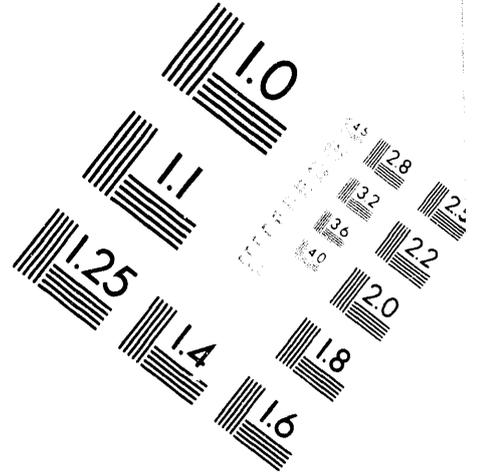
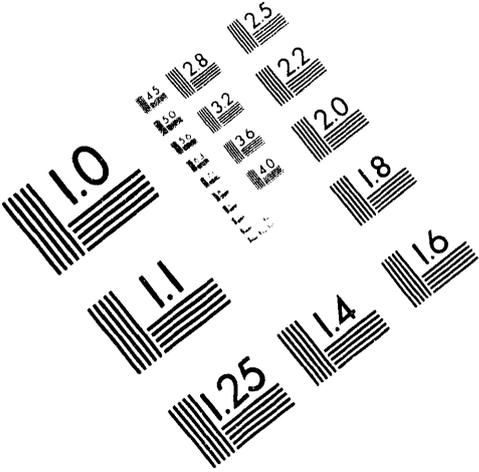




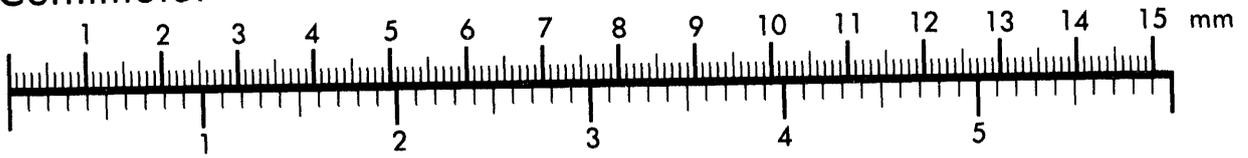
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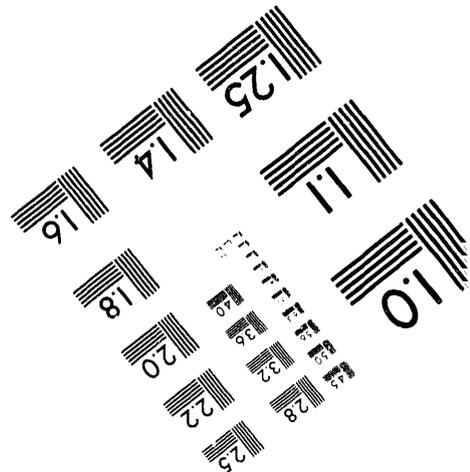
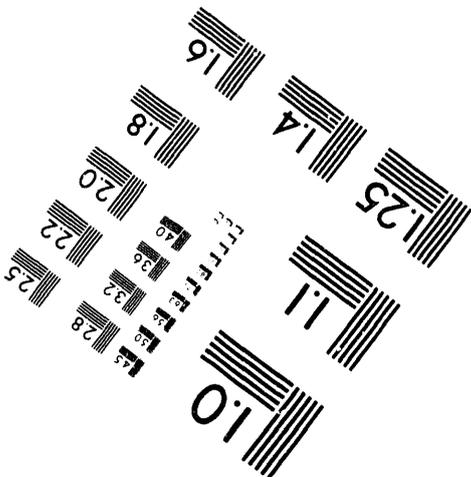
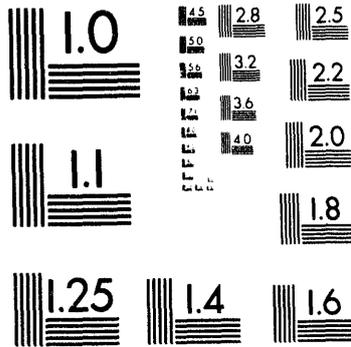
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PUBLIC PARTICIPATION IN THE EVALUATION OF
INNOVATIVE ENVIRONMENTAL CLEANUP TECHNOLOGY

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August 1994

Presented at the
Spectrum '94: International Nuclear and Hazardous
Waste Management Conference
August 14-18, 1994
Atlanta, Georgia

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

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Richland, Washington 99352

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PUBLIC PARTICIPATION IN THE EVALUATION OF INNOVATIVE ENVIRONMENTAL CLEANUP TECHNOLOGY

