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CASE STUDIES

AN ANALYSIS OF PERFORMANCE- BASED SYSTEMS FOR ENCOURAGING INNOVATIVE ENVIRONMENTAL TECHNOLOGIES

-FINAL-

December 1997

Prepared by
Interstate Technology and Regulatory Cooperation
Work Group
Policy Work Team
Performance Based Systems Project

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Established in 1995, the Interstate Technology & Regulatory Council (ITRC) is a state-led, national coalition of personnel from the environmental regulatory agencies of some 40 states and the District of Columbia; three federal agencies; tribes; and public and industry stakeholders. The organization is devoted to reducing barriers to, and speeding interstate deployment of, better, more cost-effective, innovative environmental techniques. ITRC operates as a committee of the Environmental Research Institute of the States (ERIS), a Section 501(c)(3) public charity that supports the Environmental Council of the States (ECOS) through its educational and research activities aimed at improving the environment in the United States and providing a forum for state environmental policy makers. More information about ITRC and its available products and services can be found on the Internet at **www.itrcweb.org.**

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EXECUTIVE SUMMARY

The Interstate Technology and Regulatory Cooperation (ITRC) Work Group established a Policy Work Team in 1996. Among other tasks, the Team was asked to document and evaluate whether a promising new trend in environmental regulation--performance based contracting and regulatory systems--was encouraging development and deployment of innovative technologies.

In August 1996, the Team surveyed the ITRC member states to identify promising case studies. The Team selected eight case studies -- two state-lead regulatory initiatives, two site management service activities and four federal site remediation or waste processing projects. Team members collected background documents, visited case study locations, and interviewed state, federal, and citizen stakeholders and innovative technology vendors. The major interview themes included: defining the performance-based system, identifying the roles of the key parties engaged in the system, and evaluating whether the system could lead to better, cheaper cleanups and greater use of innovative technologies or methods to achieve those cleanups.

Since many of the activities reviewed were at an early stage of development or implementation, it was too early to comment on their ultimate individual performance. Nevertheless, the team was able to reach a number of important findings and conclusions relevant to Performance-Based Systems (PBS) in general and relevant to their impact on technology innovation in particular. The full report describes the specifics of each case study and presents all of the findings and conclusions.

For those interested in implementing performance-based systems or in promoting innovative technology, the issues catalogued in the discussion of findings and conclusions can serve as a checklist of topics that must be addressed programmatically to successfully implement PBS and promote innovative technology.

The team could not come up with one single definition of performance-based systems. However, the working definition developed and used by the team to survey ITRC states is broad enough to cover the general characteristics of these systems. The team defined performance-based systems as follows:

> *In a broad context, performance-based approaches to regulation and contracting are those that establish performance criteria that must be met or exceeded in lieu of defining the specific technical path toward reaching a goal. Performance-based approaches avoid mandating how the cleanup is to be performed, giving the regulated entity the flexibility to prescribe an approach to achieving results-oriented criteria.*
>
> *Such approaches can be further characterized as more cooperative and flexible ways to deal with environmental cleanup, that invite innovation and include dialogue and cooperative efforts among state and federal regulators, private industry, publics, and local and tribal governments. An example of performance-based regulation is self-certification of compliance in lieu of permitting.*

It is the significant benefits of these general characteristics that make performance-based systems worthwhile. Without exception, case study participants showed a willingness to try a new approach and learn from the experience.

Performance-based systems, while necessary to allow the use of innovative technologies, are not by themselves sufficient to encourage the development and deployment of innovative technologies. In fact, if not designed and implemented properly as complete systems (with supporting programs), PBS approaches sometimes create or reinforce barriers to innovation.

Performance-based contracts and regulations must be designed and implemented as part of a flexible, comprehensive program including early and continuous collaboration with stakeholders, common and clear goal setting, incentives for innovation and use of innovative technologies, and a willingness to make changes together as the project proceeds.

Implementing performance-based systems can encourage a culture shift where all parties begin to act as collaborators and problem-solvers, seeking and accepting innovative approaches. This evolution must be nurtured to have a successful program.

Contracting or regulatory agency resources needed to design and implement these performance based systems are often more expensive, at least initially, than traditional systems and may require implementing agencies to emphasize different skill sets. Accountability and reporting requirements for contractors or regulated entities are often more extensive and expensive than under traditional "command and control" structures -- but the net long-term benefit of the greater flexibility PBS allows should be better environmental results at lower costs.

Performance-based systems allow innovations but additional program incentives must be provided to encourage use of innovative technology. Desirable incentives include separate government led programs to remove barriers and promote the use of innovative technologies, financial rewards or regulatory relief such as enforcement discretion criteria and flexible Records of Decisions (ROD).

