Best Practices for Environmental Project Teams

The goal of *Best Practices for Environmental Project Teams* is to help Contractor project teams continuously improve competitiveness and performance on environmental restoration (ER) projects. This book is primarily directed at project team members such as Project Managers, Engineers, Geologists, Chemists, and resource staff who support one or more project teams (e.g., QC Managers, Health and Safety Managers). Best practices described in this book can be implemented by smaller Contractors who directly compete with larger Contractors. They can also help specialty subcontractors seeking to team with large or small prime Contractors. Contractor-perspective insights can help Government Environmental Restoration Service Providers obtain lower prices and better value for their ER funds, and help regulatory agencies support ER continuous improvement.

The United States Department of Defense (DoD) is the most influential driver of change, competition, and continuous improvement in our industry. They are the largest global buyer of ER services. For over three decades, they pushed the “bleeding edge” of ER cleanups within the complex and rigid legal framework. DoD has amassed the most global experience in their ongoing pursuit of best value cleanup. They have spent billions of public tax dollars over this time period. Through 30 September 2009, DoD identified 21,333 Installation Restoration Program (IRP) sites and 86% of these sites are designated as “Response Complete” [*Defense Environmental Restoration Program’s Annual Report to Congress, Fiscal Year 2009* (April 2010)]. DoD estimates the cost-to-complete (CTC) for IRP sites to be 6.4 billion USD and 3.8 billion USD for the emerging Military Munitions Response Program (MMRP) cleanup. This body of experience represents thousands of mistakes and lessons learned.

In 2002, DoD Component agencies (e.g., Air Force, Army, and Navy) tasked with ER began changing their acquisition strategy to foster broad competition for contracts. They continuously improved their methods of contracting to obtain lower prices for services and began shifting risk to Contractors. The increasing competition to win contracts led to lower Contractor bids, much leaner project team staffing, lower profit margins, and higher risk. One project plagued with problems and cost overruns can quickly erase the profits from several projects that have achieved project objectives and satisfied the customer. Contractor senior managers are now asking, “How can we win more contracts and avoid disaster projects that erase slim profits from other projects?”
This book summarizes ER best practices based on lessons learned over a 15-year period, from my DoD Contractor perspective as a practitioner at the programme management level. Collectively, the ER Contractor community contributed to accelerating the DoD learning curve with numerous mistakes and process improvements. We have made more mistakes in our industry than any other global industry in the world – not because we are less capable or committed to success. We work in the most complex industry in the world. Variability is the norm, which is why experienced DoD ER Remedial Project Managers (RPMs) are the most skeptical professionals in the world. Beware of the Contractor proposal that assumes everything will go as planned. Each ER project is different due to the complex mix of variables (contracts, regulatory requirements, contaminants, geology, and technologies).

U.S. taxpayer funds have been put to good use. Our ecosystem is a safer and cleaner place due to our life-long contributions and commitment to continuous improvement. Other Governments, their Government ER Service Provider organizations, regulatory agencies, project teams, and academia can capitalize on lessons learned and best practices featured in this book. This chapter provides a historical overview of the Defense Environmental Restoration Program (DERP) and lessons learned, including editorial viewpoints from my Contractor perspective. It concludes with a summary of environmental project team challenges and best practice topics covered by Chapters 2 through 10.

Historical Overview of the Defense Environmental Restoration Program (DERP) and Lessons Learned

The United States Department of Defense (DoD) began their Defense Environmental Restoration Program (DERP) in the 1980s under the Installation Restoration Program. The DoD Environment, Safety, and Occupational Health Network and Information Exchange (DENIX) website contains a comprehensive library of historical documents. This section draws heavily upon the DERP Annual Reports to Congress from 1995 to 2009 including lessons learned from my Contractor perspective. The DoD has done an outstanding job of documenting the DERP journey.

The DERP Annual Report to Congress, FY 1997, contains a graphic that describes the “Evolution of the Defense Environmental Restoration Program” (see Figure 1.1). In previous decades prior to the 1970s, the DoD, along with the United States Department of Energy (DoE), was polluting their facilities, land, and groundwater with the same lack of awareness as many corporations.

The U.S. Environmental Protection Agency started business on December 2, 1970. According to the EPA website, “EPA was established to consolidate in one agency a variety of federal

http://www.epa.gov/history
research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. EPA’s mission is to protect human health and to safeguard the natural environment – air, water, and land – upon which life depends. For more than 30 years, the EPA has been working for a cleaner, healthier environment for the American people”.

In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund. This law requires responsible parties to clean up releases of hazardous substances in the environment. The 1986 Superfund Amendments and Reauthorization Act (SARA) refined and expanded CERCLA, and formally
established DERP and funding for the programme through the Defense Environmental Restoration Account (DERA).

RCRA and CERCLA were written before any significant DoD and industry ER site cleanup experience was gained. The popular U.S. slang expression for this is “putting the cart ahead of the horse”. U.S. laws are drafted and available for public comment. However, at that time, nobody knew if the environmental legal framework would enable an efficient process and approach for implementing site cleanups. Strict Government and Contractor compliance with these laws paved the way for project work plans that would be voluminous, detailed, inflexible, and costly to change. The laws required an interactive process with various time-consuming regulatory agency document reviews. The laws also required public involvement and comment. Nobody would disagree with the necessity of engaging public involvement. But it adds more time to the process. Government attorneys review documents before they are provided to the regulatory agencies. The legal process is rigid, time-consuming, and assumes a static and predictable site cleanup process.


