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ASSESSING THE PUBLIC REGULATORY ACCEPTABILITY OF DEPLOYING NEW CLEANUP TECHNOLOGIES: A CASE STUDY OF THE INTEGRATED DEMONSTRATION FOR REMEDIATION OF VOLATILE ORGANIC COMPOUNDS AT ARID SITES

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ABSTRACT

The U.S. Department of Energy (DOE) is funding several integrated demonstrations (IDs) around the United States in an effort to improve the pace and effectiveness of cleaning up its sites. The objective of these IDs is to demonstrate an array of innovative cleanup technologies that address the specific needs at a site and to provide deployable technologies to all DOE sites with similar environmental problems. This approach eliminates the need to redemonstrate these technologies at multiple sites, thereby minimizing technology development cost and schedule requirements. However, for an ID to be truly successful, the technologies must be technically sound, acceptable to the various interested or concerned individuals and groups who feel they have a stake in the case (often referred to as stakeholders), and acceptable to the regulators responsible for approving the technologies' deployment. As a result, the ID for Remediation of Volatile Organic Compounds at Arid Sites (VOC-Arid ID) has instituted a process for assessing public and regulatory acceptability of the technologies that it is developing. As part of this process, an information system has been developed that describes the innovative technologies being supported under the VOC-Arid ID. It also compares innovative technologies with the baseline technologies currently in use by environmental restoration personnel.

A STRATEGY FOR ASSESSING REGULATORY AND PUBLIC ACCEPTABILITY

Three criteria for success must be met before innovative cleanup technologies will be successfully deployed: the technologies must be technically sound, acceptable to the various stakeholders, and acceptable to the regulators responsible for approving their deployment (see Figure 1). Typically, however, much more attention has been given to the first criterion— technology performance—than to public and/or regulatory acceptability. Experience has shown that the lack of attention to public and regulatory acceptability has hampered the acceptance and deployment of innovative technologies. Two examples of this phenomenon are nuclear power and in situ vitrification, an environmental remediation technology. In both cases, technology performance was the major emphasis, with relatively less attention given to regulatory acceptability and even less attention given to public acceptability. As a result, the construction of nuclear power plants has stalled over the past decade and in situ vitrification has not been widely used, particularly in commercial situations. The strategy presented in this paper focuses on the importance of evaluating all three criteria simultaneously to achieve overall acceptance of deploying innovative technologies. Lessons learned from conducting the VOC-Arid ID will be the basis for this strategy.

A first step in building this strategy is to determine the degree to which various stakeholders (e.g., the Yakima Indian Nation and the Hanford Education Action League) want to be involved in assessing these innovative technologies. The VOC-Arid institutional assessment team has reviewed past and ongoing public involvement activities to determine who might want to be involved. Likewise, interested members of the regulatory community are being identified to participate in evaluating the ID technologies.

A three-phased approach is being used to involve interested publics and regulators. In Phase I, interviews will be conducted with individuals representing the various publics

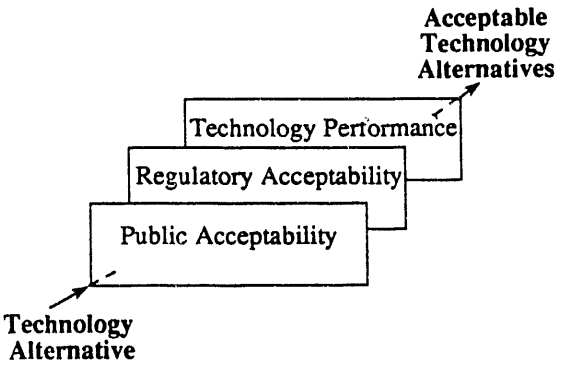

Figure 1 - Technology alternatives must be acceptable to the public and the regulators and be technically sound.

