

**OFFICE OF DEACTIVATION AND DECOMMISSIONING (D&D) AND
FACILITY ENGINEERING
MULTI-YEAR PROGRAM PLAN
FY 2009 - 2011**

I. INTRODUCTION

In fiscal year (FY) 2007, the U.S. Department of Energy (DOE or Department), Office of Environmental Management (EM), was directed by Congress to prepare a technology roadmap that identifies technology gaps in the Department's cleanup programs and projects, and to develop strategies to address those gaps. The roadmap, developed by EM with input from the national laboratories and the field sites, is documented in *U.S. Department of Energy – Office of Environmental Management Engineering & Technology Roadmap*¹.

The Roadmap defines the Department's intent to reduce the technical risks and uncertainties in its cleanup programs. As evidenced by the successful cleanup of the Fernald, Rocky Flats, Miamisburg, Columbus, Ashtabula, and Mound sites, as well as a number of individual facilities at non-Closure sites, DOE has made great progress in safe disposition of contaminated facilities. However, the unique nature of many remaining surplus facilities will require a strong and responsive research and engineering program. Accordingly, the Office of Deactivation & Decommissioning and Facility Engineering's (EM-23) Multi-Year Program Plan (MYPP) supports the Roadmap's goals and objectives by providing the strategic direction for technology enhancement, development, and demonstrations for FYs 2009 – 2011 that will lead to commercially viable, field deployable solutions for end-user needs.

This MYPP summarizes the strategic initiatives and scope covering the next three years that will improve safety and reduce costs, uncertainties and environmental impacts associated with the deactivation and decommissioning (D&D) of the Department's legacy contaminated facilities. The MYPP includes strategic initiatives aligned with the phases of the facility D&D project cycle that address the key risks, uncertainties, and priority technical needs of the EM-complex wide D&D program:

- Planning and Analysis,
- Characterization,
- Deactivation, Decontamination and Decommissioning/Demolition,
- Closure.

In addition, a crosscutting effort, entitled D&D Toolbox, is included in the MYPP to facilitate the adaptation and integration of the 'best-in-class' technical solutions into the baseline practices of the site D&D operators for site-specific and complex-wide applications. Thus, the MYPP, with its four strategic initiatives and one crosscutting "D&D Toolbox", functions as an interactive system to implement the following mission and vision of the EM D&D program.

¹ Engineering and Technology Roadmap: Reducing Risk and Uncertainty in the EM Program, U.S. Department of Energy, Office of Environmental Management, March 2008

- **Mission: Reduce project technical risk and uncertainty through Technology Development and Deployment thus enabling the implementation of safe, cost-effective, efficient and timely D&D of facilities and their contents planned for environmental cleanup.**
- **Vision: Become the ‘best-in-class’ D&D engineering and technology program through the provision of technical assistance, technology development, and applications engineering support to reduce technical risks and uncertainties to complete the EM mission.**

In addition to its role in D&D, EM-23 is responsible for the Energy Management Program in the Office of Environmental Management. This program has established an Energy Management Program Working Group that has developed aggressive goals and implemented programs designed to reduce the Department’s energy consumption through conservation, alternative fuels and transportation improvements.

EM-23 is also responsible for Facility Engineering and Real Property Asset Management. Efforts continued in FY09 to validate the Facility Information Management System and update the Department’s Ten Year Site Plans.

Although these strategic initiatives are now grounded in plans, budgets and schedules, and flow down tactical approaches, they should be considered flexible with the ability to respond to emerging needs and risks.

II. D&D LIFE-CYCLE COST

D&D is EM’s second highest cost center with an estimated legacy cost of \$20-30 Billion. EM’s current life-cycle scope comprises almost 3500 facilities, including over 1000 nuclear and radioactive buildings². The portfolio includes multiple nuclear production reactors, over 100 test and research reactors, multiple-football field size gaseous diffusion plants, chemical processing plants, fuel and weapons component fabrication facilities, canyons and radionuclide separations facilities, laboratories, hundreds of miles of buried pipelines, and a myriad of other contaminated facilities.