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ABSTRACT

Technologies for remediation of contamination are urgently needed to clean up U.S. Department of Energy (DOE) sites across the country. DOE is managing a national program to develop, demonstrate, and deploy new technologies with promise to expedite this cleanup. The Integrated Demonstration for Cleanup of Volatile Organic Compounds at Arid Sites (VOC-Arid ID) is one such effort. Time and resources, however, are too limited to be invested in methods of remediation that will never be deployed because they have not been rigorously evaluated or because they face the withering opposition of stakeholders. Therefore the VOC-Arid ID is assessing technology both in terms of its technical effectiveness and its stakeholder acceptability. Only if a technology performs as required and is acceptable to regulators, users of technology, and the public will the VOC-Arid ID recommend its use. What distinguishes public involvement in the VOC-Arid ID is the direct influence stakeholders have on the design of technology demonstrations by working directly with technology developers. Stakeholders participated in defining the criteria with which innovative environmental cleanup technology is being evaluated. The integrated demonstration is committed to providing stakeholders with the information they've indicated they need to reach reasoned judgments about the use of specific cleanup technologies. A guiding principle of the VOC-Arid ID is that stakeholder participation improves the technologies being developed, enhances the acceptance of the technologies, and will lead to the broad and timely deployment of appropriate and effective methods of environmental remediation. The VOC-Arid ID has involved stakeholders from the host demonstration site, Hanford, Washington, and from other arid sites where the ID technologies may be deployed.

INTRODUCTION

The VOC-Arid ID is one of several Department of Energy demonstrations designed to expedite the development and deployment of innovative cleanup technology. Innovative technologies are needed now because of the extent and severity of environmental contamination at DOE sites and because technologies currently in use are, in some cases, incapable of effective, economical, and timely remediation. The intent of the VOC-Arid ID is to devote limited resources to testing and developing only those technologies most likely to be deployed. A technology's performance and its acceptance by regulators, users of technology, and the public determine its ability to be deployed. The ultimate goal of the VOC-Arid ID is the timely, widespread use of effective, accepted technologies at arid DOE sites throughout the western United States.

The Integrated Demonstration's public involvement program is being carried out in three phases. Phase I involved Hanford stakeholders in defining the criteria with which innovative technology is evaluated. Phase I consisted of extensive interviews with individual stakeholders, and workshops to consolidate and refine stakeholders' definitions of evaluation criteria.

Phase II applied these criteria to four technologies comprising a groundwater remediation system that is part of the VOC-Arid ID. Technologies were evaluated through a series of focus group discussions with Hanford regulators, representatives of public interest groups, and technical specialists. A highlight of Phase II was the opportunity, in an integrated workshop, for this broad range of stakeholders to consider each other's concerns and consult directly with the VOC-Arid ID technical staff to further guide the design of the technology demonstrations. The integrated workshop also provided a forum for public involvement and environmental restoration specialists from other DOE arid sites to assess the VOC-Arid ID's approach and to describe their own

public involvement and remediation challenges. An immediate benefit is that if the Hanford demonstrations are able to address the issues and concerns of stakeholders from other arid sites, the VOC-Arid ID's technologies will be able to be tested once and deployed widely. The purpose here is to lessen the need for redemonstration.

Phase III of the public involvement program is focused on involving stakeholders at other arid sites including Rocky Flats, Los Alamos National Laboratory, Sandia National Laboratories, Lawrence Livermore National Laboratory, and the Idaho National Engineering Laboratory. Interviews and regional focus groups will be used to have stakeholders from these other arid sites evaluate two remediation systems (one for soil and one for groundwater) planned for demonstration under the VOC-Arid ID.

APPROACH TO STAKEHOLDER PARTICIPATION

Several attributes distinguish the VOC-Arid ID's approach to stakeholder participation: the degree to which stakeholders are involved in technical evaluation, the responsiveness of the technology development process to stakeholders' contributions, and the extent to which the ID works to meet stakeholders' needs for information, rather than assuming to know what those needs are. The ID understands that each stakeholder group, using data they identify, will decide whether or not a technology is effective and acceptable. The ID works to provide stakeholders with the information they require to make reasoned decisions.

Stakeholders can see concrete results of their involvement at distinct points during the process of technology evaluation. For example, in Phase I stakeholders helped define the criteria by which innovative technology is being evaluated. Developers of the VOC-Arid ID's technologies used these criteria in developing information materials (technology profiles) on the ID technologies, and in designing plans for testing these technologies.