and regulators who have been identified as being interested. In Phase II, focus groups will be organized to evaluate the acceptability of the VOC-Arid ID technologies. Participants of the focus groups will be drawn from individuals who showed an interest in being involved in Phase I and new individuals who were identified during Phase I. Phase III will include interviews and focus groups composed of individuals representing various publics and regulatory agencies from other arid DOE sites that have similar problems—VOCs in soils. Their input is critical if the ID is to be applicable to all arid sites. The VOC-Arid ID team must know how deployable the technologies are at all arid DOE sites in order to decide which technologies to support and how those technologies should be designed to maximize public and regulatory acceptability while maintaining technology performance. Information gained from each phase of the public and regulatory involvement activities will be fed back to the project team, including the principal investigators on projects developing individual technologies, so that technology selection and design can be modified to address public and regulatory concerns. This redesign and modification step is a challenge for principal investigators. They are expected to accept data from evaluating public and regulatory concerns, which may or may not be quantitative, and to place as much importance in these data as in laboratory or field data. The project team and its principal investigators must then modify technology selection and design to address these qualitative issues.

VOC-ARID ID INFORMATION SYSTEM

The VOC-Arid ID institutional assessment team has also developed an information system to describe the innovative technologies being supported under the ID and to compare them with the baseline technologies currently being used in DOE environmental restoration (ER) activities. The system was designed as a communication tool, to be used on a portable computer, for public and regulatory involvement activities (e.g., interviews and focus groups). The system presents a schematic of all the technologies being currently supported under the ID. They are divided into five technology categories; each category is divided into "baseline technologies" and "ID technologies." Figure 2 is the schematic of the five technology categories, and Figure 3 is an example of the baseline and ID technologies that fall under the "retrieval and ex situ treatment" category. When the user of the system chooses an innovative technology, the system will provide a fact sheet and a graphic describing the components of the technology. Furthermore, the user can select any two ID technologies under any category and compare them with the baseline technology for that category. Another screen in the system (see Figure 4) displays the technology evaluation criteria the user can select to compare the technologies. Any two of the criteria can be selected at a time (e.g., cost and time to meet objective), and the system will display how the two ID technologies compare with the baseline technology. The user can scroll through all of the criteria and receive an overview of the technology comparisons. Detailed profiles of each technology are the basis of these comparisons, and the user can display the profile for more detail on a technology if he or she chooses.

By scrolling through the comparisons of these technologies, users can see the advantages and disadvantages of the innovative technologies. Furthermore, they see the uncertainties associated with a technology. Reducing uncertainty is one of the major purposes of the IDs because fewer uncertainties improve predictions of a technology's performance in the deployment stage. Participants in the public and regulatory involvement activities will use this information to decide how acceptable a technology is for eventual full-scale deployment.

The list of technology evaluation criteria shown in Figure 4 is a first step in identifying the issues that are likely to interest the public and regulatory involvement participants. They will be asked to comment on the criteria in each involvement activity so that the list can be modified to reflect their collective interests and concerns. In addition, the institutional assessment team will determine the importance participants give to each criterion that can affect overall acceptability. Different participants are expected to place more emphasis on certain criteria than on others. The emphasized criteria are indicators of public and regulatory acceptability.

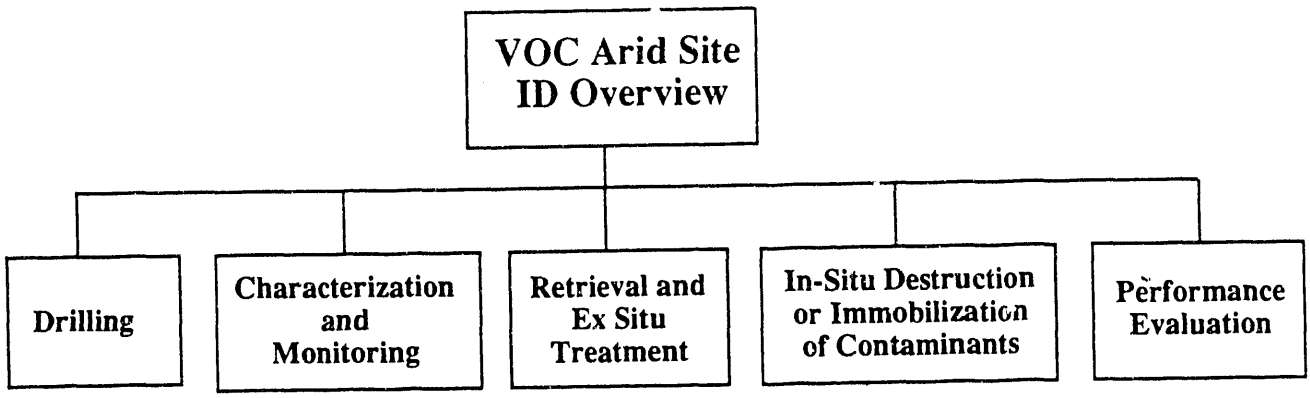

Figure 2 - Schematic of five technology categories used in the information system for the VOC-Arid Integrated Demonstration.