EM typically performs D&D under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as a “non-time-critical” removal action. However, there have been few regulatory compliance agreements at DOE sites that specify D&D activities. Although a significant amount of D&D has been completed for a number of facilities, these successes represent only a small fraction of the facility inventory, with the bulk of EM’s D&D actions scheduled for completion in the 2020 to 2035 timeframe. However, the integration of facility D&D with soil and groundwater clean-up as a part of ‘Area Closure’ or facility modernization actions enhances the need for an accelerated and more cost effective D&D

² Mark Gilbertson, Deputy Assistant Secretary, Office of Engineering and Technology, Office of Environmental Management, Presentation to Waste Management Symposium, Phoenix Arizona, February 2008.

program. Furthermore, delays in the final disposition of contaminated facilities have, and continue to result in deterioration, making a solid case for the acceleration of D&D.

To directly support the completion of D&D projects, this MYPP is aligned and driven by site cleanup priorities and corresponding technical needs at DOE's major cleanup sites: Savannah River (SR); Idaho (ID); Richland Operations Office (RL), Portsmouth and Paducah Project Office (PPPO), and Oak Ridge (OR)—as well as at the smaller closure sites at West Valley (WV) and Brookhaven National Laboratory. Additionally, EM must plan to support the closure of facilities that are not currently in the EM program – a huge influx of large, highly complex and contaminated facilities accepted for transfer starting in the 2010-2012 timeframe, characterized by, but not limited to, the Oak Ridge Integrated Facility Disposition Program (IFDP).

To date, the common D&D approach for most of EM's excess facilities has been to use relatively few new technical approaches or innovative technology insertions, rather relying on “brute force” manual labor and *ad hoc* solutions to emerging challenges. However, empirical evidence suggests that step improvements in technical approaches and innovative technologies can lead to greater enhancements in worker safety while offering improved D&D operational schedules with reduced cost profiles. Additionally, while numerous smaller but highly contaminated facilities have been closed, only a few of the large, highly complex and contaminated facilities (e.g. reactors, separations canyons) have been fully decommissioned to closure. Innovative technologies and strategies to more efficiently, safely, and permanently close these facilities need to be developed, tested, demonstrated and integrated into work practices at the DOE sites. As a benchmark, it is important to consider that a mere 5% cost reduction attributable to innovative/alternate technologies or approaches could result in cost avoidance of over \$1 billion over the life cycle of the D&D program³. Thus, increased, targeted investments in programs and projects that will improve D&D baselines are clearly warranted.

III. MAJOR TECHNICAL RISKS AND UNCERTAINTIES

The Department's D&D program currently contends with a variety of uncertainties that must be addressed:

- End States for numerous facilities are not currently resolved,
- Historical knowledge of operations in many facilities is incomplete,
- Key areas where technologies can be inserted to reduce cost or increase safety are not fully identified.

The need to reduce these uncertainties provided a focus for the FY08-09 EM-23 program in which substantial effort is devoted to better defining overall program requirements, developing alternative pathways to close facilities, methodologies to better characterize facilities, and approaches to identify and prioritize technical initiatives.

³ Determined as result of FY09 EM-23 Prioritization using Cogentus Process (see Section VII and footnote 7).

IV. RATIONALE FOR D&D INVESTMENTS

The D&D engineering and technology investment strategy is linked to EM's mission priorities as reflected in the Site Performance Baselines, corporate performance measures, Performance Management Plans (PMPs), Risk Management Plans and defined end-states. The EM sites have begun to identify technical gaps in their cost and schedule baselines which, if resolved, can offer significant improvements to current baselines. EM-23's independent evaluation of site plans has identified additional gaps and technology needs. Clearly, our challenge is to identify alternate technologies or technical approaches that will serve as "forcing functions" or "transformational advancements", impacting the baseline schedules or having significant potential for changing the dynamics of site D&D approaches. The proposed program is established to leverage other funds as much as possible among DOE sites, other DOE Offices, Directed Institutions and other Federal Agencies.

The purpose of this MYPP is to provide a vision and logical case for DOE investments in technology development, demonstration, and deployment; technical assistance; and applied research/applications engineering focusing on four major goals with the ultimate objective of working 'smarter':

- Enhancing worker, public and environmental safety,
- Reducing risks and uncertainties,
- Reducing costs and schedules,
- Providing early awareness of alternate technologies and practices.

V. STRATEGIC APPROACH AND PROGRAM DEVELOPMENT

The development of an effective program to positively impact the cost, schedule and safety baseline of the D&D program is an exceptionally complex task because of the number of facilities, their varied operational histories, and their current state of contamination and structural integrity. EM-23 has implemented a multi-pronged approach, utilizing a wide variety of resources both internal and external to the Office. Primary among the tasks is definition of the scope and scale of the D&D challenge in terms of the number and condition of facilities, and identifying those technical and technology gaps that inhibit effective action or represent significant opportunities to improve upon an existing baseline.

