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OPPORTUNITIES FOR INDUSTRY PARTICIPATION IN DOE'S ENVIRONMENTAL MANAGEMENT TECHNOLOGY DEVELOPMENT PROGRAM

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The U.S. Department of Energy's (DOE's) Environmental Management (EM) Office of Science and Technology (OST) manages an aggressive national program for research, development, demonstration, testing, and evaluation. This program develops high-payoff technologies to reduce the risk and cost of environmental cleanup efforts at DOE Weapons Complex sites in a market estimated to exceed $200 billion. One of OST's goals is to focus technology development on DOE's major environmental management issues, while involving the best talent in DOE and the public and private science and engineering communities. The Morgantown Energy Technology Center (METC) provides OST with technical management services to maintain a program visible to the private sector that is committed to private sector involvement in developing, demonstrating, and implementing innovative technologies through direct Government contracting mechanisms. In this program, Industry Programs, DOE supports technology development efforts from bench-scale to full-scale demonstration, in a phased approach, to develop validated technology cost and performance data.

METC has managed approximately 85 research, development and demonstration projects on behalf of OST that include those in each of the four major environmental remediation and waste management problem areas. These major problem areas are termed "focus areas" and include – subsurface contaminants, such as radionuclides, heavy metals and dense non-aqueous phase liquids (DNAPL's); decontamination and decommissioning (D&D) of facilities; high-level waste tank remediation; and mixed waste characterization, treatment, and disposal. Since 1991, METC has evaluated over 600 proposals received in response to 7 separate solicitations – 4 Program Research and Development Announcements (PRDA's) and 3 research opportunity announcements (ROA's). Of the projects selected, 39 percent are with large businesses, 12 percent are with educational or non-profit organizations, and 49 percent are with small businesses. Small businesses have received about 55 percent of the total funding ($160 million) allocated.

The Industry Program's projects cover a wide spectrum of technologies, ranging from single components to full remediation systems. These include hand-held, portable monitors for contaminant analyses; field Raman spectroscopy systems; entire remote transportable analytical laboratories; small batch chemical treatments; full-scale (25 ton/day) vitrification systems; robotic manipulators and complete robotic systems; subsurface monitors; alpha, beta, and gamma detectors; and radioactive metal decontamination processes.

The processes used to acquire research and development (R&D) projects are typical of competitive Government contracting methods. Procurements are announced in the "Commerce Business Daily" and are available on the METC Homepage at the following Internet address:

http://www.metc.doe.gov/business/solcita.html

The focus area teams are critical to the R&D acquisition and implementation process. METC relies on their expertise and guidance to identify the problem sets and technology needs, to evaluate the technical merit of proposals, and to assess the progress of R&D activities. Thus, it is important that private sector companies understand the requirements established by the four focus area programs.

All projects within Industry Programs are essentially phased or have optional tasks at specific go/no-go decision points. This allows DOE to make investment decisions at various points in the technology development cycle to ensure that we are meeting the technology development goals and that we are meeting the needs of the customer or end-user of the technology. This decision-making process has been more formalized in a Technology Investment Decision Model summarized in Figure 1. It encourages discontinuing less favorable technologies at early stages of development, so that more money is available for developing technologies that are more likely to succeed.

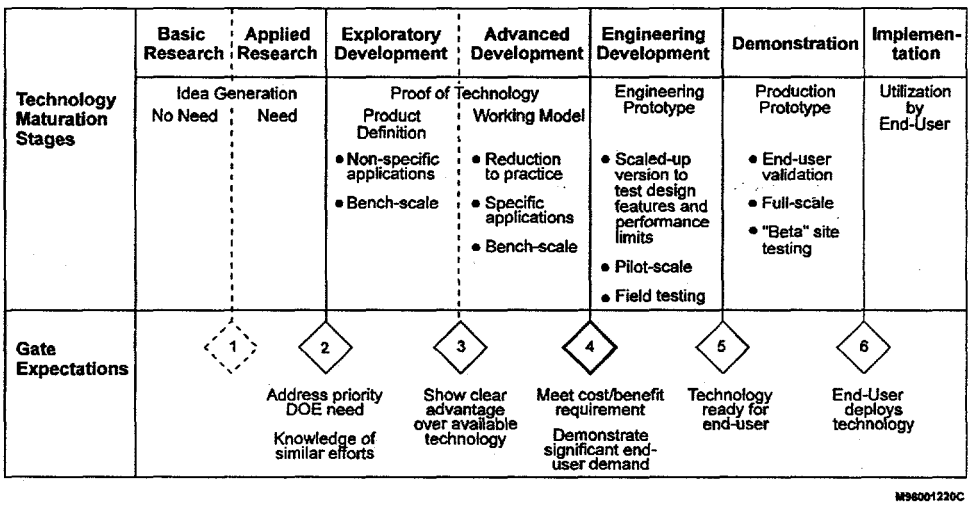

Figure 1. Technology development stages.

As shown in Figure 1, DOE has established specific data expectations at each gate of the technology development cycle that will be used to determine if further R&D is warranted. Researchers should be mindful of data quality and verification requirements as their work progresses. Since the goal of the R&D efforts is field implementation by the end-user at the DOE sites, technology systems must be designed for acceptance. This means that acceptance issues need to be addressed and planned for early in the developmental cycle, such as regulatory compliance, public involvement, worker health and safety, and cost/benefit analysis. The EM organization intends to use a standard Innovative Technology Summary Report or "The Green Book" to validate the acceptability of technology systems prior to field implementation by the end-user.