Additional case studies on performance-based systems including contracts and regulations could help practitioners better define the total system changes required to develop the appropriate PBS structure, including risk allocation and incentives for innovation.

Better information and data sharing among stakeholders on innovative technology development and performance is needed; federal agencies should be encouraged to invest a portion of their demonstration funding into ensuring that the results will be acceptable to a wide-range of regulatory agencies who may be asked to approve future deployment of successfully demonstrated technologies.

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AN ANALYSIS OF PERFORMANCE-BASED SYSTEMS FOR ENCOURAGING INNOVATIVE ENVIRONMENTAL TECHNOLOGIES

1.0 INTRODUCTION

This report presents information on the various mechanisms that are being used by state and federal agencies in applying "performance-based standards" and "contract reform" to enhance cleanup of contaminated sites as well as lower the cost. The purpose of this report is to document what type of performance-based systems are being used, where, and how. More specifically, it addresses how the use of performance-based systems promote or discourage the use of innovative technologies in remedial activities.

1.1 Background

It has been over 25 years since the first Earth Day, and the passage of landmark environmental legislation that created the Environmental Protection Agency (EPA). As a nation, we have made considerable progress in using new technologies in the cleanup of contaminated sites, for pollution prevention, and at the "end-of-pipe" point source control. It is perceived that performance standards along with economic incentives encourage innovation. Although, EPA is uncertain regarding the ultimate changes to Superfund law, it recognizes and shares with the regulated community the urgent need to find less expensive and more effective solutions than the current state of remediation science and technology provide.

We are in the midst of change in our nation's environmental policy. Federal regulatory programs continue to be delegated to states, and government agencies are expected to increase efficiency and reduce spending wherever possible. The cost of cleaning up contaminated sites is staggering and there is a general consensus that now is the time to draw upon the lessons learned to reinvent environmental protection for the next century. Corporate environmental firms have testified before the U.S. House of Representatives calling for investigating and recommending corrective action to existing regulatory impediments to innovation in environmental technologies. It is assumed that by setting performance standards and allowing the regulated community to find the best way to meet them, everyone can get results cheaper and quicker, and sometimes cleaner than by mandating design standards or specific technologies.

The performance-based systems approach to remedial activities has meant everything from innovative regulatory strategies to reforming the current system of environmental management. A variety of similar but different definitions exist for discrete elements in a performance-based approach. This has resulted in some confusion in what is meant by performance based. Simply stated, performance-based approaches may include a broad range of regulatory and contract elements in which the purchaser tells the contractor what to accomplish, but not how. The contractor is required to "perform" to a certain level that is defined in a contract or, in the case of cleanup levels, to a certain standard. A performance-based systems approach must include specific requirements for time, or units, or level of cleanliness so that all the involved parties

know what must be accomplished in order to be successful.

1.2 Federal and State Initiatives

In this time of transition, the Department of Energy (DOE), the Department of Defense (DOD), some states, and portions of the Environmental Protection Agency (EPA) are in the vanguard of promoting this new performance-based environmental policy. It is a policy that requires environmental protection to be driven by clear and measurable goals. Economic, environmental, and social goals are to be integrated so policies are mutually supportive, not conflicting.

The DOE is planning to accomplish this policy through a mix of reforming the current system of environmental management and by building a framework based on performance, partnerships, flexibility linked to accountability, and finally market incentives. The plans for market incentives consist of wedding economic performance and environmental protection through contract reform and privatization.

Within the DOE, contract reform is defined as moving from the old, cost-plus management and operation contract approach to competitive, performance-based, systems contracts that contain cost reduction incentives. The DOE has learned that what you incentivize, gets done. Therefore, one must be careful about what incentives are built into contracts. Performance-based contracting is an important element in DOE's contract reform initiative. DOE believes that whenever performance- based contracting is employed, it takes them out of the business of prescribing technologies. The other tool DOE is using is privatization. Privatization is defined as vendors, under contract with the DOE, using private funding to design, permit, construct, operate, decontaminate and decommission their own equipment and facilities to treat DOE waste and receive payments as results which meet performance specifications are achieved.

The Department of Defense (DOD) has a long record of successfully applying performance-based concepts to the development and deployment of military weapon systems. DOD's insistence on an outcome-oriented approach has produced better, and in some cases more cost-effective, results. Transferring this expertise to the highly regulated military environmental arena has not been easy. Nonetheless, performance-based systems, in conjunction with other mechanisms that promote risk-sharing, offer the opportunity for a wider variety of technologies to be considered in remediation selection.