Primary among the resources utilized are periodic reviews by the National Academy of Science/National Research Council which conducted a study of research opportunities for EM in 2001⁴ and a workshop on technology needs in 2007⁵. A third assessment⁶ has been completed evaluating the overall status of technology needs and implementation in the EM program. The results of these assessments, evaluations of technology needs and gaps conducted by the DOE

⁴ Research Opportunities for Deactivation and Decommissioning Department of Energy Facilities, National Research Council, 2001

⁵ Science and Technology Needs for DOE Site Cleanup: Workshop Summary, National Research Council, The National Academies Press, 2007

⁶ Advice on the Department of Energy's Cleanup Technology Roadmap: Gaps and Bridges. National Research Council, February 2009.

operations sites, and workshops conducted by EM and their contractors have identified multiple opportunities and needs for technology development and insertion into the program.

EM-23 has progressively refined its strategy for evaluating these needs to address individual technology gaps, as well as programmatic needs to provide both near and long-term benefits using the limited funds that have been available. Using the Cogentus Framework⁷ (See Section VII), EM-23 conducted a rigorous prioritization process to identify investment opportunities based on needs identified by the DOE sites. In future years, the program will include a greater emphasis on identifying partnering and leveraging opportunities with other federal agencies, universities, the private sector and the international community.

Increasing Programmatic and Technical Understanding

EM-23 takes a corporate, holistic and strategic approach to reduce the technical risk and uncertainty of EM programs and projects. In order to set a foundation upon which to build in the future, significant effort has been allocated to understand the magnitude, technical complexity and life-cycle cost of current and proposed D&D activities across the Complex as well as the inter- and intra- site dependencies. Activities are also being undertaken which identify and advance alternative technologies, technical assistance, and lessons learned and best practices, combined with multi-disciplinary services of engineering consultation, guidance, expertise, and policy development. Our overarching goal is to improve planning, engineering/design, and execution of DOE's D&D projects.

Technology Research, Development and Deployment

Alternative technologies must be validated and delivered in a timely manner for implementation during the life-cycle of a site cleanup schedule. In addition, the technology must stand on its own merits, be safe, cost effective, and offer significant advantages over conventional approaches without introducing unacceptable technical risk. The program therefore focuses on evaluating, and facilitating the development, integration and deployment of new technologies and approaches to meet current and future D&D requirements.

The development, implementation, and execution of EM's investments in applied research are accomplished through partnerships between the EM Program, other DOE program offices, universities, National Laboratories and private industry. While the proposed program will devote effort to technology development and demonstration to address short and medium term issues, there is also a need to tackle longer term technology requirements through an Applied Research program. Critical core competency remains at several major laboratories closely associated with larger EM sites and it is essential that this capability be effectively utilized.

Technical Assistance

EM-23 provides technical assistance to sites to reduce the technical uncertainty and risk in facility D&D projects. It provides rapid response to address current technical problems impeding site cleanup that will result in significant cost savings or have a major improvement to the waste disposition pathway. Most importantly, a key component of this assistance is providing

⁷ Prioritization of Projects within the Office of Decommissioning and Deactivation and Facility Engineering (EM-23), Final Report, NuVision Engineering, November 2008.

engineering and scientific expertise for External Technical Reviews (ETRs) to address difficult technical problems.

Engineering and Technology Integration

The 2001 National Research Council report³ identified four broad areas of research where technologies could make significant contributions to solving D&D problems, decreasing lifecycle costs, and improving safety performance, including: 1) Characterization of contaminated materials; 2) Decontamination of equipment and facilities; 3) Remote intelligent systems; and 4) End state definition for facility D&D.

Building upon these broad areas, an EM Technical Integration Workshop in October 2006 identified and prioritized EM's technical needs for the next ten years. Participants included EM Headquarters and field sites (both federal and contractor staff), other DOE programs, National Laboratories, the National Academies of Science (NAS), the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), among others. The results of this workshop are reflected in EM's Technology Roadmap.