PHASE I: Defining Criteria through Interviews and Workshops

The goal of Phase I was to determine what stakeholders believe to be the characteristics of effective, trustworthy technology. Three hundred individuals who had shown interest in the cleanup of the Hanford Site were invited by mail to participate in a process of public

consultation. In addition to those who responded to the initial solicitation of interest, the VOC-Arid ID public involvement team sought the involvement of other key stakeholders until a group of 40 was selected. These individuals represented the following interests:

- Regulatory agencies
- Federal, state and local governments
- Native American tribes
- Public interest and environmental groups
- Business and labor groups
- Agriculture
- Education
- Commercial developers and users of technology
- DOE site contractors

This group was comprised of stakeholders knowledgeable about the issues, activities, and goals of the Hanford cleanup. In many ways, however, they represented the general public in that their recommendations reflected their personal, value-influenced perspectives on cleanup technologies. The VOC-Arid ID public involvement team conducted interviews with stakeholders at locations convenient to them to determine what was important if they were to judge a given cleanup technology appropriate for use.

The interviews yielded invaluable information that substantially revised an initial set of criteria. These criteria served as the basis for discussion during two workshops in which stakeholders discussed and refined criteria. Figure 1 is a list of the criteria. See "Phase I Involvement for Potential Stakeholders of the VOC-Arid Integrated Demonstration" (December, 1992) for more information on the development of the criteria.

PHASE II: Using Criteria to Evaluate Technologies

Focus Group Discussions

Phase II of the VOC-Arid ID's public involvement process involved applying the criteria stakeholders helped develop in Phase I to a system of groundwater remediation technologies that will be demonstrated in and above an approximately seven-square-mile plume of carbon tetrachloride at Hanford. The VOC-Arid ID's goal is to evaluate, test, and deploy technologies to clean up contamination of this kind at arid sites throughout the western United States. The system of innovative technologies currently being evaluated consists of:

- resonant sonic drilling to gain access to subsurface contamination

- in-well vapor stripping to retrieve contaminated water vapor
- membrane separation to condense contaminated vapor into a contained liquid
- in-situ bioremediation as either an independent method of degrading VOCs in groundwater, or as a means to complete the cleanup of residual contamination following in-well vapor stripping.

Focus group discussions with regulators, representatives of public interest groups, and technologists elicited stakeholders' assessments of the groundwater remediation system technologies. The public involvement team conducted three focus group sessions in which participants evaluated the technologies using the criteria developed in Phase I. Before the meetings, participants received detailed descriptions of the innovative technologies and the "baseline" technology used in the past. Participants described the criteria important to them in terms of the technologies under consideration. They were asked what additional information they would need in order to adequately assess the technologies' readiness and appropriateness to be deployed. Participants' insights, perspectives and questions were recorded so they could influence the design of the technology test plans.

RESULTS AND FINDINGS OF THE FOCUS GROUP DISCUSSIONS

General

The focus group format helped participants with the same roles and responsibilities better understand their similarities and differences before discussing them other individuals. Certain focus groups were interested in discussing how another group would judge a particular technology and were incorrect in their assessment. The stakeholder involvement team had to urge such focus groups to concentrate on their perspectives and allow another group to represent itself. Although certain focus groups thought there would be great differences across focus groups, the issue and concerns raised were generally similar.

Data Requirements Suggested by Stakeholders That Should be Considered for All Technologies

Participants raised a number of issues that, while they may have been inspired by a particular technology, are

usefully considered in the development of any innovative technology.

- Define remediation objectives to ensure that the technology truly contributes to the objectives
- Conduct integrated comparisons of an innovative technology to the technology currently in use
- Design demonstrations to provide data on performance, cost, and time to reduce uncertainty and better define trade-offs
- Demonstrate the technology considering differing site conditions to measure its versatility
- Define the demonstration assumptions and expectations about secondary waste
- Define the risk management strategy and the elements of and process for assessing operational readiness
- Alter the regulatory framework to make it more flexible to encourage the use of innovative technologies where they provide a substantial improvement over existing mechanisms but may fall short of meeting regulatory absolutes (e.g., maximum containment levels in groundwater)
- Involve regulators early and conduct demonstrations in a CERCLA treatability study framework if it will save money and provide data useful beyond the demonstration
- Define how effectiveness of the technology, both in terms of its performance and its effect on the environment, will be monitored
- Use below-ground technologies, efficiencies among above- and below-ground technologies being equal, to reduce exposure to contaminants
- Plan for unintended consequences and define and test all potential failure control mechanisms
- Define the liability implications and insurance requirements for the deployment of the technology
- Demonstrate that future cleanup is not foreclosed by using the technology
- Have a credible third party evaluate demonstration data

Summary

Notes recording the discussions were sent to participants for their review and comment and then summarized in focus group reports. A summary of the range of issues and concerns raised was presented in a Phase II report (Peterson, January, 1994) and used as the basis for the Integrated Workshop.