DoD activities from 1975 to 1995 focused on searching for contaminated properties, studying the problems, and writing reports. Figure 1.2 shows the level of funding from 1984 to 1997, including the amount funded to BRAC.

![Figure 1.2](image)

National Economic Stimulus

The multi-billion dollar projected cost-to-complete DoD and DoE cleanup that emerged in the late 1980s and early 1990s created a new “environmental cleanup industry” that attracted several large corporations. Corporations and small businesses made substantial investments into “innovative site cleanup technologies”. At that time, the industry had an aura of “gold-rush” prospecting because Government and corporations were looking for “silver-bullet” technology remedies. Many optimists perceived that if the United States can put a man on the moon, then certainly we could meet the challenge of developing innovative technologies to clean up contamination. A variety of speciality subcontractors and analytical laboratories targeted the growing ER industry. Rapid economic growth corresponded with cyclical downturns and downsizing in domestic industries, such as petroleum exploration, nuclear power plant construction, and aerospace. National symposia and conferences attracted scientists, engineers, and regulatory professionals from other countries who were committed to cleaning up contaminated sites.

Universities were caught off guard by the rapid emergence of the environmental cleanup industry. Good professional salaries, interesting projects, extensive research and development, and working outdoors in scenic locations offered very appealing career opportunities for scientists and engineers. The resultant high corporate demand lured many scientists and engineers to join companies that were positioning their capabilities and resources to help clean up the environment. Professionals who transferred from other industries leveraged their experience and college educations in Geology, Chemistry, Engineering, and Biology. To this day, very few senior professionals in our industry began their college education with the goal of doing this type of work, and most take pride in contributing to a cleaner earth.

DoD Pressure to Decrease Studies and Increase Site Cleanups

In the mid-1990’s, the U.S. Congress, public, and communities threatened or impacted by contaminated DoD properties thought too much funding was being spent on “studies” and not enough on “site cleanups”. The DERP was under pressure to transition the programme towards accelerated site cleanup. The Defense Environmental Restoration Program Annual Report to Congress, FY 1995, contains the following quote from President Bill Clinton:

“Environmental experts from EPA, DoD, and the state will work together, and a professional cleanup team will be stationed at every site.”

–President Clinton, July 1993

The 1995, Defense Environmental Restoration Program Annual Report to Congress, FY 1995, describes a series of monumental changes to the DERP, such as “Accelerating Cleanup”,

**Measuring Performance**

DoD developed “Measures of Merit” to measure progress towards goals. Newly developed measures provided crucial feedback needed to develop and adjust programme requirements and budget projections, as well as determine whether established goals reflected fiscal reality.

Three separate categories of Measures of Merit were developed to assess site remediation progress from one discrete time period to the next, generally at the end of each fiscal year:

*Relative Risk Reduction.* This measurement applied only to DERA and BRAC sites that were ranked using the relative risk site evaluation framework. DoD classified sites as having a high, medium, or low relative risk; response complete; or no further action required.

*Progress at sites.* Gauging the progress of restoration efforts was still a critical measure that required status reports on particular phases of investigation, design, cleanup, or response complete determinations at specific sites.

*Milestones Accomplished.* This Measure of Merit tracked the number of sites where cleanup action had been taken and relative risk had been reduced in one or more media. This measure of merit was applied to sites funded by both the DERA and BRAC accounts to provide another view of the progress in the restoration programme.

Measures of Merit allowed DoD to more accurately measure and report progress towards cleanup goals as well as fundamental efforts to protect human health and the environment. Measures of Merit were hailed by DoD as a “breakthrough initiative that greatly enhanced DoD’s ability to monitor the performance and progress of the restoration program”.

Figure 1.3 is a common graphic used by DoD to show the relationship between DoD Installation Restoration Program Phases/Milestones with EPA CERCLA Phases/Milestones. *(Defense Environmental Restoration Program Annual Report to Congress, FY 2009.)*

DoD ER performance metrics were inconsistent with EPA performance metrics. DoD, under significant pressure to accelerate cleanup and demonstrate progress, forged ahead without EPA. The only measures that had merit from the EPA perspective were those established by law: CERCLA and RCRA. Table 1.1 compares DoD, RCRA, and CERCLA Phases, Milestones, and Terminology. It shows the inconsistencies that exist between Remedy-in-Place and Site Closeout. Note how “Site Closeout” is not recognized by CERCLA.
DoD Contracting Obstacles to Accelerating Cleanup

From 1994 to 1999, DoD components (Army, Navy, and Air Force) felt significant public and congressional pressure to transition a higher percentage of their ER budgets from studies to site cleanup. Each was using large cost plus award fee (CPAF) contracts to execute the site cleanup phase on their multi-billion dollar environmental restoration programmes (~5 year contract term at ~200–250 million USD). In the era of large CPAF contracts, the Government paid the Contractor to establish a Program Management Organization (PMO) to interface with the Government and assist with accelerating studies to cleanup.

