Multi-Site Project Management
A Program for Reducing the Cost of Technology Deployment at Department of Energy Sites - 9480

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ABSTRACT

Retrieval and processing of High Level Waste (HLW) stored in Department of Energy (DOE) waste tanks is performed to support closure of the tanks as required by site specific regulatory agreements. Currently, there are four sites in the DOE Complex that have HLW tanks and must process and disposition HLW. As such, there is an opportunity to achieve an economy of scale and reduce duplication of efforts.

Two or more sites typically have similar technology development and deployment needs. Technology development is already executed at the national level. As the technology is matured, the next step is to commission a design/build project. Typically each site performs this separately due to differences in waste type, tank design, site specific considerations such as proximity to the water table or to the site boundary. The focus of the individual sites tends to be on the differences between sites versus on the similarities thus there is an opportunity to minimize the cost for similar deployments.

A team of engineers and project management professionals from the Savannah River Site has evaluated technology needs at the four HLW sites and determined that there is an economy of scale that can be achieved by specific technology deployments in the area of waste retrieval, waste pretreatment and waste disposition. As an example, the Waste on Wheels tank retrieval system (presented in the 2006 Waste Management Symposium) was designed and fabricated in portable modules that could be installed in HLW tanks at Hanford, Savannah River or Idaho. This same concept could be used for modular in-tank cesium removal process and equipment, tank cleaning mechanical equipment, and chemical tank cleaning process and equipment.

The purpose of this paper is to present a multi-site project management approach that will reduce deployment costs and be consistent with DOE Order 413.3 project management principles. The approach will describe how projects can be managed by a lead site with representation from additional sites; how design and testing can be developed for multiple end users; and how costs can be shared by multiple sites.

SUMMARY

High Level Waste tank space management and tank closure activities present some similar challenges at the various DOE sites where such activities are present. Development and deployment of appropriate technologies is often a key to meeting related objectives. While information sharing between the sites can and has offered opportunities for each site to gain from other experience, further benefit can be gained by sites partnering earlier in the process by approaching certain technology development / deployment initiatives in an integrated fashion under a single project umbrella. The approach for doing so is as described in this document.

PROGRAM DEVELOPMENT SEQUENCE

Candidate projects would be those meant to address a technology gap that exists at more than one site. Identification of technology gaps that exist at each site and comparing them is key to developing a list of candidate projects for a multiple site approach. The DOE Waste Processing Multi-Year Program Plan is a valuable source of information and should be a key component of any planning efforts. The scope of a selected project would take the technology from its current state to a state ready for site specific deployment. The site specific deployment effort would address the balance of plant scope and would integrate the deployment-ready technology and equipment into the site specific environment.

PROJECT APPROACH

A Multiple Site Technology Deployment Project would be managed in accordance with the requirements of DOE Order 413.3A, tailored as appropriate for the project scope as allowed by the Order. There are two distinct pieces to such a project that typically overlap:

1) An integrated multi-site effort to take the core technology from its current state to a state ready for site specific deployment, including the development of site specific deployment plans, and
2) Site specific efforts to effectively deploy the developed technology through Balance of Plant design, construction, and related project activities.

Managing efforts of multiple sites as a single project achieves an economy of scale, but it also presents some unique challenges. To provide greater clarity / definition, subsequent sections on project phases and critical decisions will focus primarily on those issues that arise due to having multiple sites.

PROJECT PHASES

Initiation

The technology gap to be addressed must be clear, concise, and well-documented; technology end-users from all participating sites must provide input and approval. Preconceptual planning activities need to ensure that related overall goals and strategic objectives are clear and consistent with overarching DOE complex and site specific objectives. If site specific goals and objectives differ, then they must be complementary and not in conflict in order for project planning to proceed. Key at this point is contractor alignment with each other, alignment with site specific DOE interests, and alignment with the Office of Environmental Management Engineering and Technology Roadmap. An approved mission need statement is an outcome of the initiation phase. A decision on who will be the “lead site” for the project should be made, with the lead site having project roles as later described in this document.

Definition

Using the appropriate project tools and sources of information, alternatives to addressing the technology gap are evaluated and a recommended alternative chosen. The recommended alternative must meet the site specific needs within relevant constraints. Items such as project and life-cycle cost, schedule, risk, security constraints, regulatory constraints, safety basis issues, Environmental, Safety, and Health performance are examples of things to consider in the alternative recommendation process. Stakeholder interests must be appropriately accounted for when recommending an alternative.

During the project definition phase, sufficient conceptual design and cost and schedule information needs to be developed to allow for site specific decisions about ongoing project participation and to reach an

initial agreement concerning funding strategy and cost sharing. A preliminary project execution plan should be developed during this phase.

