members. Mr. Kingscott asked

that any further comments from Roundtable members be forwarded to him by December 9. He said a revised guide would be sent out to active members of the Cost and Performance Working Group and to any other Roundtable member or associate who requested it.

Issues Surrounding Collection of Cost and Performance Information

Mr. Kingscott explained that the Working Group also identified several issues that they determined should be brought to the Roundtable for consideration. These include:

Adapting the guide for use with demonstration projects;

Producing an addendum to the guide that deals with radioactive and mixed wastes;

Preparing guidance and protocols for collecting the recommended data—e.g., contract specifications and QA/QC guidance;

Coordinating future assessment of data collected—doing roll-ups and comparisons—to develop performance “envelopes” and contribute to ongoing work to determine presumptive remedies.

He also suggested that the Roundtable may want to consider where to go with this effort in the future. For example, should state governments and private interests be encouraged to participate in this effort to standardize cost and performance information? If they did, could their data be incorporated and used in Federal effort to look at presumptive remedies and other issues?

Frank Freestone, U.S. EPA Risk Reduction Engineering Laboratory (RREL), indicated that a Federal effort is underway to develop criteria for presumptive remedies, defining measurement parameters and determining the volume of data required to provide the “weight of evidence.” He said this effort will play a role in providing data sets that can be correlated agency-to-agency. He suggested that the presumptive remedies effort and the Roundtable's Cost and Performance effort should be coordinated.

Fred Lindsey, U.S. EPA Office of Research and Development (ORD), said that the QA/QC issue is very important, and that each agency should be doing what it can to ensure the quality of its data. Mr. Kingscott explained that in drafting the guide, the Working Group specified that agencies should at least explain what QA/QC procedures had been used. The Working Group determined that developing and influencing agencies to use a standardized set of QA/QC procedures would be a major undertaking and would require more time. Mr. Lindsey suggested it might be helpful to collect information on what QA/QC procedures various agencies currently are using as a basis for developing some QA/QC guidance that would be useful to all agencies. He said there are a variety of QA/QC methods being used, not only among agencies but also among different parts of the same agency, which makes it difficult to compare data generated.

Mr. Kingscott indicated that the Cost and Performance Working Group could undertake this work, or a different working group could be specifically chartered to work on this issue. It would depend on the level of interest in the issue.

Dr. Jeff Marqusee, U.S. Department of Defense, asked why the Working Group sees a need to adapt the guide for use with demonstration projects. Mr. Kingscott explained that there is no consensus on appropriate parameters for some of the newer technologies and demonstrations offer the

ability to plan for collecting more data than could be expected to be available for full-scale projects. Gordon Evans, U.S. EPA/RREL, also pointed out that cost data for demonstration technologies would have to be extrapolated since there would be no full-scale data available.

In response to a question, Dr. Kovalick indicated that the timeframe for addressing this and other future issues would depend on the Roundtable agencies' interest in pursuing them. He offered to convene the meetings or conference calls and provide contractor support to help Roundtable members address the issues they identified as priorities. He asked Roundtable members who want to pursue a specific issue to contact him to discuss their needs.

Mr. Freestone suggested a small working group be formed to begin working on adapting the guide for demonstration projects. He said, at a minimum, the group should involve the six or seven ongoing Federal demonstration programs. Dr. Kovalick said he would ask the EPA SITE program to convene a meeting for that purpose.

Mr. Kingscott said another issue that remains to be addressed is how best to disseminate the cost and performance information collected. He said the Working Group feels that some form of electronic distribution makes the most sense for distribution of the potentially large volume of information. He said there are several options that could be explored.

In the short-term, in addition to continuing to distribute hard copy of the reports through existing mechanisms, several established Federal systems offer the ability to distribute electronic copies of the files. These include EPA's Alternative Treatment Technology Information Center (ATTIC) and CLU-IN Bulletin Board System; DoD's Defense Environmental Electronic Bulletin Board System (DEEBS), Defense Environmental Network Information Exchange (DENIX), Defense RDT&E Online System (DROLS), and Environmental Technical Information System (ETIS); and the interagency EnviroText Retrieval System. Text and graphics could be loaded onto the systems from DOS-based or Macintosh software, but the ability to retrieve each would require users to have software compatible with the software used to create the specific report.

A mid-term option involves adaptation of existing systems. For example, it would be possible to create a database containing abstracts of each of the cost and performance reports available. The abstracts would be searchable on existing online systems using as key words the six key categories of information addressed as site background in the *Interagency Guide*. This system could also offer users the option of online ordering of hard copy of the reports they needed; the ordered information would be faxed back to them within a few hours.

Over the long term, there also is the potential for investigating other online delivery systems or CD-ROM capabilities. Mr. Kingscott stressed that the immediate concern is to make the information that already has been prepared—about 17 EPA reports, just over 20 Air Force reports, and several DOE reports—available in the most expeditious manner.

Mr. Freestone suggested that the formatting issue is an important one to address for the future. He said most systems like ATTIC can use information created with different software, but how it's formatted makes a difference in terms of the time required to assemble the material for loading onto the system.