DoD Component ER Service Provider organizations were approaching site cleanup with a construction industry model, which backfired miserably on ER projects. The construction model caused sites to get bogged down in the study phase due to the substantial time and effort commonly expended investigate and characterize the site, followed by developing prescriptive technical packages for site cleanup (e.g. reports, design drawings, maps, and specifications). Many technical packages were impressively well written, elaborate packages based on a limited number of analytical samples that were unrepresentative of site contamination (e.g. plume characteristics). The cleanup phase was commonly based on numerous erroneous technical
assumptions regarding the type and volume of site contamination, and many CPAF contracts experienced continual scope changes and scope growth. Contractors would not earn award fee on the value of scope growth, which usually amounted to 8–10% of the physical progress.

The Navy established a front-end Contractor role similar to an Architect–Engineer (AE), known as the CLEAN Contractor, to investigate and characterize the site, and then (if sites required

<table>
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<th>DoD IRP Phases/Milestones</th>
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<td>Site Discovery (Source: Department of Defense Reporting Conventions (Restoration Management Information System; Management Guidance for DERP))</td>
<td>Site Discovery</td>
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<td>Remedial Action (RD)</td>
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<td>Remedial Action (RA) or Operation &amp; Maintenance (O&amp;M) [depending on remedy]</td>
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<td>Site Closeout</td>
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<td>Corrective Action Process Terminated</td>
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Table 1.1 Comparison of DoD, RCRA, and CERCLA Phases, Milestones, and Terminology
cleanup) develop technical package deliverables for the Navy (design drawings, maps, plans, specifications). CLEAN was a misnomer acronym because the role resembled STUDY – not site cleanup. The Navy bundled the technical package deliverables in the Request for Proposal (RFP) for a separate Remedial Action Contract (RAC). The CLEAN as AE role quickly changed when the Navy realized the approach consumed too much time and lacked flexibility. For example, the time and effort required to characterize the site and develop the technical package deliverables commonly exceeded the time and effort to clean up the contaminated site.

Thus, the RAC Contractor role evolved into a design–build Contractor for site cleanups, and the scopes of work for cost-reimbursable cleanup evolved to become “performance based”. Performance-based contracts did not prescribe “how” to clean up sites. They contained enough site characterization information for the RAC Contractor to develop design–build technical packages and work plans, supported by technical assumptions to define contract scope, contamination types, and quantities. RAC Contractors started to augment their construction-oriented workforce with scientists and engineers to review site characterization data, evaluate technology options, and develop work plans for design–build field execution. The Navy emphasized getting into the field. By giving the RAC Contractor design–build freedom and responsibility, site cleanups could be started sooner. Also, removing the AE oversight role enabled the Navy Remedial Project Managers (RPMs) to deal directly with the RAC Contractor. Costly contract modifications and change orders were minimized.

**DoD Component Competition**


This competition was excellent timing for Contractors anxious to start site cleanup. The DoD components were under substantial pressure to start cleaning up sites. They listened to Contractor recommendations on how to streamline the studies and accelerate the schedule to start cleanup. Along the way, Contractors and the Government learned some tough lessons.

**Single Technology Focus**

Many Contractor project teams frequently assumed a single technology (i.e. remedy) would be effective in cleaning up site contamination. This single-remedy approach (e.g. excavation, thermal treatment) was sometimes effective for leaking Underground Storage Tank (UST) sites
involving shallow soil contamination. But it backfired on sites containing more complex geology, groundwater contamination, and certain contaminants of concern (C of Cs). UST sites with shallow soil contamination provided Contractors and Government ER Service Providers with many early wins for accelerating site cleanup.

The Contractor project team single technology focus extended to a narrow focus on the physical site cleanup, with a lack of consideration to developing the final report during field execution. Contractors were narrowly focused on cleaning up the physical contamination, not developing data and documents that would be essential for a high quality final report deliverable. Contractors were commonly not focused on exit strategies and site closeout, and this extended to Government ER Service Provider RPMs. Government ER Service Provider initiatives to accelerate site cleanup focused on two things: (1) maximizing the amount of funds spent on cleanup and (2) maximizing the number of Remedies-in-Place. Generating multiple site exit strategies and achieving site closeouts were not the goals.

“Silver-Bullet” Technologies

Contractors and technology subcontractors pitched their “silver-bullet” innovative technologies to Government ER Service Provider RPMs. Technology capabilities were frequently overstated in proposals, and project work plans assumed the selected technology would achieve remedial action objectives. Many Government ER Service Providers Remedial Project Managers (RPMs) started to become skeptical of embellished technology claims because the norm was technology underperformance or failure.

Poor Technical Document Quality

The sense of urgency to get to the field and accelerate site cleanup caused Contractors to rush the development of project work plans. Work plans were frequently sloppy and required extensive Government review. They commonly had mis-spelt words, gaps in logic, poor formatting, and led to numerous Government and regulatory agency comments seeking clarification. Many Government ER Service Providers Remedial Project Managers (RPMs) became irritated with Contractors and downgraded their award fee. Many Contractors Project Managers were critical of the document quality “nit-picking” because they claimed their project teams did not need professional quality technical publications with perfect grammar to clean up sites. Bear in mind that many Contractor project teams engaged in cleanup consisted of numerous construction and earthwork veterans who did not perceive the need for high quality project work plans. To them, it did not matter if the project work plan contained incorrect correct regulatory terminology and acronyms – those things had no bearing on their site cleanup needs.
Many Government ER Service Providers Remedial Project Managers (RPMs) and regulatory agencies had very high document quality expectations that arose from the era of gold-plated study documents. Consequently, most Contractors, feeling the pain of their award fee downgrades, began to hire away professional geologists, engineers, and chemists and Contractors engaged in studies. They desperately needed to build a staff of scientists and professionals who could write design-build project works plans and other technical documents.