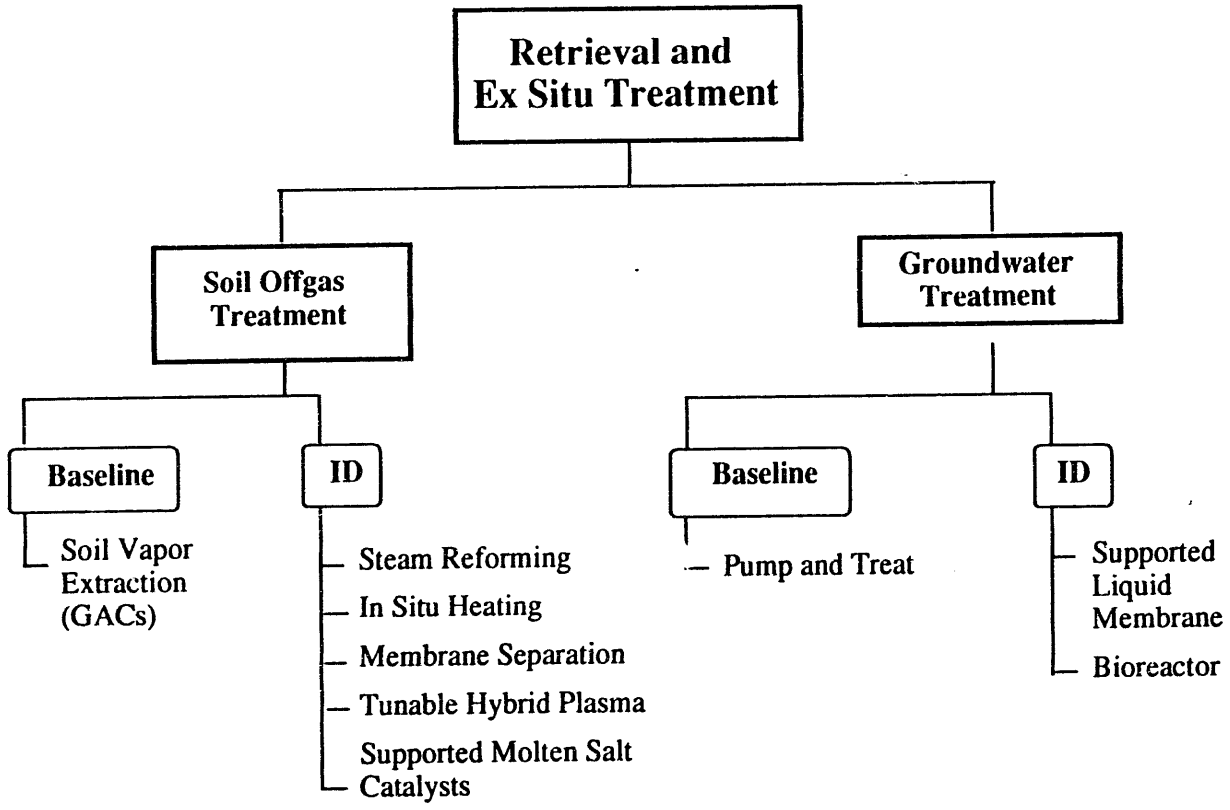

Figure 3 - Example of the baseline and VOC-Arid Integrated Demonstration technologies in the category of retrieval and ex situ treatment

The VOC-Arid ID information system has been found to be more than a communication tool for the public and regulatory involvement participants. In demonstrating it to various audiences, the institutional assessment team has found that it is also helpful to technology developers, technology appliers, and DOE program officials. For example, the system has helped the principal investigators of the VOC-Arid ID understand how their technologies compare with one another and helped them see a more general "systems view" of the ID. Likewise, ER personnel can use the system to better understand how these innovative technologies compare with the technologies they are using today. It allows the system user to compare "apples and apples." The institutional assessment team has also met with developers of ER technology data bases to determine how this information system can feed into their systems. Once an innovative technology as been successfully demonstrated and approved by the regulatory community, it becomes a new baseline technology. Therefore, the link between this technology development information system and ER technology deployment systems is critical.