Execution

Features of the execution phase include developing design through final design, constructing what was designed, and testing it. Construction and testing is on full scale equipment. Attributes tested are as defined earlier in the project and should include all that is necessary to adequately demonstrate performance. While the lead site has lead responsibility for technology related testing, this phase must be performed in a very open and inclusive fashion, with organized and systematic communications, to ensure widespread ownership of the test protocol and results.

Key deliverables in this phase include site specific deployment plans for all participating sites that define how the equipment developed will be deployed in their facilities. Site specific deployment design, construction, and testing are the responsibility of the individual site.

Transition / Closeout

For a multiple site technology deployment project, the transition / closeout phase ensures that all required performance testing has been completed with results that meet project requirements. Project equipment is accepted as "field deployable" by the multi-site project team and is deployed at participating sites. Project documentation is completed. Operations in participating sites are authorized in accordance with DOE Order 425.1C.

CRITICAL DECISIONS

All detail listed below may not be appropriate for each project. Tailoring is expected as allowed by DOE Order 413.3A. Critical Decisions may be combined, as appropriate for the project scope. The strategy for Critical Decision (CD) development will be included in the Project Execution Plan.

CD-0, Approve Mission Need

With mission need being determined and documented during the project initiation phase, CD-0 for the multiple site technology deployment project is little different than that for a project at a single site. It is expected that a lead site be chosen and agreed to as part of CD-0 and that approvals from all participating sites, both contractor and DOE, be obtained as part of the process.

CD-1, Approve Alternative Selection and Cost Range

With work as described in project definition phase, CD-1 is generated and approved in a manner like that for a project at a single site. The lead site has the primary responsibility, with all participating sites having project team representation and input to their lead site counterparts to ensure adequate representation of all interests. Each site should provide funds as required, to be managed by the project, in a manner that is consistent with the cost sharing agreement and the requirements of this critical decision / project phase.

CD-2, Approve Performance Baseline

The performance baseline is generated early in the project execution phase and is approved as CD-2 by the lead site, with input from all participating sites. Site-specific preliminary design for balance of plant

scope must be completed as part of establishing the performance baseline. All participating sites shall request and pursue funding for their share of the total project cost.

CD-3, Approve Start of Construction

For a multiple site technology deployment project, the tangible physical asset produced will be an equipment package that addresses the agreed upon technology gap that is deployable at the participating site. Site specific scope identified for the technology during project initiation must have been addressed for all participating sites as part of generating final design and required project documents. It is expected that each site would generate and approve a CD-3. The centralized technology development / deployment portion of CD-3 should be developed by the multi-site project team. Site specific deployment plans and final balance of plant design should be developed and approved for all participating sites that define how the equipment developed will be deployed in their facilities. Approval of the site specific deployment plans is the responsibility of each site.

CD-4, Approve Start of Operations or Project Completion

CD-4 for this type of project should be reached when equipment produced has been installed and tested in a manner consistent with project requirements and meets all performance criteria. Pre-installation testing that is common to all sites should be managed by the multi-site project team. Testing related to site specific deployment should be managed by the site specific team and completed prior to CD-4. Generation and approval of CD-4 is the responsibility of the lead site, with input from participating sites.

It is expected that each site would generate and approve a CD-4. The centralized technology development / deployment portion of CD-4 should be developed by the multi-site project team. Site specific deployment details that are not common to all participating sites should be developed by the individual sites and incorporated into CD-4.

APPROACH FOR MANAGING ISSUES RELATED TO HAVING MULTIPLE SITES

The general approach for managing technology development activities that relate to multiple sites is the achieve economies of scale regarding both the technology development activities as well as common design efforts. Whether the need for technology development is identified during development of the Mission Statement (CD-0) or the technology need is identified during other activities (e.g., integrated system planning, risk management handling planning, process or system improvement reviews), the ability to develop a common set of design inputs, testing documentation and design output documents is achievable.

This approach is outlined in the following sections and shown in Figure 1.

Funding: Multiple Funding Sources

Utilizing a single project umbrella as an integrated approach to technology development / deployment projects across the DOE complex adds a funding dimension that requires the ability for more than one funding source to potentially share the cost of a project. The contributing sources may include DOE-HQ EM-21, as well as the appropriate DOE EM sites. This integrated approach provides the mechanism for the DOE to fund certain activities (i.e. development, common design) only once versus each site funding duplicate activities thus saving taxpayer dollars that can be re-directed to other priority scope.

A lead site would coordinate all the funding sources. The proposed funding mechanisms between Contractors would be the Memorandum Purchase Order (MPO) / Inter-Entity Work Order (IEWO) processes which allow DOE Contractors to send funding to other DOE Contractors. EM-21 funding, if applicable, would be sent to the lead site via the Approved Funding Plan (AFP). The funding from the lead site would also be identified in the lead site's AFP as well.