**Bigger Is Better**

The DoD ER push to accelerate site cleanup fed the Contractor desire for “bigness”. Bigger technology was better. Bigger technology meant faster and cheaper site cleanup. Bigger meant more yellow-iron, bigger Soil Vapor Extraction Systems, and bigger thermal treatment units. It did not take long for everyone to realize that bigger was not better, and meant a bigger bust when technologies underperformed. Many erroneous technical assumptions were routinely made regarding site conditions that decreased technology effectiveness.

In the pursuit of accelerated cleanup, many Contractors constructed full-scale remedial action systems that were overkill for the site, without any thought given to optimization (predated optimization concept). One of these large scale projects in 1996 involved a young Navy RPM in San Diego by the name of Mr. Richard Mach Jr. He was assigned to manage a full-scale Soil Vapor Extraction project at an active Navy installation in San Diego. It was a huge SVE system and it was burning through his project budget quickly. His project performance evaluations had a recurring “technology optimization theme”, and he downgraded project performance evaluations for not recognizing and implementing optimization opportunities in a timely manner. He built on his RPM experience and helped teams to develop the technical optimization guidelines for the Navy. Mr. Mach went on to become a significant driver for technology optimization in the DoD ER industry.

**DERP ER Programs Shifts Focus to “Site Closeout”**

The *Defense Environmental Restoration Program, Annual Report to Congress* (FY 1997) was the first report to establish a focus on “site closeout”. The introduction conveys the shift: “In reporting on the DERP’s status in FY97, the focus is on the road to Site Closeout”.

The report contains a section entitled, “The Road to Site Closeout”, which states,

> After more than a decade of effort and billions of dollars of expenditures, the Defense Department’s environmental cleanup program is moving with increasing rapidity toward
Site Closeout at a majority of its installations and sites. The initial focus of the program was on finding the sites with problems (site identification), deciding how best to handle cleanup at these sites (remedy selection), determining which sites to clean up first (risk-based prioritization), and beginning the cleanup process (remediation design and beginning construction). Today the Department’s progress can be measured by the number of Remedies in Place (RIP) and the number of sites categorized as Response Complete (RC), which indicate that sites are reaching the last milestones in the often lengthy cleanup process. The phrase “Road to Site Closeout” highlights DOD’s objective of completing the cleanup program.

Figure 1.4 shows the relationship of these milestones, and shows response complete and site closeout can take place at any time during the process.

**New DERP ER Emphasis on “Remedial Process Optimization”**

The *Defense Environmental Restoration Program Annual Report to Congress (FY2002), Identifying and Implementing Expedited Remediation Approaches*, introduced the concept of Remedial Process Optimization. It states:

*DoD strives to maximize limited program resources by conducting environmental restoration activities in the most efficient and expedient manner possible. One tool that has been extremely helpful in evaluating and improving site remediation processes so that maximum risk reduction is achieved for each dollar spent is remedial process optimization. Remedial process optimization is a systematic, iterative process that assesses remediation efforts to enhance technical effectiveness and reduce overall site cleanup costs. This process evaluates remedial processes for overall system effectiveness, taking alternative remedial approaches and new technologies into consideration. Remedial process optimization offers multiple benefits, including the evaluation of remedial progress through data collection and*

![Figure 1.4](image-url)

The relationship of these milestones.
established cleanup goals; the acceleration of site transfer; reduced operation, monitoring, and maintenance costs; and superior protection of human health and the environment. Remedial process optimization is cyclical in nature and is designed to ensure that cleanup goals are met fully and efficiently.

“Red and Unsustainable Remediation?”

Shortly after the turn of the century, DoD Component leaders started evaluating funding allocation trends from 1998 to 2001 and became alarmed at the increasing percentage of DERP ER funds consumed to simply sustain remedies in place, such as pump and treat. The total cost to operate and maintain installed remedies (i.e. sustain remedies), combined with the total DoD Component programme support cost, was rapidly increasing.

For many installed remedies, The Road to Site Closeout had no end in sight. If this trend continued, the DERP ER Program would become unsustainable – annual DERP funds for each DoD Component will be consumed by Program Support combined with the open commitments (cost) to operate and maintain passive Remedies-in-Place.

DoD Components Expedite Technology Optimization Policies

The DERP published Management Guidance for the Defense Environmental Restoration Program (DERP), in September 2001. Section 20 gave DoD components the requirement to establish technology optimization policies. It requires DoD Components to continually optimize remedies. Following issuance of this document, leaders from each DoD Component started developing their respective technology optimization policies and technical guidance documents.