Brent Johnson, U.S. Air Force, said that downloading graphics from bulletin boards often is time consuming. The idea of being able to get hard copy is appealing since it preserves the ability to

include graphics in the reports, which the Air Force feels is important, and minimizes the time required for downloading the material.

Mr. Johnson said that it would be important to get the National Technical Information System (NTIS) involved in discussions of these options—especially in terms of determining how to format future reports—since the reports would eventually have to be sent to NTIS anyway. In addition, NTIS may have other capabilities that would facilitate the kind of dissemination the Roundtable is seeking.

Dr. Kovalick also pointed out that EPA could commit to putting Air Force, DOE, and other agency reports onto ATTIC and CLU-IN, but he was not sure what steps would be required to ensure that the reports could be made available via DENIX, ETIS, or other systems operated by DoD or DOE. It will be important to make whatever administrative arrangements are necessary to make sure all available cost and performance information is accessible through all outlets.

Schedule for Joint Agency Announcement of Adoption of Interagency Guide

Dr. Kovalick said that he would move forward on arranging an informal trade press event to announce the Roundtable agencies' agreement on how to document cost and performance. He said he feels that announcement should be done independent of any work on these issues. He indicated that TIO has received commitments for implementation from DoD, the Navy, and DOE. The ensuing discussion indicated that EPA's SITE and Superfund Programs, the Navy, the Army Corps of Engineers, the Air Force, and DOE would be likely to participate in the event. Each agency would prepare its own statement characterizing its commitment and timeframe for implementation.

Dr. Kovalick indicated that he would aim at scheduling the event the last week of January or the first week in February. There was general agreement that the meeting should be held in a non-government facility. He indicated that he would extend invitations to all other Roundtable agencies who want to participate.

Status of Site Characterization Consortium

Jeff Heimerman, U.S. EPA/TIO, told participants that the Consortium for Site Characterization Technologies (CSCT), which has been developing for more than two years, will be operational shortly. EPA's effort to develop the Consortium has been led by its Environmental Monitoring Systems Laboratory (EMSL) in Las Vegas. Eric Koglin and Steve Billets, U.S. EPA/EMSL, participated in the briefing by telephone.

Mr. Heimerman explained that the CSCT concept originated in 1991. EPA had begun to be asked more often to put its imprimatur on various technologies. In addition, there was interest both inside and outside the Agency in increasing the focus on characterization and monitoring technologies since characterization and monitoring account for a sizeable portion of total cleanup costs.

The objectives of the Consortium are to get quicker acceptance by regulators of new technologies; provide a sound scientific basis for evaluating technologies (eliminating vendor bias); provide reliable performance information; support the use of "verified" technologies; pool Federal resources and establish good pathways for verification; and reduce the time it takes to get new technologies into routine use. Under the concept, the Consortium, through its Board of Advisors, will develop and distribute guidance on design protocols and QA/QC procedures; conduct demonstrations and support developer-driven demonstrations using the protocols and other guidance; evaluate and verify

technologies; manage and disseminate information about the verified technologies; and provide technical support to technology users.

In response to a question, Mr. Koglin explained that an interagency agreement is already in process between EPA and DOE's Sandia National Laboratory through which Sandia will orchestrate demonstrations to be conducted using the protocols provided by the Consortium. He said he envisions similar arrangements with other agencies and organizations as the Consortium grows.

Dr. Kovalick indicated that the Consortium's Board of Advisors will include representatives of EPA, the Navy (DoD), DOE, DOI, the Small Business Administration's Small Business Development Centers, Fortune 500 companies, instrument-related professional societies, and the Association of State and Territorial Solid Waste Management Officials (ASTSWMO). Funds for the Consortium's start-up projects will come from EPA's Environmental Technology Initiative (ETI) and DoD's Strategic Environmental Research and Development Program (SERDP).

Mr. Heimerman said the Consortium process will add two important phases to the existing process for demonstration/commercialization: a pre-selection screening to limit acceptance to candidate technologies that meet certain criteria; and a separate verification step between the evaluation and technology transfer phases. He said EMSL has been working with EPA's Regional offices to bring them on board with the concept, so that the verification will mean something to them and will encourage them to use the verified technologies. He said generic demonstration and QA/QC protocols are being developed and will be circulated late in January.

Dr. Marqusee asked if EPA plans to issue a "certificate" to indicate a technology has been verified. Dr. Kovalick said that would be determined by the Board of Advisors but suggested that one option is to produce a document that contains the names of the protocol committee and the results of the evaluation. Mr. Koglin added that an official letter or memorandum could be provided for developer-driven demonstrations indicating that the Consortium checked the data sets provided and verifies that the protocols were met.

Dr. Marqusee also asked who will provide funding to support verification of demonstrations submitted, particularly those submitted by developers or private companies. Mr. Koglin said that in the near term, the ETI and SERDP funding should be sufficient. However, in the future the Consortium may consider establishing a fee-for-service arrangement or consider funding the effort out of the Agency's base funding. Mr. Lindsey suggested that the availability of base funding to support the effort probably will depend on how successful the pilot projects are. Dr. Kovalick suggested that if the Consortium's system for verification meets technology users' needs, they may be willing to pay for the service; the challenge is to build that type of system.