As a point of reference, the four broad areas addressed by the 2001 NAS report, were reconfirmed in the 2009 NAS report. This report summarizes the D&D challenges as:

- Remote and robotic technologies that mitigate the current hands-on/manual labor approaches for characterization, equipment removal, and dismantlement,
- Improved decontamination technologies that are based on R&D leading to fundamental understanding of the physicochemical interactions between contaminants and building materials, and
- Improved personal protective equipment (PPE) designed for elevated temperatures and longer stay-times in contaminated environments.

These findings and recommendations are largely consistent with EM-23's 2009 projects, and are further being taken into considerations and input to ongoing EM-23 priority development and project selection for 2010 and beyond.

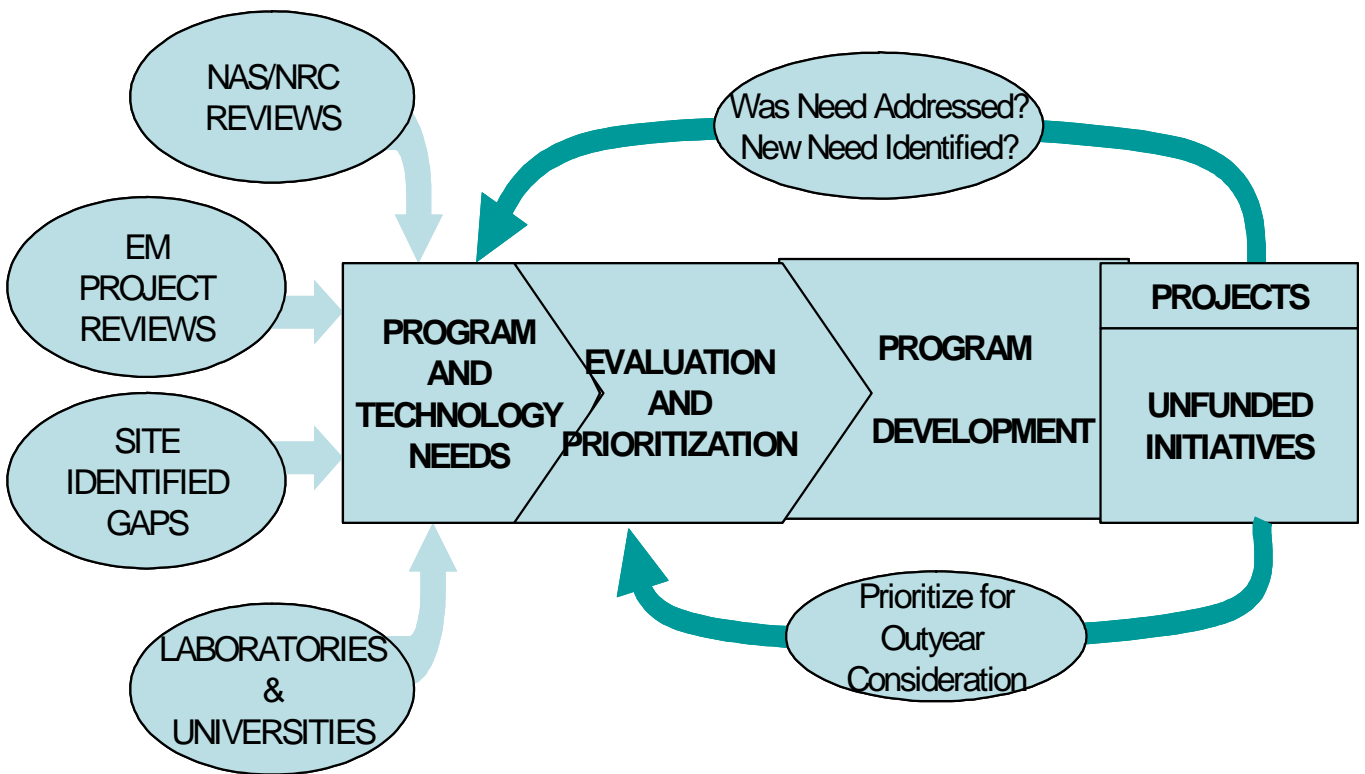
Technical Oversight and Review

The D&D Program Staff conducts periodic reviews to monitor progress toward meeting strategic goals and objectives. Additionally, the staff uses external reviews such as those by the National Academies and Corporate Review Boards, as well as more limited reviews of individual projects and issues. The purpose of these internal and external reviews is to secure knowledgeable counsel on the attributes of ongoing or proposed activities at levels ranging from programmatic direction to individual projects, thereby ensuring that programmatic needs are met in an efficient and timely manner.