The institutional assessment team has evaluated the option of expanding the VOC-Arid ID information system to encompass all of the IDs and possibly the DOE Integrated Programs. Such a system would enable DOE Headquarters staff to visualize the range of technologies being supported under the DOE Office of Technology Development, compare the demonstrations of these technologies at the various sites, and compare these innovative technologies with the baseline technologies currently being used. This information would also likely be of interest to the Congressional committees with jurisdiction over ER activities at DOE sites.

The success of the IDs will be measured not by the number of technologies that perform successfully, but by the knowledge gained about these technologies so that they are either ready to be deployed by ER or found to be no longer viable. If a technology fails after being tested and evaluated in an ID, the knowledge gained prevents further investigation of the technologies by ER users, saving time and money. If a technology is technically sound but not acceptable to the public or regulators at the sites where it may be used, it will probably not be deployable. Only by achieving successful technology performance, public acceptability, and regulatory acceptability can the technologies developed in the IDs be transferred to their ultimate users.

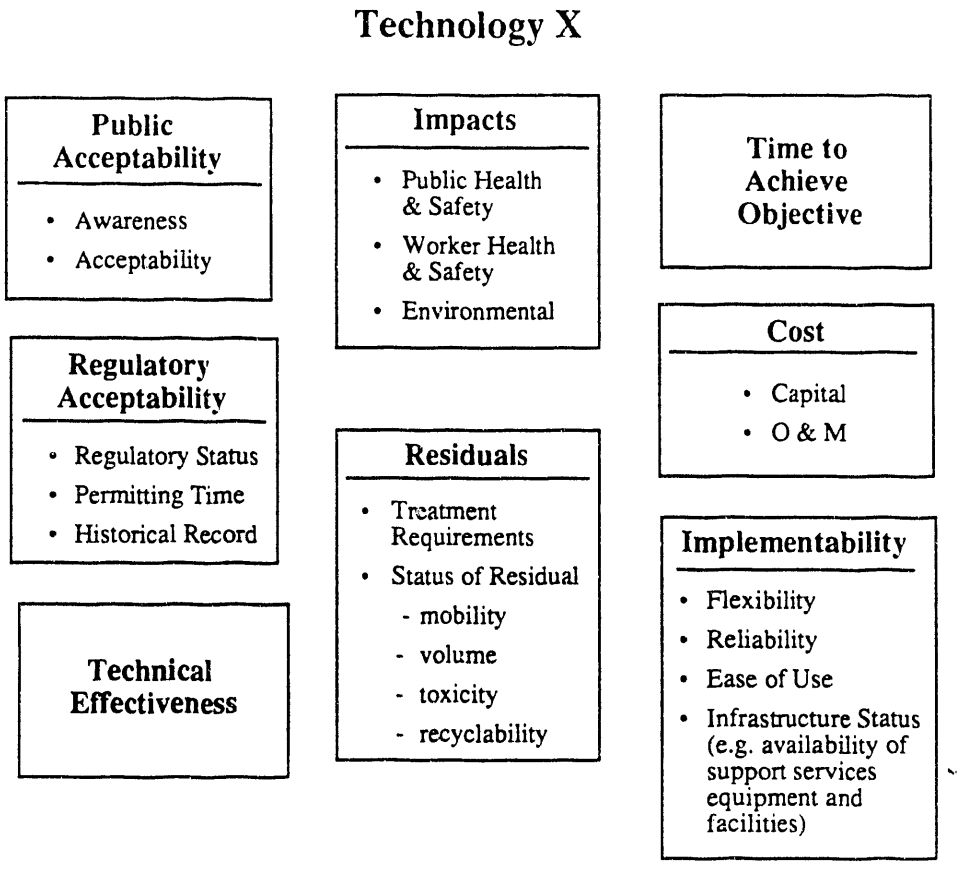

Figure 4 - Technology evaluation criteria in comparison with baseline technology.

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