In response to another question, Mr. Koglin said plans at present call for writing generic—universally applicable—guidance and technology-specific guidance for only one or two technology types (such as, possibly, the cone penetrometer). He said future technology-specific guidance will be written based on experience gained through a demonstration. The emphasis will be on working with the developer on the initial demonstration/testing plan, so it can serve as a model for future demonstrations.

In summary, Mr. Heimerman said that the CSCT process is not offering radical approaches, but stresses standardization. EPA will become more involved in verification, and the Consortium will support both developer-driven demonstrations (like EPA's SITE Program) as well as other

demonstration programs. The emphasis will be on support to the regulators and regulated communities through partnerships. The first "Board of Directors" meeting is being scheduled for late January as well and will be held immediately following a meeting of the Remediation Technology Development Forum (RTDF) which focuses on building public-private partnerships to support laboratory and field research on remediation technologies. Mr. Koglin indicated that plans call for five demonstrations to be conducted by the end of calendar year 1995.

The Environmental Security Technology Certification Program (ESTCP)

Dr. Jeff Marqusee, U.S. Department of Defense, said the impetus for the Environmental Security Technology Certification Program (ESTCP) came from the slow pace of remediation projects in DoD. He said the program is designed to demonstrate and validate innovative technologies that address DoD problems and to promote their commercialization. Meeting user needs is the real priority in the program; the goal is to orient demonstrations to provide information the users want.

He said the initial focus of the program will be on DoD technologies that are sufficiently mature to exploit in the near term. ESTCP will pay the full cost of the demonstration and evaluation. Technologies will be demonstrated at real DoD sites at a scale sufficient to get realistic cost and performance data.

FY 95 is the first year of the program. ESTCP operates in two phases. The technology selection phase was a competitive process within DoD and involved submission of written proposals that are being evaluated by a panel that includes DoD and non-DoD participants. Proposals focused on cleanup, compliance and pollution prevention and included technologies for use on unexploded ordinance, bioremediation, technologies to address lead contamination, site characterization technologies, and ground-water treatment technologies.

The second phase involves establishing priorities and making final choices. These final decisions are expected by mid-December. Dr. Marqusee said the program probably will fund six or seven remediation technologies for two-year projects. Overall, the program is funded at \$44.5 million for FY 95.

He said that while the technologies considered for demonstration in the FY 95 program have come strictly from within DoD, plans call for broadening the scope of the program to include DOE-developed technologies since many of DOE's cleanup problems parallel those of DoD. Talks currently are underway about a potential joint DoD-DOE demonstration designed to stimulate further technology development at DOE laboratories and bring these technologies to bear in cleaning up military installations, providing DOE with a larger market for its products and reducing costs to DoD. In the proposed project, DOE would demonstrate its technologies at DoD facilities. Demonstration results would be validated by DoD to ensure they are useful within the DoD establishment. In response to a question, Dr. Marqusee said that a reciprocal arrangement in which DoD-developed technologies would be demonstrated at DOE sites has not been finalized by the two agencies.

Donna Kuroda, U.S. Army Corps of Engineers, asked where demonstrations will be conducted. Dr. Marqusee said sites for the technologies to be selected for the FY 95 program are located throughout the country. He stressed that the program would not rely on one or two central demonstration sites. He said under the ESTCP, DoD will fund scale up of the successfully demonstrated technologies to ensure that in two years they can be implemented to respond to Records of Decision (RODs) at DoD sites.

Interim Status Report: NATO/CCMS Pilot Study

John Kingscott, U.S. EPA/TIO, explained that the Council of the North Atlantic Treaty Organization (NATO) established the Committee on the Challenges of Modern Society (CCMS) in 1969. CCMS was charged with developing meaningful environmental initiatives that complement other international endeavors. A fundamental precept of CCMS involves the transfer of technological and scientific solutions among nations with similar environmental challenges. The U.S. delegation is co-chaired by Dr. Kovalick and Stephen James, U.S. EPA/RREL, and includes Maj. Mark Smith, U.S. Air Force, and Gerald Westerbeck, DOE.

The NATO/CCMS project provides a forum for an exchange of information among representatives of different countries on research and experience focused on remediation technologies through a series of case study presentations. The project concentrates on treatment technologies. While some emerging technologies have been included, most of the case studies involve pilot- or full-scale applications.

During Phase I, which concluded in 1991, 11 countries presented 29 case studies. This information is available in a 3-volume report. One volume is a synopsis of the case studies with some evaluation of the work undertaken. The remaining two volumes provide technical detail to backup the case studies.

Phase II of this 5-year project involves 18 countries, 11 of which are sponsoring case studies. Each country is allowed to have four active case studies; all project participants vote on others to include. The United States serves as the project director, along with Germany and the Netherlands. Mr. Kingscott showed participants tables illustrating the types of technologies included in the NATO/CCMS case studies. (See Attachments 3 and 4.)