The nature of the risks presented by contaminated sites mandates that DOD remediation or containment actions be focused on results. DOD is committed to developing performance-based approaches to the maximum extent practicable. The military environmental programs are introducing a variety of performance-based systems ranging from performance-based records of decision to contracting mechanisms. These allow site managers more flexibility in working with regulators, communities, and other stakeholders to

specify objectively measurable performance standards and quality levels. Concurrently, DOD believes the environmental contracting market should be given flexibility to propose efficient and innovative methods of attaining the required results. Defining and including appropriate incentives for attaining superior quality levels or achieving significant cost saving should also be considered.

Over the past decade, state governments and the EPA have also been developing environmental policies and programs that are based on environmental performance, are more user friendly, and promote innovative technologies to improve the cleanup of contaminated sites. These policies and programs vary from state to state in their design and implementation but share the common goal of improved regulatory processes and results-oriented environmental protection. Examples of performance-based or market-based regulations include pilot demonstrations for facility-wide air emission limits, the emissions trading-based acid rain control program, and flexibility in meeting effluent discharge deadlines by applying innovative treatment approaches that prevent pollution. Clearly, a top priority for the EPA is the development and commercialization of remediation technology. As a result, EPA will consider experimental and innovative approaches to site remediation.

1.3 New Way of Doing Business

The common thread among these new federal and state activities is that they all involve an aggressive move towards a "new way of doing business." Because of the speed and scope with which this "new way of doing business" is occurring, the application of performance-based systems in some regulatory reform and site remediations may have suffered from non-optimal design and implementation specifics, particularly with respect to their impacts on the development and deployment of innovative technologies. A primary objective of this study has been to collect and share the lessons being learned as states and federal agencies apply performance-based systems and contract reforms across a broad range of situations. We believe that future applications of performance-based systems for more difficult situations should study and consider lessons learned from recent applications.

2.0 APPROACH

During the summer of 1996 discussions among members of the ITRC indicated that there was considerable interest in performance-based contracting and regulatory activities being conducted by state and federal agencies, particularly those involving contaminated site remediation activities. This interest stemmed primarily

from the expectation that performance-based systems (PBS) might help to get more innovative environmental technologies accepted and used. As a result, plans were developed to form an ITRC Policy Team to investigate this issue during Fiscal Year (FY) 1997.

2.1 Survey of ITRC States

In order to get an early start and to frame the scope of the effort, a survey was prepared and distributed to each of the ITRC member states during August 1996. The survey included the following PBS definition and questions:

> *In a broad context, performance-based approaches to regulation and contracting are those that establish performance criteria that must be met or exceeded in lieu of defining the specific technical path toward reaching a goal. Performance-based approaches avoid mandating how the cleanup is to be performed, giving the regulated entity the flexibility to prescribe an approach to achieving results-oriented criteria. Such approaches can be further characterized as more cooperative and flexible ways to deal with environmental cleanup, that invite innovation and include dialogue and cooperative efforts among state and federal regulators, private industry, publics, and local and tribal governments. An example of performance-based regulation is self-certification of compliance in lieu of permitting.*
>
> *With this as backdrop, your response to the following would be greatly appreciated:*
>
> *Does your state have any ongoing or planned performance-based?*
> *A. Regulatory efforts?*
> *B. Contracting efforts?*
>
> *For identified efforts, please provide a brief characterization/description of the effort (Program or project, ongoing or planned, and nature of effort), and address:*
> *A. What prompted the effort:*
> *B. The status of the activities:*
> *C. Identified issues:*
> *D. Identified benefits:*
> *E. Effects on use of innovative technologies and demonstrations:*

By late September of 1996 the ITRC Policy Team had established a PBS Project Team to address this subject. Also, responses to the screening survey had identified ITRC states with performance- based activities. TABLE 2-1 summarizes the survey results. The full text of responses provided by each state

together with relevant points-of-contact are included in Appendix C.

TABLE 2-1
Summary of Responses to PBS Survey
(Program or Type of Activity - State)

Type/Status	Demonstration or Operating	Planned or Under Development
Performance Based - Regulatory	Medical Waste Treatment - IL Environmental Results - MA Voluntary Cleanup - NJ Voluntary Cleanup - OR Brown fields/Land Recycling - PA Environmental Audits - SD Risk-based Corrective Action - SD Tri-Party Agreement - WA Model Toxics Control Act - WA	Voluntary Cleanup - IL Risk-based Corrective Action - LA Watershed Cleanup (Proj XL) - OH Unauthorized Discharge Remediation - TX
Performance Based - Contracting	MMR Plume Containment - MA Remedial Investigations - OR Proj Hanford Mgmt Contract -WA INEL M&O Contract - ID INEL Pit 9 Demonstration - ID	Petroleum Cleanup - FL Underground Storage Tanks (POL) - LA Hanford Tank Waste Remediation - WA Advanced Mixed Waste Treatment - ID

Note: Underlined activities were selected for follow up and eventually became case studies.