INTEGRATED WORKSHOP

In February 1994, stakeholders who participated in the focus groups as well as in Phase I were brought together in an integrated workshop. This was an opportunity for stakeholders with a variety of perspectives to work directly with test plan developers. The heart of the workshop was small group discussions between technology developers and a range of different types of stakeholders working together in designing technology demonstrations by means of the test plans. The goal is to design test plans such that the demonstrations provide results that can be used by the stakeholders to evaluate each technology and to decide whether or not they think it is appropriate for deployment. Representatives from other DOE arid sites where the technologies could be used participated to become familiar with the stakeholder involvement process, and to share their perspectives on data requirements for technologies at their sites.

Some of the results from the workshop were:

- Stakeholders were able to learn more about the technologies by working directly with the technology developers
- Technology developers heard first-hand stakeholders' issues and concerns, and discussed them to determine how to better design their demonstration test plans
- Of all the stakeholder groups represented, technology users had the most stringent data requirements for the demonstrations due to liability concerns and wanting to protect their reputation in choosing "winners".

Comments received from stakeholders at the workshop have been used in developing the report "Phase II Stakeholder Participation in Evaluating Innovative Technologies: VOC-Arid Integrated Demonstration, Groundwater Remediation System," April 1994.

PHASE III: Identifying the Issues and Concerns of Other Arid Site Stakeholders.

Phase III of evaluating the acceptability of the VOC-Arid ID technologies is to assess concerns and interests of stakeholders at other arid sites with VOC contamination. The purpose of Phase III is to define any issues or concerns that need to be addressed in the VOC-Arid ID to make a technology broadly deployable. Addressing as many issues as possible in the Hanford demonstration lessens the need to redemonstrate a technology later. In order to achieve this objective, the VOC-Arid ID public involvement team is working with representatives from other arid sites with VOCs to develop a strategy for how best to involve stakeholders at their sites. (See "Strategy for Involving Stakeholders from DOE Arid Sites in the VOC-Arid Integrated Demonstration," June, 1994). Furthermore, this team of arid site stakeholder involvement representatives is identifying a cross section of stakeholders including regulators, technologists, interest group representatives, Native Americans, and local elected officials. Interviews will be conducted at each site with these stakeholders.

The criteria for evaluating technology will be reviewed. Profiles on the groundwater remediation system technologies and two soil remediation approaches using passive vapor extraction will be critiqued by the stakeholders. Following the interviews, regional focus groups will be held: one where regulators from across all sites will be asked to attend, followed by one focused on interest group representatives, and one focused on technologists. The goal is to foster cross-fertilization of ideas, issues, and concerns, and to foster a regional discussion on how to resolve them. Such discussions could support reciprocal permitting objectives.

Following the demonstrations the VOC-Arid ID team will confer with both Hanford stakeholders and those at the other arid sites to assess whether or not the demonstrations have met their needs for information about the technologies and methods of remediation. Finally, the VOC-Arid ID will prepare technology acceptance reports reflecting, among other things, the degree to which stakeholders believe the technologies under consideration are appropriate for deployment.

RESULTS OF THE PUBLIC INVOLVEMENT PROCESS

The public involvement process has yielded the following results:

Improved criteria for evaluating technologies. Involving stakeholders greatly improved the range and precision of criteria for evaluating technologies. The Integrated Demonstration's technical staff learned what is important to stakeholders about proposed cleanup methods.

Commitment by test plan developers to stakeholder involvement. The technical staff of the VOC-Arid ID have a greater understanding of the value of stakeholders' participation and have become committed to involving stakeholders substantively in the evaluation of technology.

Test plans that reflect stakeholders' concerns. The design of technology demonstrations now reflects the concerns of the interested public, regulators and technology users.

Interest in seeing the VOC-Arid ID public involvement process be a model for other DOE public involvement programs. At the conclusion of Phase I, one activist who follows the Hanford cleanup with keen interest and great skepticism asked that a direct message be taken to DOE that this was the type of early and substantive involvement that interest groups mean when they demand involvement in federal facility decision making. Stakeholders have also praised the VOC-Arid ID's public involvement process by recommending its use with other complex and pressing environmental issues and projects.

An effective method of public consultation. Through numerous focus groups, workshops, and interviews, the VOC-Arid ID is developing an effective method of involving regulators, the interested public, and users of technology in the substantive detailed discussion of technical issues.

Peterson, T.S. and G.H. McCabe, January 1994, "Phase II Summary of Focus Groups to Evaluate Stakeholder Acceptance of VOC-Arid Integrated Demonstration Technologies," Prepared for Thomas Brouns, Pacific Northwest Laboratory. Battelle: Seattle, WA.

Peterson, T.S. and G.H. McCabe, April 1994, "Phase II Stakeholder Participation in Evaluating Innovative Technologies: VOC-Arid Integrated Demonstration, Groundwater Remediation System," Prepared for Thomas Brouns, Pacific Northwest Laboratory. Battelle: Seattle, WA - 800/94/013

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