Case studies are presented at annual Pilot Project technical conferences. Thus far, there have been three such conferences for Phase II of the program. The initial meeting was in Budapest, Hungary, in October 1992. Another meeting was in Québec City, Canada, in September 1993, and the most recent meeting was in Oxford, United Kingdom, in September 1994. The next meeting will be in Adelaide, Australia, in February 1996.

Mr. Kingscott said the CCMS is interested in seeking participation from non-NATO countries, particularly those in central and east Europe. An interim status report is being prepared to summarize the case studies in Phase II. He said Roundtable members would receive a copy of the report early next year.

Mr. Kingscott encouraged Roundtable members interested in sponsoring a case study to contact U.S. delegation members.

Status of Environmental Technology Initiative FY 95 Project Selection

Fred Lindsey, U.S. EPA/ORD, said EPA and other participating agencies are in the process of selecting projects to be funded by the Environmental Technology Initiative (ETI) in FY 95. ETI, outlined by President Clinton in his 1993 State of the Union Address, is designed to spur the development and use of innovative environmental technologies to protect the environment and enhance the competitiveness of the U.S. environmental technology industry.

Mr. Lindsey said the United States comprises by far the largest single market for environmental technology. Environmental Business International (EBI), an industry analyst, has valued the U.S. market at an estimated \$134 billion in 1992, compared to \$161 billion for the rest of the world. EBI projected that the global market would grow to about \$600 billion by the year 2000. In addition, exports of environmental technologies have a high potential for creating high-wage U.S. jobs. Mr. Lindsey said research shows that every \$1 billion in exports creates 20,000 U.S. jobs.

The ETI was funded at \$36 million in FY 94; \$69 million is available for FY 95. About \$40 million of the FY 95 funding will be used to support environmental technology-related projects that involve partnerships among Federal agencies, States, Native American tribes, and private sector organizations. Project proposals were sought earlier this year in six categories. These include:

Policy Framework, to adapt EPA's policy, regulatory, and compliance framework to promote innovation and delegation to the states;

Innovative Capacity, to strengthen the capacity of technology developers and users to succeed in environmental innovation;

Environmental Technologies, to stimulate development and commercialization of promising new environmental monitoring, control, and remediation technologies;

Pollution Prevention, to invest in promising new pollution prevention technologies and control processes;

Domestic Diffusion and Technology Transfer, and

International Diffusion, to accelerate the transfer of new environmental technologies for use in solving problems at home and abroad.

Mr. Lindsey said that over 1,500 proposals were received. These proposals requested a total of \$1 billion in funding and, significantly, involved the leveraging of another \$1 billion from the project partners themselves. While 179 proposals requested more than \$1 million, about 60 percent sought less than \$500,000. Since there is only about \$40 million available, Mr. Lindsey said the hope is that some projects will be undertaken with the leveraged funds, even if they are not successful in getting ETI funding.

As expected, about 40 percent of the proposals fall into the Environmental Technologies category. Proposals in the Innovative Capacity, Pollution Prevention, and International Diffusion categories each account for 13-14 percent of the total. About 27 percent of the proposals came from within EPA. About 19 percent came from DOE, 16 percent from States, and smaller percentages from the U.S. Department of Commerce (DOC), DOI, DoD, Native American tribes, and other state and Federal agencies.

He said EPA committees for each of the six categories, augmented with representatives of other agencies, currently are in the process of screening proposals. The next step is a peer review and ranking of the project proposals. Final selection of the proposals to be funded will be made by EPA's Innovative Technology Council (ITC) and EPA Deputy Administrator David Gardiner. These selections are expected to be completed sometime in the spring of 1995.

In addition to these awards, between \$17 million and \$20 million of the FY 95 ETI funding will be used to support the Global Climate Action Plan. About \$5 million will be spent to support scale up of successful Small Business Innovative Research (SBIR) Program projects, and another \$5 million will be reserved for a competitive university grants program.

In response to a question, Mr. Lindsey explained that the ETI cannot guarantee outyear funding for multi-year projects. However, groups interested in making such proposals were counseled to indicate what the outyear requirements would be. While there is no guarantee, multi-year projects that are awarded funding for FY 95 probably would be in a better position to obtain funding in the future.

Greg McNelly, Clean Sites, asked if awards of the SBIR and university set-aside funds would focus on the same categories used in the main part of the program. Mr. Lindsey explained that the SBIR set-aside will focus almost exclusively on hardware development because of the nature of the SBIR Program. He said initial plans called for using the same categories for the university set-aside, but, since the amount available is so small, EPA is considering focusing more narrowly.

Briefing on National Research Council Study on Ground-Water Cleanup Alternatives and Proposed Development of Cost and Performance Measures for Cleanup of Ground Water

Jacqueline A. MacDonald, Water Science and Technology Board, National Research Council (NRC), explained that the NRC is part of the National Academy of Sciences which was founded to make the nation's most eminent scientists available to advise the Federal government on technical matters. The Academy created the NRC in 1916 at President Woodrow Wilson's request to broaden the scientific expertise available to the government. About 9,000 scientists and engineers currently participate, on a voluntary basis, in the various committees that carry out NRC studies. Water Science and Technology Board was established in 1982 to respond to an increasing need in the Federal government for policy-oriented studies and advice on water-related issues.

