U.S. Department of Energy/Environmental Management's Office of Groundwater and Soil Remediation Strategy

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ABSTRACT

The vision for the Office of Groundwater and Soil Remediation is to focus and place high visibility on program achievements and broad-based remediation challenges and uncertainties facing the Office of Environmental Management. These include, but are not limited to, the development of contract performance measures; monitoring and controlling the cleanup investments for remediating groundwater and soil; finding and implementing interim and permanent cleanup remedies for technetium-99, strontium-90, chromium, uranium, and trichloroethylene; the development and use of sophisticated groundwater and fate and transport models; presenting the best science and engineering principles and practices for remediating groundwater and soil to environmental regulators and other key stakeholders; and ensuring that all source terms of contamination are fully identified and all sites are appropriately characterized.

INTRODUCTION

The Office of Environmental Management (EM) faces significant challenges in the remediation of contaminated sites across the Department of Energy (DOE) complex. Many of the sites have multiple contaminants and a complex subsurface hydrology. The EM Office of Groundwater and Soil Remediation focuses on addressing broad-based soil and groundwater remediation challenges and uncertainties facing EM.

Develop, Deploy, and Transfer Remediation Technologies

In order for EM to be successful in completing its cleanup mission, it needs to develop, deploy, and transfer innovative technologies that address the challenges of remediating contaminated groundwater and soil at DOE sites. In a recent and notable example, Congress directed the DOE in 2006 to fund $10,000,000 to analyze contaminant migration to the Columbia River from the DOE Hanford Reservation and to introduce new technology approaches to solve contamination migration issues. The Office of Groundwater and Soil Remediation currently has the lead role in carrying out this effort. EM personnel have worked closely with DOE and contractor personnel at Hanford to identify and fund projects that could be deployed to meet the objectives of the congressional appropriation. Technical experts from industry, academia, DOE's Office of Science and the National Laboratories peer reviewed the proposed projects, provided recommendations for improvement of the proposals, and recommended which projects should go forward. Nine projects have been approved by EM and are being deployed at the Hanford site.

These include new approaches to remediate chromium, strontium, uranium, and carbon tetrachloride at Hanford.

The Office of Groundwater and Soil Remediation is also working with other DOE sites to develop, deploy, and transfer innovative technologies. In October 2006, a workshop was held at the DOE Headquarters facility to identify and prioritize EM's technical needs for the next ten years. Sites were given an opportunity to present their technology and technical assistance needs, as well as participate in a group discussion specifically focusing on groundwater and soil issues. The results of the workshop will be included in EM's Technology Roadmap, which is scheduled for submittal to Congress in March 2007.

The Office of Groundwater and Soil Remediation works closely with the Environmental Remediation Sciences Division of the Department's Office of Science (SC) to ensure feedback between the research activities funded by SC and the needs of the EM complex-wide remediation program. The two offices have worked together to solicit, review, and identify research projects from the scientific community to advance the understanding of processes affecting the cleanup, mobility, storage and long term fate of contaminants in the environment. The close working relationship and frequent interactions of these two offices have resulted in numerous applications of basic science to cleanup activities and ongoing input of cleanup needs to the research program.

Monitor and Assess Cleanup Investments

The Office of Groundwater and Soil Remediation uses site visits as important tools in their understanding and management of the groundwater and soil cleanup activities currently underway or planned at the EM sites. These visits focus on the nature and extent of the groundwater and soil contamination, the technologies currently deployed or planned, performance measures/exit strategies that are in place or planned for deployed technologies, and the cost and operational performance of existing remedies. The hands-on exposure and first-hand experience of the site visits have been useful in identifying lessons learned that can be shared with other sites, especially opportunities that exist for optimization and cost savings of currently installed remediation systems.

The Office of Groundwater and Soil Remediation currently maintains a corporate groundwater database on groundwater conditions at Department sites. The database provides a centralized corporate location for information relating to groundwater dynamics, contamination, remediation approaches, and regulatory information for DOE sites. A similar database regarding soil conditions at Department sites is planned for development.

Representatives of the Office of Groundwater and Soil Remediation recently participated in a workshop with representatives of the Department's Offices of Science, Fossil Energy and Civilian Radioactive Waste Management regarding computational science research needs. The charge of the Computational Subsurface Sciences Workshop was to identify computational science research needs and opportunities in the subsurface sciences and related areas, with a focus on developing a next generation of numerical models of subsurface flow and process simulation. A report from the workshop is planned for completion in March 2007. This

workshop builds on research currently funded within the Office of Science's SciDAC program, a component of which seeks to advance scientific discovery through the integration of high performance computing with subsurface contaminant reactive transport modeling.

Create New Technical Performance Measures for Contracts

To ensure that EM procurement actions contain the necessary language and covenants on technical performance measures for remediation projects, the Office of Groundwater and Soil Remediation plans to review existing remediation contracts in coordination with the EM Office of Acquisition and Project Management. Assessments are planned to demonstrate whether performance-based environmental remediation projects are being effectively implemented by achieving expected cost savings and/or performance improvements. In addition, knowledge is obtained from other federal agencies and the private sector in their application of technical performance measures in remediation activities.

Conduct Independent Reviews and Technical Studies

The Office of Groundwater and Soil Remediation has conducted several independent technical reviews of site remediation programs using highly qualified subject matter experts. These reviews have focused on the uncertainties and vulnerabilities of these programs and have resulted in findings and recommendations that have been provided to Federal staff managing the site remediation programs. In addition to performing independent reviews, technical assistance is provided to sites in solving specific groundwater and soil problems.

The office also performs reviews of site cleanup decisions to ensure that a national remediation perspective is maintained. These remedy reviews are conducted before the site formally submits draft proposed plans or equivalent to the regulators. These reviews are intended to ensure that all alternatives have been adequately evaluated, that decisions are technically sound and can be accomplished within anticipated budgets, and that complex-wide impacts and national policy implications are fully considered.

PROGRAM CHALLENGES/UNCERTAINTIES

There are many challenges and uncertainties that must be addressed in the remediation of contaminated groundwater and soil at Department sites. Some of the highest priority issues faced by the Office of Groundwater and Soil Remediation will be finding and implementing interim and permanent cleanup remedies for technetium-99, strontium-90, chromium, uranium, and trichloroethylene; the development, validation and use of sophisticated groundwater and fate and transport models; presenting the best science and engineering principles and practices for remediating groundwater and soil to environmental regulators and other key stakeholders; and ensuring that all source terms of contamination are fully identified, that all sites are appropriately characterized and that contract performance measures drive efficient and effective cleanup.

CONCLUSION

EM Headquarters is taking a very active approach to improve our complex-wide effectiveness in managing and implementing an integrated, well-defined, investment-focused, and results-oriented environmental remediation program. The Office of Groundwater and Soil Remediation is prepared for the challenge and looks forward to carrying out its mission.