Project reporting would be generated from the lead site and proper fiscal oversight would also be the responsibility of the lead site to ensure the funding sources and the scope are properly aligned. For example, funding appropriated for operating activities should be used for operating activities.

Funding: Site Specific Work

Deployment efforts at a specific site, including balance of plant design and construction, are expected to be funded by that site.

Design Inputs and Assumptions

Design input and assumptions will be required from each site where the technology will be deployed. While consensus codes and standards will be applicable to multiple locations within the Complex, site specific Engineering Standards will need to be identified by the team member from each deployment location. Once the design inputs and assumptions are identified for each deployment location, the team will develop an integrated set of inputs and assumptions for incorporation into project design input documentation (for example the Technical Requirements and Criteria document). Since one site's input could result in an overall project constraint (for example, if there were multiple inputs for the maximum allowable working pressure for the system, the lowest pressure would have to be selected for the overall project input document or a design feature would have to be specified in the design input document that would allow the maximum pressure to be adjusted to meet each site's limit), it is critical that all design related inputs and assumptions be identified as early as practical in the project.

Safety Case

During initial project planning it will be necessary for each site to identify the potential Documented Safety Analysis (DSA) accidents that could be impacted by the new technology and understand what are the most likely constraints that those accidents will impose on the technology development and deployment (for example – if one site's DSA assumes the presence of an ignition source and thus an energetic event but another site's DSA does not assume the presence of an ignition source). Once these programmatic constraints are identified, then the integrated project team will need to decide if the strategy for the overall project will be to work within the constraint or plan to provide a safety case revision that eliminates the constraint and carry this as a project risk until such time as the Safety Basis Strategy is approved by DOE at that specific site. This review process may also identify opportunities for making different DSA assumptions common. While not the primary focus of the multi-site project team, these identified opportunities should be followed up at the participating sites as appropriate.

As the project matures, the lead site (as a minimum) will develop a Safety In Design Strategy, consistent with DOE Standard 1189. Safety in Design Strategy documents will be developed and approved at each site where technology deployment is planned. Similarly, in later stages of the project, a Hazard Analysis will be performed by the lead site (as a minimum) as well as the Preliminary DSA (if required). The Preliminary Hazard Analysis will address each site's hazards. When a Preliminary DSA is required by DOE Order, each site where the technology deployment is planned will develop their site specific

document. Each site will be responsible for obtaining local DOE approval for their site specific Safety in Design Strategy and Preliminary DSA.

Since it is not cost effective for all sites where the technology may be deployed to develop the site specific Safety Case documents, a lead site should be selected to develop these documents as the technology is matured. As confidence increases regarding the ability to deploy the technology additional sites can prepare and submit their safety case document(s) for approval.

Regulatory Permitting

During initial project planning, it will be necessary for each site to identify the potential permits or regulatory agreements that could be impacted by the new technology and understand what are the most likely constraints that those documents will impose on the technology development and deployment (for example – if one site requires leak detection in the waste transfer system while another site only required the transfer line to be sloped). Once these programmatic constraints are identified then the integrated project team will need to decide if the strategy for the overall project will be to work within the constraint or plan to provide a permit revision that eliminates the constraint and carry this as a project risk until such time as the regulatory document change is approved at that specific site.

Start-up Testing

Deployment of the technology will be subject to a start-up review per DOE Order 425.1C. It is important to understand the type of the review that will be required at each site and the site specific experience that helps define how that review will be conducted. Having that foresight allows input to be provided early in the design process that can aid in facilitating the subsequent required reviews. It is also certain that the subsequent 425.1C reviews required at each site would include documentation developed by this multiple site project. Understanding participating site expectations will allow the multiple site project to be optimized relative to 425.1C reviews and the completion of CD-4s at participating sites to be more straightforward. The following summarizes those documents that could be common for the sites pursuing deployment of the same technology deployment project.

Document Type	Integrated Document	Site Specific
Design Inputs	X	
Safety in Design Strategy		X
Regulatory Requirements	X	
Safety in Design Strategy	X	
Preliminary Consolidated Hazards Assessment	X	
Preliminary DSA		X
Final DSA		X

Site Specific Interfaces

Each participating site will have its own set of stakeholder interfaces. It is important that those be identified early and that each site establishes and maintains the communication channels necessary to address the needs of those stakeholders. Those channels need to include participating site members of the

project team to ensure adequate integration of stakeholder interests with the plans of the project. Failure to engage stakeholders in the multiple site project may impact subsequent ability to effectively deploy the results of the project.