Ms. MacDonald described two NRC studies related to ground-water cleanup. She indicated that background information on both projects had been sent to Roundtable members and associates in advance of the meeting.

The first was a study on the degree to which contaminated ground water can be restored. It has been completed and its report, *Alternatives for Ground Water Cleanup*, was released in June. The study was sponsored by Chevron USA, the Coalition on Superfund, DOE, and EPA. Data from 77 sites were examined in the study. The study found that cleaning up ground water "completely"—to health-based standards—is feasible at a few sites, but a much larger number of sites are not likely to be cleaned up to the same degree.

The study panel recommended that agencies evaluating the technical feasibility of ground water cleanup categorize contaminated sites according to their complexity. Category A would be sites for which use of existing technologies could achieve cleanup to health-based standards; Category B would be sites where use of existing technologies would achieve partial cleanup and new or improved technology on the horizon could provide the additional capability necessary to achieve complete cleanup; and Category C would be sites for which there are no known technology applications capable of achieving cleanup to health-based standards.

The panel recommended that cleanup to health-based standards be required for sites in Category A. They recommended setting temporary or interim cleanup objectives for sites in Category B and

regularly reviewing technological improvements for potential use in achieving complete cleanup over the long-term. For sites in Category C, the panel recommended setting realistic cleanup goals—short of meeting health-based standards. The panel also recommended imposing on Potentially Responsible Parties (PRPs) an annual “infeasibility fee” for sites in categories B and C for which health-based cleanup goals have been deferred or waived. Funds from collection of the fee could be used for research on new technological solutions or for providing PRPs with monetary incentives for trying new technologies.

Ms. MacDonald said copies of the *Alternatives for Ground Water Cleanup* and another NRC study, *In Situ Bioremediation: When Does It Work?*, are available from the National Academy Press. A form for ordering copies is included as Attachment 5 of this summary.

Ms. MacDonald also described a new NRC study to develop protocols for evaluating the cost and performance of new technologies developed to clean up contaminated ground water. This study will involve the participation of EPA, DoD, DOE, and at least one industry group. The study has been designed as a follow-up to the project *Alternatives for Ground Water Cleanup* and will explore how to define “success” short of meeting health-based standards. The study will focus on data needs for technology development, testing protocols, guidelines for administering designated field testing sites for innovative technologies, and guidelines for “certifying” innovative technologies. The final report also will include case studies to illustrate what works. Ms. MacDonald invited Roundtable members to provide input to NRC to help shape the project. Col. Jim Owendoff, U.S. DoD, indicated that part of the study will involve examining existing Federal development, testing, and demonstration efforts related to innovative soil and ground water technologies and encouraged Roundtable members to get information about their ongoing programs to the NRC.

Update on Other Roundtable Projects

Dan Powell, U.S. EPA/TIO, said the Roundtable has published three successive editions of its publications *Synopses of Federal Demonstrations of Innovative Site Remediation Technologies*; *Federal Publications on Alternative and Innovative Treatment Technologies for Corrective Action and Site Remediation*; and *Accessing Federal Data Bases for Contaminated Site Clean-up Technologies*. The third edition of the publications was issued late last year. These publications have been very popular and have served as a means for exchanging information about Federal efforts related to development and promotion of innovative site remediation technologies.

He explained that the new *Remediation Technologies Screening Matrix and Reference Guide, Second Edition*, which will be published as a Roundtable document, captures, updates, and expands the information that appeared in the Roundtable's *Synopses* document. Mr. Powell suggested, however, that the bibliographic references and information on Federal data bases contained in the other two reports should be updated and reissued since they are not available in the same form elsewhere. He said there appears to be a continuing demand for the information.

He indicated that EPA would send copies of the two publications to all Roundtable members and associates in late December or early January and ask everyone to review and update the material relevant to their respective agencies. Dr. Kovalick said the target for issuing the updated publications will be mid-1995.

Guide to Accessing Federal Technology Development Programs/Initiatives

Dr. Kovalick proposed that the Roundtable expand the list of contacts for various technology development- and demonstration-related programs in each agency, included as an appendix in the last version of the *Synopses* document. He called participants' attention to the copy of EPA's *Innovative Hazardous Waste Treatment Technologies: A Developer's Guide To Support Services, Third Edition* included in their meeting packets. He suggested that information, such as included in the *Developer's Guide*, that explains how developers can access and participate in the technology development systems in each agency would be beneficial to the agencies as well as to developers. He said the document would include short descriptions of the agency-specific and interagency programs as well as points of contact for each. He said the final product would be a 4-to-6-page flyer rather than the size of the *Developer's Guide*.

In response to a question, he said this idea had been proposed late in 1992 and while most agencies seemed to support the idea, it never came to fruition. He asked for feedback on whether to pursue it, and most participants indicated they were in favor of preparing such a document. He said EPA would develop an outline and send it to Roundtable members and associates for them to use as a guide in preparing their agencies' input. Preparation would be done during the winter, so that the document could be issued during the spring of 1995.