Technology Program Development

The following figure depicts the process that is utilized to manage the technology development and deployment program in EM-23. A key aspect of this strategy is the continuing review and

input into the program from multiple and independent sources which serve to routinely identify emerging issues and re-define the priorities for the program as it addresses progressively greater technical challenges. Periodic reviews and prioritization exercises are conducted to evaluate this input and ensure that the program being implemented addresses the highest near-term needs, while identifying longer term needs for strategic R&D investment. This process ensures that limited resources are applied strategically to achieve the greatest benefit. The realization that identified needs are currently greater than the resources available is addressed through annual re-evaluation of issues identified during earlier reviews that could not be addressed.



VI. FY08 STRATEGIC INITIATIVES

Working with the field office point of contacts, in 2008 EM-23 reviewed the identified D&D needs and prioritized projects for initiation based on the anticipated program budget. Accomplishments in 2008 are summarized below. Funding restrictions precluded the initiation of all the planned activities and these were considered for funding in FY09 and beyond. A key feature of the final FY08 program was the emphasis on developing a better definition of the programmatic and technical challenges that the program must address over the next decade. This strategy was designed to provide an improved focus on, and definition of, out-year needs, thus

reducing programmatic uncertainty and identifying issues that could result in reduced technical and safety risk.

The following activities were initiated during FY08:

Planning and Analysis

- Performed evaluations of over 300 excess facilities at 11 sites leading to a significant improvement in defining the future scope and needs for the EM-23 program.
- Conducted External Technical Review of Oak Ridge IFDP with expert panel to ensure identification of issues at early stage of project development.
- Developed draft Guidance for the graded development of engineering/design specifications including technologies, as required by the Critical Decision process and provided direction for the early incorporation of technology into projects leading to reduction in project risk and uncertainty.
- Conducted assessment for the use of Process Knowledge for D&D planning at multiple DOE sites, and commercial nuclear industry leading to development of recommendations on key elements of facility knowledge that should be captured prior to initiation of D&D leading to reduced uncertainty in planning.
- Developed a Multi-Criteria Decision Model to identify the appropriate interim condition a facility should be maintained in and help prioritize surveillance and maintenance activities needed to avoid costly unanticipated conditions during D&D. Application of the model will reduce uncertainties in the cost, schedule and safety while minimizing facility deterioration between deactivation and decommissioning.
- Initiated development of D&D Knowledge Management system to provide central resource for information on processes and technologies; will lead to reduced time and more consistent results in technology implementation.
- Established a D&D Work Group within the Energy Facilities Contractors Group (EFCOG) to build on technical exchange opportunities and collaboration between the leading D&D companies.

Characterization

- Conducted robotic deployment of high resolution laser imaging system for structural characterization of facilities that are structurally deteriorated or contaminated resulting in reduced worker risk while attaining high quality structural information for planning
- Reviewed, evaluated and consolidated practices at DOE's former Rocky Flats Environmental Technology Site regarding beryllium monitoring (characterization), handling and health and safety controls. Subsequent evaluations will be accomplished to determine whether the practices are still current and valuable for distribution and consideration at other sites.

Deactivation, Decontamination and Decommissioning/Demolition

- Conducted review of available fixatives addressing known performance, effectiveness for specific contaminants and other key criteria, thus providing core reference to expedite selection of appropriate fixatives for specific problems
- Conducted test of multiple fixatives for stabilization of PCBs and lead on corroded exterior metal surfaces leading to immediate reduction of contaminant migration and initiating a test of long term performance of material in weathering environment

- Conducted a technical workshop to evaluate issues associated with the decommissioning of the Experimental Breeder Reactor II tank systems at the Idaho National Laboratory. Identified a technical solution to dramatically reduce liquid waste generation, cleanup schedules and costs over the baseline project estimates.

Closure

- Conducted workshop to assess current practices and experience with In Situ Decommissioning (entombment) around the complex leading to identification of technical and regulatory issues that must be addressed to fully implement this closure strategy; workshop led to the initiation of DOE-HQ guidance document in FY08 and planning for technology needs workshop to be held in FY09.
- Sponsored a review of independent verification of radiological closure surveys. The review identified lessons learned, good practices and areas for improvement that could improve the conduct of Final Status Surveys for site and facility closure, and increase confidence in achieving long term cleanup goals.