Project Team Composition

Each individual technology deployment project should have a team led by the project manager and the project owner from the lead site. As a general rule, a project engineering manager should be assigned to ensure that technology development, design, and safety elements are effectively coordinated across multiple sites. The balance of the project team should be individuals representing functions that would be typical for a similar site specific project. Those individuals on the team would typically be, but are not required to be, from the lead site. In their project team capacity having lead representation of their function, those team members would be expected to have counterparts at all participating sites, with open and established lines of communication to ensure that all interests are adequately represented. This principle applies to contractor and DOE personnel. The project manager and project owner should rely on their principal team members, with the team members themselves ensuring adequate involvement in support of their function at participating sites. A project team chart identifying all of these relationships and interfaces must be included in the Project Execution Plan.

Provisions for Joining a Project in Progress

Ideally, participating sites would be clearly identified at the project initiation phase with roles as described in this document. Circumstances may arise where it is desired to add a participating site to a multiple site project already in progress or a project begun as one for a single site. This approach should be adapted to the individual situation to retrofit the items that need to be in place to support the phase that the project is in. The approach should then be followed as outlined as if the new site were participating from the beginning.

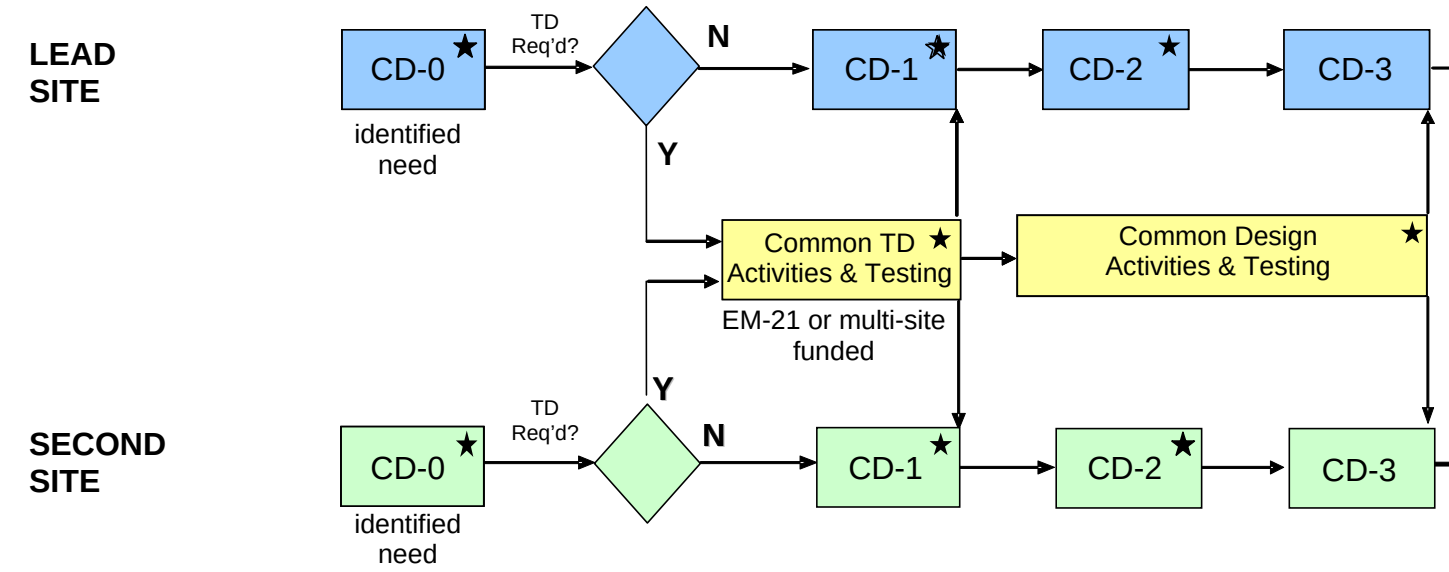
Provisions for Staggered Deployment

While this document is written as if the developed technology will be simultaneously deployed at all participating sites, it is recognized that staggered deployment may occur or even be desirable. In cases where deployment at one site leads that at another, the project should ensure that lessons learned during initial site deployment are effectively captured and factored into subsequent deployment efforts at other sites.

PATH FORWARD

This multi-site project approach is currently being piloted on three projects that involve Hanford and Savannah River. Both sites have a common need to provide robust in-tank mixing to prepare HLW feed for treatment and disposal. The Waste on Wheels approach has been successfully deployed at Savannah River and is being directly transferred to Hanford. Both sites also have a need for thorough tank cleaning in preparation for closure. The Enhanced Chemical Cleaning project is currently being developed at Savannah River with assistance and co-funding from Hanford. A third project, Modular Salt Processing is also being evaluated as a candidate for the multi-site approach.

Figure 1



Acronyms
SDS – Safety in Design Strategy
PCHA – Preliminary Consolidated Hazards Assessment
PSDR – Preliminary Safety in Design Report
PDSA – Preliminary Documented Safety Analysis
DSA – Documented Safety Analysis
★ Opportunity for common documents