Update on the Unified Army/SITE/Roundtable Technology Demonstration Document

Frank Freestone, U.S. EPA/RREL, and Ed Engbert, U.S. Army Environmental Center, distributed copies of the final draft of the *Remediation Technologies Screening Matrix and Reference Guide, Second Edition*. Development of the document has been a joint effort of the DoD Environmental Technology Transfer Committee (ETTC) and the Roundtable, and plans call for it to be published as a Roundtable document. The project was designed to combine a number of Federal remediation technology documents into a single, easy-to-use compendium to assist site cleanup managers and supporting contractors in selecting remedial technologies. The document consolidates similar documents published by the Army, Air Force, Navy, DOE, and EPA.

The new compendium has a three-tiered format. Tier 1 will be a screening matrix, similar to the original Air Force/EPA *Remediation Technologies Screening Matrix and Reference Guide*, to direct users to appropriate technology options. Tier 2 is a series of consolidated technology descriptions. The profiles provide a common format for existing information in the *Screening Matrix*, the Roundtable's *Synopses of Federal Demonstrations of Site Remediation Technologies*, EPA's *Superfund Innovative Technology Evaluation (SITE) Program: Technology Profiles*, the Army's *Installation Restoration and Hazardous Waste Control Technologies* handbook, DOE's *Technology Catalogue*, and other sources. Tier 3 consists of references for each technology, such as bulletins, analyses, handbooks, and other articles, to which users can refer for additional information.

Mr. Freestone said the document has been submitted to NTIS. He said various Roundtable agencies have made arrangements to stock bulk quantities of the document for their own distribution.

He pointed out a questionnaire included in the copies distributed. He explained that the survey is designed to obtain feedback on the structure, content, and format of the document and encouraged participants to fill out and return the survey forms. He said the project was completed under budget, and the development group intends to use the left-over funds to produce a version in WordPerfect 6.0 for CD-ROM and a version for Windows. The CD-ROM version is expected to be available, in limited quantities, by the end of the year, he said.

Dr. Kovalick suggested that the development group also may want to consider purchasing a "deck

card” in a professional journal to advertise the availability of the document. “Deck cards” are promotional flyers, usually the size of an index card, that include an order form. Flyers for several products and publications are packaged together and mailed to reader lists by some of the major trade publications. He said this system, which is not very expensive, was used in 1992 to advertise the availability of the three Roundtable publications and proved to be very successful.

Dr. Kovalick also pointed out that EPA/TIO is currently conducting an evaluation of the original Air Force/EPA *Matrix and Reference Guide*. He indicated that results of that evaluation also may be instructive for the development group and said a copy would be forwarded to Mr. Freestone and Mr. Engbert.

Mr. Freestone said that the development group will be focusing over the next few months on the most appropriate “next steps.” For example, he said they are looking closely at the economics of electronic, as opposed to hard copy, availability; they want to make use of the cost and performance data being generated using the Roundtable's new *Interagency Guide*; they would like to explore the feasibility of including information provided by Hazardous Waste Action Coalition (HWAC) members; and they would like to broaden the development working group to include states and, possibly, others. He said the group will prepare options and recommendations for presentation to the Roundtable at the next meeting.

Dr. Kovalick said that he meets with various HWAC committees occasionally and suggested it may be appropriate to arrange a meeting with HWAC to discuss this subject. He said he would pursue that. He also suggested that Mr. Freestone and Mr. Engbert talk with the ASTSWMO and ask the association to provide copies to its members.

Demonstration of CD-ROM Technology for Storage of Reference Materials

Richard Jensen, DuPont Central Research and Development, demonstrated a CD-ROM system the company has developed to store a variety of environmental technology-related information for reference and use by its user stations. Mr. Jensen said CD-ROM can encapsulate entire documents intact and has enormous storage capacity—as much as 50,000 scanned or 500,000 typed pages per disc. The DuPont CD-ROM has the advantage of being able to run on any DOS computer—even old PC models—that can be equipped with a reader. Mr. Jensen said users need no expensive front-end software because it is built into the CD-ROM. CD-ROM also provides seamless text and graphics. The system designed by DuPont uses a “hypertext” feature to organize information in a logical order, providing the ability to move through successively detailed layers of information in any given document stored on the disc.

Mr. Jensen said the DuPont system was developed in Turbo Pascal and only runs in a DOS format. DuPont wrote its own software. He said there may be commercial software packages available that would build a system with approximately the same features, but he is not aware of any. The DuPont software includes an online tutorial and “Help” screens throughout. It is expected to be updated yearly.

He said duplication of the CD-ROM is relatively inexpensive—about \$2,000 for actual creation of the master disc and then \$1.80 per copy. However, to design the software, scan the appropriate material to be included, and create the first version, DuPont invested about 20 percent of Mr. Jensen's time over 2 years, plus about 80 percent of system operator's time. The expense for a system operator will continue as long as the system is in use. In addition, DuPont purchased CD-ROM readers, at

about \$300 per reader, for its 35 user stations.