VII. FY09 STRATEGIC INITIATIVES

In FY08, EM-23 commissioned a team composed of DOE-HQ, DOE Site, Site Contractors, National Laboratory and University personnel to identify programmatic needs, develop initial project descriptions, develop evaluation criteria and perform the project screening using a systematic and traceable process (Cogentus Framework). This effort identified 60 individual needs based on previous evaluations, current project experience and anticipated D&D issues⁷. The results were further processed to identify those core initiatives that should be funded under a variety of funding scenarios and an ‘order of buy’ that provides a basis for program optimization. Individual issues/tasks were further structured into larger scale initiatives of high importance to the overall program, but contained the flexibility to rapidly scale up if additional funding were available.

Of the 60 initial needs, five broad program areas were identified which represent higher level programmatic issues, but each of which is designed to address multiple individual technology needs at multiple DOE sites and specific D&D projects. These areas are as follows:

Characterization, Material Handling and D&D of Highly Contaminated-Restricted Entry Facilities and Spaces including Hot Cells

Among the greatest challenges for the EM-23 program is the identification, development and timely deployment of technologies for characterization, material handling and D&D of highly contaminated, restricted entry facilities and spaces, and especially for those containing large, excess equipment of unknown origin or characteristics. In order to preclude very conservative assumptions leading to increased costs and schedules, these facilities and spaces must be characterized even (and especially) when radiation levels preclude all but short term exposure to workers. These conditions require remote robotic platforms to adequately characterize the levels and types of radiological conditions, chemical contaminants, as well as remotely establish physical conditions and special layout of equipment. Innovative and alternate technologies related to these needs will be evaluated to reduce technical risks and baseline costs and schedules. A special case representing these conditions are hot cells that occur at multiple locations throughout the DOE complex and present multiple challenges for D&D, including the

spread of contamination during D&D and potential worker exposure to high radiation levels. Successful D&D of hot cells will necessitate integrated planning for the use of remote and/or robotically deployed tools and equipment; use and disposal of decontamination materials, safe entry and exit of equipment and materials from cells; reliable assay of waste exiting hot cells prior to disposition and other challenges.

Pu-238 Contamination Control/Decontamination

DOE produced and packaged Pu-238 for use in the NASA deep space program. The unique nature of the material and the processing methodology resulted in significant contamination for the facilities involved, and unique challenges for workers performing D&D on those facilities. Contamination control was a unique and difficult challenge during production and will be even more so during D&D. Successful D&D of these facilities is focused on maximizing worker safety and will require the use of remote/robotic decontamination tools and decontamination agents that are appropriate to the unique behavior and characteristics of the isotope. Cost effective waste disposal will require the development of unique NDA strategies.

Fixatives

Effective fixation of contamination is critical for conducting D&D operations to prevent worker uptake and spread of contamination. The wide variety of contaminants and contamination surfaces encountered in the DOE D&D program necessitates a systematic focus on validating the suitability of existing fixatives for the particular combinations of contaminants and surfaces, and potentially the development of new fixatives. Products of this work will have applicability throughout the DOE complex for all D&D actions, as well as other federal agencies and the commercial nuclear industry.

Non-Destructive Assay (NDA)

Characterization of piping and tank systems having residual contamination requires the use of NDA techniques whereby determination of the types and quantities of residual radioactivity are determined without penetrating the piping. Such methodologies commonly have very high safety factors (i.e. confidence intervals) leading to excessive conservatism in developing demolition and waste disposal strategies. Developing approaches to reduce the conservatism in these estimates can result in significant cost savings for projects requiring these approaches.

In Situ Decommissioning (ISD)

ISD is the preferred strategy for closure of a select set of large, hardened facilities (estimated at about 100) in the DOE complex. Effective implementation of this strategy requires the resolution of regulatory, policy and multiple unique technical challenges. EM-23 has sponsored workshops to identify experiences in this area and challenges that must be resolved as more candidate facilities approach closure. Work has already been initiated to address policy issues and a technology needs assessment is currently in development.

While lead sites have been identified for each programmatic area, substantial leveraging among projects and sites is planned that will facilitate technology transfer among the operating organizations as technologies and approaches are developed, tested and validated. Additionally, the structure of the resulting needs prioritization can support an efficient and strategic expansion of the program should additional funding become available because an ‘order of buy’ for technologies has already been developed.