For example, the Navy issued a 1 October 2003 policy memo that stated the following:

As the Navy/Marine Corps have progressed through implementation of the Installation Restoration (IR) Program and begun the Munitions Response (MR) Program, many sites have advanced through the remedy evaluation, selection, design, and construction phases and are undergoing Remedial Action Operation (RAO) and Long Term Management (LTMgt). This has shifted a growing proportion of the available Environmental Restoration Navy (ERN) and Base Realignment and Closure (BRAC) funds to these long-term site cleanup commitments. Continued monitoring of many of these remedies has indicated that remedies selected are not meeting cleanup objectives as planned. Further evaluation of specific sites has revealed several areas where optimization efforts could be applied to ensure the most appropriate remedies are screened, evaluated, selected, designed, and properly operated/maintained, and that options are available to modify systems to ensure cleanup objectives are met in a timely, cost effective manner. These results prompted the need for further optimization direction. Section 20 of the Management Guidance for Defense Environmental Restoration Program (DERP), September 2001, requires the Components to
continually optimize remedies. This policy outlines the Navy/Marine Corps efforts to be conducted to ensure all remedies are continually optimized through evaluation of all available data at each phase of the project.

The Navy Policy also contained a “Special Technical Issue”:

Since 1998, Navy, other DoD Components, and the Environmental Protection Agency (EPA) have been conducting evaluations of the effectiveness of “pump and treat” systems to address groundwater contamination. Consensus of all parties is that pump and treat systems are rarely the optimal alternative for groundwater response actions. Therefore, any plans to install new pump and treat systems on Navy and Marine Corps installations requires approval from Headquarters (HQ) at the Naval Facilities Engineering Command (NAVFAC). This requirement applies to all “pump and treat” systems (remedial and removal actions) where groundwater is removed from the sub-surface by pumping or other means, treated above ground in any way, and discharged in any way (i.e. off site disposal, sewer systems, re-injected, etc.). In order to receive the NAVFAC HQ approval, the IR Manager shall forward a summary of the site background, the conceptual site model (CSM), the remedial action objectives, a listing of the technologies screened for the site, a summary of the alternatives analysis, and a statement of why “pump and treat” is the most appropriate technology to be used at the site, including a life cycle cost analysis (net present value and total site cost) and exit strategy. NAVFAC HQ will provide a written approval/dis-approval response to the IR Manager based on review of this submittal.

DoD ER Components wanted RPMs and Contractors to adopt an “exit strategy” mentality. The new Government philosophy could be summed up as follows, “We value site closure and property transfer . . . tell us the exit strategy to achieve site closure as soon as possible”. Flexible Contractor technical approaches and the ability to articulate exit strategies became the common Contractor proposal win theme. This influenced the RPM perception of best value. Contractor proposals, project work plans and regulatory documents evolved from a short-term focus on achieving “Remedy in Place” to a flexible technical approach to achieve site closure. The transition to “Performance-Based Multiple Award Contracts” with an emphasis on optimization reinforced the importance of a flexible approach to managing project scope.

The DoD Navy Component “Optimization Work Group”, led by Mr. Richard Mach, drafted the 1 October 2003 Navy optimization policy and published the following optimization guidelines that can be downloaded for no cost on the Navy (NAVFAC) website:

- Guide to Optimal Groundwater Monitoring (February 2000)
- Guidance for Optimizing Remedial Action Operations (April 2001)
- DON Groundwater Pump and Treat Systems Special Publication (February 2003)
- Guidance for Optimizing Remedy Evaluation, Selection and Design (March 2010)
- Department of the Navy Guidance to Documenting Milestones Throughout the Site Closeout Process (March 2006)
Guidance for Optimizing Remedy Evaluation, Selection and Design was first published in April 2004 and was recently updated. It was groundbreaking work that introduced numerous optimization concepts and guidelines. It described the “Treatment Train Concept”, and provided examples of how exit strategies can be developed for each target treatment zone. It sensitized project teams to the economics of remediation. It also introduced guidelines for developing a “Flexible Record of Decision (ROD)”.

New DoD ER Acquisition Strategy

The (2002 to Present) emphasis on technology optimization corresponded with a major shift in DoD ER Component Acquisition Strategy. The DoD Acquisition Strategy shift started in 2002. CPAF contracts produced reasonable and consistent profits with negligible risk for a few large Contractors. Consequently, many smaller Contractors lobbied the U.S. Congress that the environmental restoration programme had become a welfare programme for large business (it did not matter that most CPAF contracts required over 60% of the work to be subcontracted among small businesses). Congress, in turn, directed the DoD to spread the environmental restoration workload and dollars to more Contractors, with an emphasis on small business Contractors.

DoD components responded by scaling back CPAF contracts. They changed their acquisition strategy to involve more Small Business Contractors, increase competition, and create aggressive goals for using fixed price contracts. The DoD Components emphasis shifted to Performance-Based Contracting, as described in the Federal Acquisition Regulations, Part 37, Service Contracting. Specifically, Subpart 37.6 pertains to Performance-Based Contracting.

One very popular contract vehicle to emerge was the fixed price Performance-Based, Multiple Award Contract (PB-MAC). On PB-MACs, the Government starts with an open competition among Contractors for a “seat at the table”. PB-MACs are competed as Unrestricted (Large Business), or Small Business. The objective is to hire three to six Contractors who will compete with each other on a case by case basis for contract task orders (CTOs) (i.e. projects)

DoD components who were accustomed to working with three to five large Contractors and their funded “Program Management Offices (PMOs)” prior to 2002 were suddenly dealing with 25–35 Contractors including many small businesses with no PMOs. Proposal evaluations became routine.