Mr. Powell (EPA/TIO) asked what QA/QC is done on material after it is scanned for storage on the CD-ROM system. He added that scanners sometimes misread images, particularly numbers, and that this could affect the usability of data and other information in a system such as DuPont's. Mr. Jensen said DuPont does not use Optical Character Recognition (OCR) for scanning documents; they are scanned as images. The readability of the images is a reflection of the quality of the original document. While most documents are scanned at 75 dots per inch for inclusion, documents with a very small type size and older documents in which the images may be faded require scanning at 112 dots per inch.

In response to a question, Mr. Jensen indicated that this system is used for accessing stored information only; information in this system cannot be changed or updated without producing a new disc.

Introduction to NASA Environmental Technology Programs

Maria Bayon, NASA Environmental Management Division (EMD), said NASA has 10 major centers and 11 off-site facilities. The Headquarters EMD works directly with Center environmental offices. NASA's environmental program is still relatively new.

Three NASA sites are currently on the National Priorities List (NPL). In all, NASA has about 360 hazardous waste sites under investigation or remediation; another 180 have yet to be studied. NASA also has 100 Underground Storage Tank (UST) sites requiring remediation. Ms. Bayon said contamination problems at NASA facilities tend to parallel those experienced at other Federal facilities—solvents, petroleum hydrocarbons, PCBs, and some metals.

She said a few of the NASA centers have identified innovative technologies that could be applicable, but use of innovative technologies is still in the early stages since most sites still are being investigated. NASA joined DOE's Lawrence Livermore National Laboratory in a small project at the Kennedy Space Center to study the feasibility of using *in situ* microbial filter technology for contaminant degradation. The results of that project, as well as the publications and other information produced by the Roundtable, have been disseminated to all NASA centers. In addition, NASA's Jet Propulsion Laboratory is working with a university on development of bioremediation applications.

A working group is being established within NASA to facilitate the sharing of environmental information among the centers and to serve as a forum for presentations by other agencies and individuals that could provide information useful to NASA. Ms. Bayon said NASA also submitted an environmental technology-related proposal for funding under the ETI.

Ms. Bayon said that the Environmental Management Division plans to continue expanding its base of information and making it available to the NASA centers. She said the agency is willing to make its sites available for demonstration programs and encouraged Roundtable members to consider including NASA sites in their future demonstration and testing program plans.

In response to a question, Ms. Bayon said that each center has its own contract authority, and procedures for navigating the system at each center vary.

The Tennessee Valley Authority: Environmental Technology Development

Dr. Catherine Shea, Bioremediation Team Leader at TVA's Environmental Research Center, said the Center develops innovative technologies and strategies to reduce or minimize pollution from industrial, municipal, and agricultural activities. She said the Center currently is working on projects that will be useful to other TVA divisions.

Dr. Shea said the Center uses a multi-disciplinary approach in addressing problems. It focuses on bench, pilot, and field applications, not basic research, in the biological, chemical, and physical sciences. The Center's teams offer analytical, preparative, and molecular skills as well as expertise in project management, technical consultation, and experimental design and performance.

The Center, located in Muscle Shoals, Alabama, has a variety of facilities that make it possible to conduct projects in their entirety. These include state-of-the-art laboratories, constructed wetlands, greenhouses, composting facilities, and prototype plants.

Dr. Shea said the Center currently is involved in several projects related to site remediation. One project focuses on bioremediation of PCBs; another is exploring the use of constructed wetlands to treat acid mine drainage. The Center is pilot-testing a bioreactor that efficiently removes about 97 percent of styrene from air emissions and is handling about 30 percent of styrene wastes at a boat production company. A "next generation" sensor to monitor mercury emissions from coal-burning plants for efficient process control is in development. The Center also has been working on bioluminescence as a tool for monitoring solvent degrading activity in a bioreactor. For a small project, the Center staff have constructed a bioreactor with transparent walls and are hoping to monitor the removal of toluene. Dr. Shea said bioluminescence also may be useful in monitoring to predict when bioreactors will fail.

She said the Center is very interested in partnering with other Federal agencies to carry out future projects and encouraged Roundtable members to consider the Center as they plan.

Dr. Kovalick commented that the Center seems to maintain a good relationship with the State of Alabama and has little trouble in obtaining permits when they are required. Dr. Shea agreed and added that the Center enjoys a good relationship with the public in the surrounding communities as well.

Federal Facilities Forum for Restoration Technology

Esther Coleman, U.S. EPA Federal Facilities Restoration and Reuse Office, told Roundtable participants that EPA is establishing a Federal Facility Forum to facilitate the exchange of information and enhance relationships among involved Federal agencies as a means to accelerate the cleanup at Federal facilities. The mission of the new Forum will be to:

Address specific technical and programmatic issues unique to Federal facilities, such as explosives, radioactive wastes, Federal land use, and use of institutional controls;

Resolve cleanup issues at Federal facilities;

Improve communication among Federal facilities;

Promote consistency among the EPA Regions in dealing with Federal facilities;

Restore Federal facilities for beneficial use; and

Develop alternative remediation methods for use at Federal facilities.