D&D Toolbox

The D&D Toolbox initiative utilizes an integrated systems approach, involving multiple organizations, to develop an innovative suite of D&D technologies that can readily be applied across the DOE Complex to reduce technical risks, improve safety and limit uncertainty within D&D projects. Facilities at ORNL and other locations are used to test a wide range of technologies that will reduce technical risk for the Oak Ridge Integrated Facilities Disposition Project. Once validated, these technologies will be applicable at other sites in the DOE Complex. Ongoing and new technology demonstrations will focus on:

- Stabilization of contaminants on weathered and weathering surfaces,
- Robotic and remote systems for characterizing and monitoring hazardous structures,
- Robotic systems for application of fixatives in highly contaminated spaces (e.g. hot cells)
- Strippable coatings for removal of contaminants, and
- Trenchless technology for remediating contaminated underground piping.

The results of these technology demonstrations are documented and made available to potential users throughout the DOE Complex.

VIII. LEVERAGING

To obtain the maximum benefit from invested resources, the EM-23 will transfer applicable technologies, technical approaches, and related information from other federal, state, and private sectors. The DOE, DOD, and Corps of Engineers, in particular, have dealt with similar cleanup problems as those faced by the D&D program. Thus EM-23 will investigate and transfer applicable technologies to perform Department work. Likewise, successful D&D technologies and processes used in this program will be made available for use by others, thus creating an export/import concept with other government and private agencies. By sharing both ways, synergistic benefits and maximum advantage can be obtained from available resources.

Since 2007, EM-23 has represented the United States in the International Atomic Energy Agency’s International Decommissioning Network (IAEA-IDN). The goal of the IAEA-IDN is to facilitate the flow of decommissioning information/lessons learned from member countries with more advanced experience and knowledge to members with less experience and knowledge. Within the framework of ‘facilitating the flow of information’, efforts can range from exchange of data, to providing training and technical visits including hosting or making available experienced personnel.

With the IAEA-IDN’s objectives closely paralleling those of EM’s, but on a global-international scale, EM has assisted IDN with their program development, identification of technical gaps and needs, and has made available to the IAEA-IDN a series of training videos developed in 1995 as the Decommissioning Training Series. Working in coordination with Argonne National Laboratory, IAEA plans to update sections of this series to reflect both current technologies and

the international nature of country specific policies and issues. Additionally, EM-23 has made available to IAEA-IDN information and lessons learned published by DOE's Hanford ALARA Center, and access to EM-23's new Knowledge Center. Given that the identified global-international D&D technology gaps and needs are largely synergistic with DOE/EM's needs, participation in planned developmental and demonstration efforts by IAEA-IDN should serve as significant benefits to the EM D&D program.

EM-23 has also initiated significant leveraging of industry resources. Recognizing the potential associated with a technology being developed through a DOE Grant to Cellular Bioengineering, Inc., EM-23 assumed management of the grant and focused on maturation of the Decon Gel strippable coatings technology for removal of contaminants from surfaces, while minimizing waste volume. This technology has been tested and deployed at multiple DOE sites and research continues into additional applications.

IX ENERGY MANAGEMENT PROGRAM

DOE Order 430.2B, "Departmental Energy, Renewable Energy, and Transportation Management", Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management", and the federal Energy Policy Act of 2005 (Public Law 109-58) requires federal agencies to outline the programmatic strategies for managing and implementing various energy, environmental, and transportation management within each agency. DOE promulgated the Transformational Energy Action Management (TEAM) Initiatives in August 2007 to promote the best available energy management technologies and practices to its complex across the nation. To ensure that EM meets, exceeds and leads in the implementation of these goals, in December 2008, EM-23 submitted an Executable Plan that reflects progress made and strategies in place for accomplishing all TEAM goals.

EM's Energy Management Program Working Group (EMPWG) collectively worked to establish EM's TEAM Status Report and Executable Plan. The Plan outlines what EM intends to do at each of the sites to meet the following TEAM goals. The five most critical of the EMPWG's eight goals follow:

➤ ***Energy Intensity Reduction—30% by FY 2015***

EM plans to achieve 40% energy intensity reduction by FY2015. This energy intensity reduction is due largely to the Savannah River Site (SRS) energy efficient biomass cogeneration project and the recently approved Hanford ESPC project initiative.