PB-MAC Requests for Proposal (RFPs) feature a “performance based” statement of work, also known as a Performance Work Statement (PWS). The PWS summarizes desired project objectives, important schedule milestones, deliverables, historical information and data. The PWS includes a table to specify performance standards, results, and metrics. The PWS deliberately avoids prescribing “how” the Contractor shall perform the work. PB-MACs provide competing Contractors with the freedom to formulate a flexible, design–build technical
approach, explain the exit strategies, and “sell” the benefits within the results-oriented
PWS framework. The Contractor’s project quality control plan includes procedures for
tracking and reporting performance and results relative to the PWS metrics.

Contract Task Order values range from 100 K to 30 million USD, with most in the 2–5 million
USD range. Total PB-MAC capacity is commonly 100 million USD. Contractors are required
to bond the work. Sometimes the selection criterion is best value. In other cases it is low price.

The DoD transition to PB-MACs provided Contractors with more flexibility on how to
approach proposals, technical approaches, work plans, staffing, and metrics on projects. It also
provided Project Managers with more flexibility to make scope adjustments during project
execution.

Shift in Government and Contractor Quality Management

From the early days of the DERP ER Program, the DoD Components embraced the U.S.
Army Corps of Engineers standard for Construction Quality Control. The most fundamental
principle was expressed in a simple equation: Contractor QC + Government QA = Team
CQM. Contractor QC referred to the Contractor Quality Control Representative. Government
QA referred to the Government Quality Assurance Representative. CQM referred to
Construction Quality Management. PB-MACs place 100% CQM responsibility on the
Contractor. The new equation evolved into Contractor QC + Contractor QA = Contractor
CQM. With this change, the Government is proclaiming: “We’re not going to exert any effort
making sure your performance and results meet contract requirements – that’s your
responsibility”. The Government QA role shifts to performance assessment.

Green and Sustainable Remediation

EPA published Green Remediation (April 2009) and Superfund Green Remediation Strategy
(September 2010) to fuel the green and sustainable remediation movement. On 10 August 2009,
the DoD launched their Green and Sustainable Remediation (GSR) Directive, Consideration of
Green and Sustainable Remediation Practices in the Defense Environmental Restoration
Program. Each DoD ER Component Service Provider started developing GSR guidance
documents and tools. For example, the Air Force developed the Sustainable Remediation Tool (SRT). The Navy and Army funded Battelle to develop SiteWise™. EPA and DoD
Component representatives participate in industry initiatives such as the Sustainable
Remediation Forum (SURF). The Interstate Technology & Regulatory Council (ITRC)
established a GSR Team. ER Service Provider organizations commonly develop their own
guidelines, “brand” their tools just like corporations, and develop their own acronyms.

Many organizations, including the U.S. Federal Government and DoD Components, have
embraced GSR. They are working hard to develop guidelines and tools for the ER industry.
In the future, GSR, like technology optimization, will be considered throughout the ER project life cycle to identify opportunities to minimize adverse environmental impacts (e.g. greenhouse gas emissions), natural resource consumption, energy usage, and maximize recycling. For example, DoD ER Components and Contractors will implement the Sustainable Remediation Tool (SRT) or SiteWise™ to screen technology options, starting at the Feasibility study stage.

The most intriguing aspect of the global ER GSR initiative is the complete lack of awareness that ISO-14001:2004, *Environmental Management System* (EMS), provides an ideal framework for effectively implementing GSR on ER projects. Many of these organizations, such as the U.S. federal government, are currently implementing an ISO-14001 EMS [Refer to *Defense Environmental Restoration Program Annual Report to Congress (FY2009)*, Chapter 2, *Environmental Management Systems*]. According to the report:

- DoD achieved full EMS implementation at 70% of its U.S. and overseas appropriate facilities
- Marine Corps achieved full EMS implementation at 100% of its U.S. appropriate facilities
- Navy achieved full EMS implementation at 100% of its U.S. and overseas appropriate facilities

Effective implementation of the ISO-14001 EMS prevents pollution and decreases operations costs. *DoD Components have existing EMS frameworks.* ISO-14001 is the most practical, logical, and cost-effective way to implement GSR. Going one step further: The DERP ER emphasis over the next decade will be annual site-specific life cycle analyses of installed remedies relative to performance objectives. Performance objectives can range from protectiveness to unrestricted site release. The ISO-14001 EMS provides a consistent framework and methodology for effectively implementing the life cycle analysis process, which can incorporate GSR screening. As of this print, DoD Components do not intend to utilize an EMS to implement their installation restoration program.

*Contractor Environmental Project Team Challenges*

Contractors, Project Managers, and their project teams now face several challenges caused by intensified competition and higher risk:

- **Performance-Based Multiple Award Contracts (PB-MACs).** Statements of work define the project objectives, desired results, and key schedule milestones. Contractors propose their technical approach to achieve the results, outcomes, and schedule. Contractors are uncompensated for PMO key personnel (even though required by contract), proposal development, and face stiff price competition for awards.

- **Compressed site evaluation and proposal development time frames.** Contractors commonly receive less than 1 month to evaluate most RFPs, understand site conditions, evaluate potential technical remedies, identify risks, prepare proposals and cost estimates, and
obtain approval from senior management to submit a proposal. This time crunch also makes it very difficult to obtain competitive bids from subcontractors.