EPA already sponsors Forums that focus on engineering, ground water, human health, and ecological risk. Ms. Coleman said Forums provide a mechanism for information sharing, for learning from each other's successes and failures, and for minimizing duplication of effort. In addition, they can facilitate partnerships that improve efforts in technology development, demonstration, and implementation. Routinely, Forum members participate in monthly conference calls and hold semi-annual meetings. In addition, Forums provide ready access to technical experts for the review of relevant issue papers and guidance documents and technical consultation on general or site-specific issues and problems.

Ms. Coleman said the new Federal Facility Forum is seeking staff-level participation from all agencies involved in site cleanup and environmental technology development related to Federal facilities. Roundtable members and associates interested in getting involved in the new Forum can contact EPA's Federal Facility Restoration and Reuse Office at 202/260-9924 for further information.

U.S. Army Corps of Engineers/HWAC Partnering Agreement

Donna Kuroda, U.S. Army Corps of Engineers (USACE), and Tim Daly, Roy F. Weston, Inc., said the USACE and HWAC have formed a partnership to address a number of remediation-related issues. Ms. Kuroda and Mr. Daly, who represents HWAC, co-chair the Innovative Technology Subcommittee under this project.

The Subcommittee was established to develop issues and action items related to promoting the use of innovative technology and present recommendations to the Project Steering Committee for follow-on action by HWAC and USACE. Ms. Kuroda said the Subcommittee focuses on innovative technologies, those for which cost and performance information is incomplete, rather than emerging or accepted technologies. Subcommittee efforts are directed at technology transfer to developers and evaluation of commercial feasibility and marketability.

The Subcommittee began work in March 1994 and has met several times in the intervening months. After identifying 31 issues for potential discussion, the Subcommittee selected six areas for initial consideration:

Incentives for use of innovative technologies;

Data validation;

Technology transfer and education;

Accelerating full-scale demonstrations;

Performance, regulatory, and contracting approaches; and

Coordination of research, development, testing, and evaluation efforts.

In addition, the Subcommittee selected the concept of risk for focused attention. Ms. Kuroda said the concept was a recurring theme in issues discussions, but it was apparent that the term "risk" means different things to different people. She said the Subcommittee decided to develop a risk model that

presents a method for identifying negotiating tools that can be used to expedite site cleanup. She said the idea is to use the model to identify parties who perceive that they bear “risk” associated with a particular project; demonstrate that “risk” is perceived; and identify potential options for distributing the risk involved.

Mr. Daly said the Subcommittee is defining “risk” as the probability that an “event” will occur and that it will cause injury (of a specific type and magnitude) to each affected party. The definition reflects that risk is perceived and perceptions vary. For the model, the term “event” describes the following scenario: “An innovative technology was built and operated by a general contractor as designed by an A/E and scheduled by the regulator and the owner. It substantially failed to meet the cleanup objective.”

The Subcommittee currently is working on completing compilation of a list of potentially affected parties and potential injuries for the “event” scenario. The Subcommittee's intention is to prepare one or more issue papers as the model is developed and circulate them for review and comment within Federal agencies and in industry prior to making final recommendations to the Project Steering Committee.

Wrap-Up

Dr. Kovalick reviewed the “action items” from the meeting:

He asked participants for comments on the 5-year “report card” by the end of December. He indicated that he would send a memo in February to the Roundtable members and key contacts in each agency transmitting the final draft for comment and giving them the opportunity to ride the original print request.

Dr. Kovalick said he would ask the EPA SITE program to convene a meeting to kick off work on adapting the Cost and Performance Guide for demonstration projects. Representatives of the seven major Federal development/demonstration programs would be invited; attendance would be open to anyone else who wanted to attend as well.

Dr. Kovalick said EPA/TIO will set up a conference call, if not a meeting, for agencies involved in generating cost and performance reports to explore the opportunities for getting NTIS involved in dissemination of the materials (hard copy and electronic versions).

He agreed to take the lead in orchestrating an event in late January or early February to announce agreement among the Roundtable agencies on the reporting of cost and performance data. He said he expects EPA (SITE and Superfund), Navy, the Corps, Air Force, and DOE to be ready to participate.

EPA/TIO will send out in the next month copies of the current Roundtable bibliography and data base publications for review and comment by all Roundtable members and key contacts. Dr. Kovalick indicated that he would like to have updated versions published by late Spring or Summer 1995.

Dr. Kovalick said EPA/TIO would provide Roundtable members and key contacts with an outline for a short document that amplifies on the list of contacts that is included as an appendix in the last *Synopses*. Target for publication of the new document would be Spring 1995.

Dr. Kovalick said he would get in touch with HWAC to put together a meeting to discuss HWAC members getting involved in collecting cost and performance information using the Roundtable format and including reports they generate in the next edition of the *Army/SITE/Roundtable Matrix and Reference Guide, Second Edition*.

The meeting adjourned.

ATTACHMENT 1

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