➤ ***Renewable Energy (RE)—10% by FY 2010***

EM has exceeded this goal with a current renewable energy generation/use measured at **14.1%** (of RE from electrical megawatt) and **77.4%** (of RE from thermal pounds per year). Because the EM Program exceeds this goal there is no additional plan to implement future renewable projects until deemed necessary.

➤ ***Water Conservation—15% by FY2015***

EM's plan, which includes Deactivation and Decommissioning (D&D) activities at EM's Idaho Cleanup Project (ICP) and East Tennessee Technology Park (ETTP), meets the current **30%** reduction of water consumption by FY2015. EM plans to modify the current plan in collaboration

with experts from the Federal Energy Management Program (FEMP). FEMP will provide technical assistance to EM on developing a comprehensive water management plan that can be implemented across EM sites – if found cost effective and aligns with our current program mission.

➤ ***Transportation / Fleet Management***

EM is confident that it will meet and exceed the department goals to reduce petroleum consumption by 2% annually; increase total non-petroleum based fuel consumption by 10% annually, and increase the use/acquisition of alternative fuel vehicles. These goals will be met by continuing to obtain alternative fuel vehicles and use alternative fuels made available by GSA and vehicle manufacturers. EM's mission of safely transporting hazardous material is impacted by this transportation goal due to availability (and manufacturing) of the type of transportation vehicles used by EM sites. In addition, many EM sites are isolated, where infrastructure is not in place to utilize alternative fuels. Sites have posed these challenges for meeting the fleet reduction goals in their individual site goals.

➤ ***Sustainability***

EM has performed a preliminary building assessment on 17% of its applicable (existing building) footprint using the sustainment assessment tool (results shown in table below). Even though there is a sustainability requirement, EM needs to further evaluate and prioritize activities for cost effectiveness to achieve 100% of the GPs. EM meets the guidance in the HPSB Implementation Guidance issued in July 2008 by performing assessments on 15% of its footprint. EM did not identify any new construction facilities at Critical Decision 1 (CD1 or less) to be included in the assessment.

X. FACILITY ENGINEERING AND REAL PROPERTY ASSET MANAGEMENT

As steward of its facilities and infrastructure (F&I), the EM Program has made important progress in improving real property management. Unlike the other DOE programs, such as the National Nuclear Security Agency and Office of Science, the primary mission of EM is to cleanup and demolish or transfer assets; therefore EM assets are generally not maintained for indefinite operations. Much of DOE's direction and guidance is intended to maintain sustained operations, therefore extensive tailoring is needed to provide adequate guidance for cleanup projects.

- Facilities that are shutdown, or planned for near term shutdown in the FY2015 timeframe, are not required to be maintained for sustainability. Such facilities are the focus of deactivation and demolition as a final step in the cleanup process. The facilities are maintained sufficiently to support worker safety and health. The sustainment footprint may shrink as cleanup milestones reduce risks. However, many preventive maintenance tasks are no longer necessary with the understanding that future access will be required for D&D activities.
- Facilities that are shutdown, deactivated, demolished, excessed, transferred or sold in the near term do not need to comply with Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management".

New technologies and approaches for real property management need to be encouraged, as well as identifying and implementing best practices and lessons learned from existing efforts. New tools need to be developed to mitigate risk and maximize performance of real asset portfolios.

Key to effective management of EM facilities is developing a comprehensive EM asset management plan that coordinates real property acquisition; utilization; maintenance and repair; recapitalization, disposition, and long-term stewardship functions with the EM mission.

The cornerstones of facility planning in the Department are the Ten Year Site Plans (TYSPs) and/or Closure Plans developed by each site, and the facilities data in the Facilities Information Management System (FIMS). The TYSPs and Closure Plans identify the site requirements and priorities that form the basis for fiscal decisions. The TYSPs rely heavily on the data in FIMS which is the Department's repository of real property information. FIMS data are also used to support Department funding decisions, and are the primary data source for the data elements and metrics supporting Federal Real Property Council requirements. While the sites are continuing to improve the TYSPs and accuracy of their FIMS data, EM Headquarters provided guidance for updating TYSPs in FY 2009 to establish consistent facility management strategy across the EM Program.

The Lead Program Secretarial Officers are delegated direct responsibility by the Secretary for implementing F&I stewardship. Guidance and procedures need to be developed to ensure senior management has the necessary information and level of control necessary to set priorities across the all sites and maximize performance of the entire complex.