- **Proposal development responsibilities.** In addition to their “regular jobs”, Project Managers and technical staff are expected to write proposals, obtain input from subcontractors, prepare cost estimates, articulate the risk factors and countermeasures to upper management, and execute the awarded project on schedule and within budget.

- **Remedial Process Optimization (RPO).** RPO requires more involvement from scientists and engineers, specialty subcontractors, an increased emphasis on timely data evaluation, and the ability to expedite changes in a safe and controlled manner.

- **Rigorous scope management.** A better process, tools, and communication are required to anticipate, perform, and document scope adjustments during field execution.

- **Lean project staff with tighter budgets.** The lower bids required to win projects result in fewer project team staff; in turn, fewer staff have expanded responsibilities such as health and safety and quality control.

- **Increased dependency on subcontractors.** Leaner staffing may create a higher dependency on subcontractors. Many subcontractors do not pay close attention to the statement of work, lack expertise in quality control, and must be controlled.

- **No independent Customer QA Representative.** Contractors can no longer rely on the Customer QA Representative as “a second set of eyes” to make sure contract requirements are met, field staff are adhering to project plans and procedures, nonconforming materials are rejected, reports are reviewed, etc.

- **Early recognition of problems and risk avoidance strategies.** Project teams are expected to provide early recognition and timely communication of issues including recommended options. Otherwise, they may be labelled as “reactive” by the customer.

- **Increased emphasis on performance metrics.** Contractors are responsible for demonstrating that contract performance and results meet requirements. Otherwise, payments may be delayed or invoices may be marked down.

- **Use of collaborative project websites.** Ten years ago, project team members did not envision using collaborative project websites to manage their project tasks, deliverables, and records. Now project teams routinely develop and use websites without assistance from Information Technology specialists. This is a disruptive change to managers and professionals who prefer collaboration by e-mail.

- **Zero tolerance for safety accidents and losing money on a project.** In addition to all the challenges listed above, the Contractor Project Manager must run a safe project, and meet the targeted (“as-bid”) profit margin. Winning repeat business substantiates customer satisfaction.
These challenges reflect a maturing industry with stronger competition and higher risk. Environmental project teams are now tasked with a broader range of responsibilities with less staff. As recent as 5 years ago, project teams had dedicated Superintendents, Project Controls Engineers, Project Quality Control Representatives, Project Health and Safety Officers, and Project Accountants. Most Project Managers would also claim they had more technical support and more administrative assistants to help prepare and manage documents and records.

**Environmental Restoration Project Manager, Inc.**

If you are an ER Company Inc. employee who supports several Project Managers, and want to get a good laugh, ask a PM, “How are things going at (PM’s Last Name), Inc.”. Most times you will be greeted with a smile and laugh because that is how they usually feel. They are 100% responsible and accountable for their project team success, and winning follow-up projects. Most PMs would rather have it this way. PMs prevail by thinking and acting like small business owners, and helping their customers meet project objectives. If they are not thinking like small business owners, they need to be.

Chapter topics selected for this book target ER Project Manager, Inc., and project team professionals. The Project Manager cannot do it all. Their professional staff need to broaden their skills. For example, in baseball, a five-tool player is one who excels at the following: (1) hitting for average, (2) hitting for power, (3) base running skills and speed, (4) throwing ability, and (5) fielding abilities. Professional baseball players rarely excel at all five. Consequently, five-tool players are highly valued free agents. The same applies for ER professionals. A skill deficiency relative to any chapter topic will decrease your value to ER project teams. PM, Inc. needs someone to provide support on each skill. Why not you? Do not limit your utilization opportunities and ER career to being a two- or three-tool player. Fewer tools cause lower labour utilization. Lower labour utilization means your name will be on the project or Company furlough list when times get tough. Seize the opportunity to increase your value by broadening your skills because you never know when you might need to become a free agent. But if you do, you want your professional resume to appeal to the growing market of PM Inc.’s who are competing to attract and retain talented project team members.

This book summarizes a series of best practices based on lessons learned that will help Contractor project teams continuously improve competitiveness and performance on ER projects.

**Chapter Overviews**

*Chapter 2: Understand Your Government Client Business Model*

Each Government Environmental Restoration (ER) Service Provider conducts business differently, even within the same agency. This chapter provides guidelines for profiling and understanding the Government ER Service Provider business model, which dictates “How we conduct business” or “How Contractors are expected conduct business with us”.

The Environmental Restoration (ER) Service Provider Business Model and cultural characteristics
flow down into Contractor processes. Contractor Project Managers and teams need to understand the Government ER Service Provider business model in order to become better consultants. Each Government Environmental Restoration (ER) Service Provider business model influences how Contractor project teams tailor and implement best practices described in Chapters 3 through 10.

Chapter 3: Implement a Flexible Environmental Quality Management System

ER Contractors must establish and implement a flexible environmental quality management system (EQMS) to adapt to specific Government ER contract types and special initiatives such as performance-based contracts. The Company quality manual should be based on ISO-14001, Environmental Management Systems (EMS), but should be referred to as the Company “EQMS” in proposals and literature. ISO-14001 provides an ideal framework for effectively implementing performance-based contracts, and adapting to evolving Government ER programme contract requirements.