One also should realize that DOE may use different procurement mechanisms or delineate specific requirements to "purchase" research within the various technology maturation stages shown in Figure 1. For example, ROA request proposals for applied research through engineering development, ending in pilot-scale field tests. PRDA's can be used to acquire projects through full-scale demonstration. Specific limits may be placed on the stage of development DOE is interested in pursuing, because of programmatic or schedule requirements. In the past, too many proposals have not received favorable reviews, because R&D was proposed that was outside what was requested.

METC released a ROA on April 30, 1996, titled, "Applied R&D of Technologies for Environmental Restoration and Waste Management" (DE-RO21-96MC33204). This ROA is open until April 30, 1997. Proposals can be submitted at any time but will be evaluated approximately every 4 months, provided a sufficient number are received. It is expected that $5 million worth of R&D projects will

be selected. Technology needs were established through the focus area teams and include the following:

Subsurface Contamination: (1) Permeable, reactive containment methods for subsurface contaminants, including means to assess the performance of the containment methods; (2) systems to remediate dense non-aqueous phase liquids, using mass removal technologies, in situ destruction methods, and in situ fixation methods; and (3) landfill containment and stabilization technologies.

Mixed Waste Characterization, Treatment, and Disposal: (1) Stabilization of ash from thermal and non-thermal treatment processes, salt from offgas scrubber blowdown and homogeneous solids and mercury contamination in wastes at less than 260 parts per million; (2) specific treatment technologies for mercury amalgamation and cyanide destruction; and (3) materials handling techniques that minimize worker exposure to radiation, including sorting and segregation and solid/liquid separation.

High-Level Waste Tank Remediation: (1) Waste retrieval techniques to improve methods to dislodge and convey waste, robotic end effectors, and process instrumentation; (2) improved waste pretreatment and separation methods to separate low-level radioactive and high-level radioactive wastes; (3) alternative treatment options for low-level wastes to convert them to a solid waste form with improved performance.

Decontamination and Decommissioning: (1) Surface decontamination using improved strippable coatings; (2) volume reduction of uranium wastes from facilities and equipment D&D; (3) improved thermal and non-thermal metals cutting technologies; (4) removal of hazardous and radioactive contamination from inside process piping and duct systems; and (5) removal of tritium from contaminated equipment, structural materials, and spent fuel storage pool water.

Crosscutting Research Areas: (1) Characterization, Monitoring and Sensor Technologies – in situ techniques for high-level waste tanks, methods to assess subsurface barrier performance, continuous emission monitoring of offgas in mixed waste treatment, and field analysis methods for D&D; (2) efficient Separations and Processing – technologies that show substantial improvements over baseline methods in terms of cost, risk, performance, and health and safety concerns, such as reagents for soils, sludge or concrete decontamination, reagents for in situ chemical barriers, and separations techniques that recycle reagents; (3) robotics – requirements are specific to systems that are associated with each focus area.

The preceding is a brief summary of the R&D requirements; the reader should refer to the ROA solicitation and the focus area lead organizations for the specifics.

As a result of outyear planning activities that took place in early 1996, the focus area teams have identified technology needs that DOE believes can be met most expeditiously through direct contracts with private sector companies. Based on METC's understanding of the requirements, it is likely that either PRDA's or requests for proposals would be appropriate to solicit this work that would end in field implementation. Consistent with EM's overall approach in their current 10-year planning efforts, solicitations and resulting contracts should incorporate performance-based specifications or criteria to define the end product or service that EM wants to acquire. Potential opportunities for private sector involvement in the next year include the following technology needs for each focus area:

Subsurface Contamination: Alternative landfill cover designs, horizontal barriers, continuous barriers at radioactively contaminated sites, chemical oxidation methods for in situ destruction of DNAPL's, and in situ destruction of unique sources of contamination.

Mixed Waste Characterization, Treatment, and Disposal: Mercury stabilization, separation, and removal; mercury filtration and improved high-efficiency particulate aerosol filter performance; improved waste for performance; and internal drum pressure determination.

High-Level Waste Tank Remediation: Steel tank corrosion protection, characterization and retrieval processes, enhanced mixing and sampling for sludge feed systems, and leak repair technologies.

Decontamination and Decommissioning (technologies are directed to the needs of the large-scale demonstration projects that form the nucleus of the program): Improved dust and debris removal methods, volume reduction methods that reduce secondary waste, flushing and decontamination for pipes and process equipment, and containment and protective systems to reduce worker exposure.

Each of the four primary focus areas has made significant efforts to identify technology needs that form the basis for external solicitations to the private sector. Much information is available for each focus area via the Internet, and through monthly reports and other published reports. Prospective participants in the OST programs should communicate with the focus area teams, understand the technical requirements, and understand the programmatic emphasis to develop technology cost and performance data throughout the maturation cycle. It should be emphasized that the current Industry Program emphasizes development of technologies that can be deployed to meet site needs rapidly. An indepth understanding of the site needs and requirements is critical to each solicitation proposal and to project success.