Quality plans for performance-based contracts must integrate into the Government’s performance assessment and evaluation cycle. Contractor project teams implement work processes, Functional Inspection Plans, process improvements and a Monthly QC Report process that demonstrates Performance Work Statement (PWS) requirements and performance standards are being met. Contractors are responsible for providing the Government with defensible objective evidence to substantiate higher performance evaluations and award of contract incentives.

Chapter 4: Develop and Utilize User-Friendly Project Websites

In just 15 years, from 1995 to 2010, information technology has completely transformed the way the Government and ER project teams communicate, develop, and manage information. E-mail was a breakthrough in collaboration. Now Microsoft SharePoint project websites can be rented for as little as 10 USD/month from professional web-hosting companies. Many Project Managers with extensive website experience view a small number of project website features as indispensable and key to their success. Some examples, such as the Project Correspondence Log for managing contractual communication, are described in this chapter. However, the transition to paperless web collaboration is counterproductive to project teams in the field. Their productivity is maximized with a well-organized set of traditional three ring-binders.

Chapter 5: Develop Superior Proposals

The Government transition to Performance-Based Multiple Award Contracts (PB-MACs) has caused proposal development to become a routine Project Manager and team activity. Contractors mobilize proposal development professionals and expertise to win the Basic ER Program Contract. Then Project Managers and teams are expected to develop superior
project proposals and win projects. Many have not received practical training on pre-proposal capture planning, discriminator development, and proposal writing. They might not recognize the importance of understanding how Government Technical Evaluation Boards score proposals. Unfortunately, the challenge to develop superior proposals is compounded when the Government squeezes Contractors with a 3- to 4-week proposal due date. This chapter provides Project Managers and teams with practical guidelines for developing superior proposals and includes recommendations for Governments ER Services Providers who seek to obtain better value and lower Contractor prices.

Chapter 6: Develop Superior Project Work Plans

Technical document quality was a major Contractor discriminator opportunity in the 1990s. And it remains near the top of Government ER Service Provider wish-lists today. Interview your Government ER Service Provider Remedial Project Managers (RPMs) and they will confirm this fact. While Contractors continually strive to differentiate their value proposition on many proposal factors that have become neutralized in the maturing competitive market, many continue to underestimate the competitive advantage opportunity that exists for technical document quality. Your company cannot rise above the competition without a leadership commitment, mission, and plan to become the undisputed leader in technical document quality. The chapter provides programme and project teams with guidelines to develop superior project work plans and technical documents. On most ER projects, technical document quality makes the first and last impression on your Government ER RPM.

Chapter 7: Implement More Rigorous Scope Management Tools

Government ER RPMs value scope flexibility on all ER projects including fixed price, without triggering modifications that increase the total contract value. But if Contractor Project Managers and teams struggle to effectively manage scope, their projects will experience substantial cost overruns. The competitive challenge to Project Managers is clear: learn how to maximize flexibility without losing control. This must be done at each ER project phase: proposals, technical approaches, work plans, and field execution. Flexible project scope management requires Contractor ER programmes and project teams to implement better scope communication tools and processes to manage scope. Tools such as the project correspondence log, basewide risk register, project risk register, scope register, scope coordination and mutual understanding meeting, and scope variance communication log enable proactive scope management and customer satisfaction without loss of control.

Chapter 8: Effectively Control Field Work

This chapter describes enhancements to an ER-proven model called the “three phases of control” for effectively controlling field work. The team approach described in this chapter is based the Unified Facilities Guide Specification (UFGS) 01 45 00.00 20, Quality Control,


which has been used for several decades by the DoD ER Components (this standard can be downloaded at no cost from the internet). Leaner project teams must implement a streamlined approach that engages the multiple team members. The Project QC Manager and Project Manager designate a “Task Leader/QC/Safety Specialist” for each task on the project schedule. This includes high risk support tasks that involve safety, permits, and regulatory compliance. Each task, termed as a “Definable Feature of Work,” represents a three-phase inspection unit. Project managers can break tasks into smaller DFW control units if justified by task risk and complexity. Supervisors can use three phases of control for any task.

Chapter 9: Implement Cause Analysis to Generate Solutions

Cause analysis, as taught in this chapter and demonstrated throughout this book (e.g. How Government organizations can achieve better prices and better value environmental services), is an enabling technique for generating solution opportunities in an industry where flexibility is valued and failures are commonplace. The value of cause analysis stands far above any other process improvement tool. Government ER Service Provider RPMs are inherently skeptical of Contractor claims. They value risk management, flexibility, and multiple solution options – all enabled by effective cause analysis. Cause analysis will continue to be indispensable for major project problems that jeopardize the contract. However, leaders who limit the application to a crisis, or erroneously view cause analysis as an exhaustive exercise, are failing to capitalize on a major opportunity to improve performance. Cause analysis training offers the best return on investment for any training you can provide ER Project Managers and teams.

Chapter 10: Design User-Friendly Work Processes for Project Teams

User-friendly work processes achieve the following objectives: (1) eliminate narrative verbiage, (2) maximize the use of visuals, and (3) break the procedure into components to enable flexibility and process improvement. Project teams are busy. They do not have time to read procedural verbiage. This chapter provides guidelines for designing user-friendly processes and checklists that cause project teams to think. Thinking project teams succeed on projects. Doer project teams become complacent, mechanistic, and reactive to problems on projects. Processes must be clearly visible to project team members, not buried within the excess verbiage of procedure narratives.