The survey identified 22 PBS activities located in 12 ITRC states. 13 were characterized by the sponsoring states as regulatory initiatives, and 9 involved PBS contracts. When the survey was conducted during the fall of 1996, 14 activities were in demonstration or operating, and 8 were still in the planning or development phase. By December 1996, the operating group had increased to 16 activities because two DOE contracts were awarded (Hanford Tanks in Washington and Advanced Mixed Waste Treatment Project in Idaho).

The ITRC Policy Team reviewed the survey results in detail and conducted follow up discussions with some of the state personnel who provided survey responses. The team discussed a range of possible ways to explore these PBS activities and concluded that the most-effective approach within the existing resource constraints would be to conduct a limited number of case studies.

2.2 Case Study Selection

The decisions about which activities to select for case studies involved a number of tradeoffs. The team was interested in looking at a variety of PBS applications, preferably more than one of each kind to allow for some comparisons and identification of common themes and issues. The team was also interested in geographic and institutional diversity to the extent these could be achieved within the time and travel funding available.

Ultimately, eight activities were selected by the team and preliminary contacts were made to arrange site visits and interviews with the involved parties, stakeholders, etc. To efficiently use the time and funding available, the team organized itself into three case study working groups. Subgrouping of the Team made it possible to proceed concurrently with the case studies and to match team members with site/interview locations that minimized overall travel requirements.

2.3 Case Studies - Mix and Balance

The eight case studies selected comprise a diverse set of PBS activities. Some characteristics of the group are as follows:

- Two studies cover state initiated PBS regulatory programs involving site cleanups being conducted under a state wide voluntary cleanup program, and a program of self-certification with environmental performance standards in lieu of permits.

- Two studies examine multi-year, multi-billion dollar DOE site management and operating services contracts that are applying PBS concepts within a cost reimbursement plus fee contracting framework.

- Four studies involve the use of PBS approaches on specific site remediation or waste processing projects at (or connected with) federal facilities where there is also significant regulatory involvement by both federal and state agencies. Three of these are DOE contracts involving major long-term nuclear weapons complex site remediation, where both PBS and privatization (fixed price-contracting framework) are being used simultaneously. The other is a PBS driven technology demonstration effort involving DOD, state regulators, citizen stakeholders, and innovative technology vendors.

The team believes that this group of case studies provides some useful information about how PBS concepts are being applied in the environmental arena. We believe that this study has produced some valuable insights, identified important issues and concerns which warrant further study, and provided useful information about: a) performance-based approaches being used to address environmental problems; b) the

evolving roles of the key parties who are engaging in these activities; and, c) whether PBS approaches can be expected to lead to greater use of innovative environmental technologies and methods.

3.0 OVERVIEW OF CASE STUDIES

This section provides a summary description and discussion of the performance-based system (PBS) activities we examined, identifies some of the lessons learned, and presents those findings and conclusions specific to individual case studies. General findings and conclusions are presented in Section 4 of this report. Survey results and the eight case studies are presented in their entirety in the appendices.

3.1 State-Based Regulatory Initiatives

The two state-based regulatory initiatives addressed in this report are part of a much larger group of state-based programs currently underway or under development throughout the U.S. - many of which are voluntary cleanup programs. A survey conducted by the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) in the summer of 1996 identified 32 state voluntary cleanup programs. Another ITRC Policy Team study was recently completed which examined voluntary cleanup and brownfields programs in seven states using the case study approach. What sets these state regulatory initiatives apart from the federal agency PBS contracting activities the team examined is that they generally involve environmental remediations below the threshold where CERCLA[1] or RCRA[2] apply, they are driven by the need to resolve environmental liability issues associated with specific real estate transactions, they are expanding at a rapid rate, and involve thousands of sites, without any significant involvement by federal regulatory agencies. Cleanup standards also tend to be flexible and negotiable, and the states generally do not get involved in deciding the methods or technologies to be used to achieve cleanup results.

3.1.1 Washington State Model Toxics Control Act

In November of 1988, Washington State voters passed the Model Toxic Control Act (MTCA) as Initiative 97, which became effective in March 1989. This Initiative mandates that site cleanups are protective of human health and the environment. Implementation of the Act is the responsibility of the Washington

[1]Comprehensive Environmental Response Compensation and Liability Act

[2]Resource Conservation and Recovery Act

Department of Ecology (WDE).

The MTCA cleanup regulation defines a two-step approach for establishing clean up requirements for individual sites:

1. Establishing Cleanup Standards. The standards provide a uniform, state-wide approach to cleanup that can be applied on a site-by-site basis. The two primary components of the standards, cleanup levels and points of compliance, must be established for each site.

   How cleanup levels are set is dependent upon risk and since eliminating all risk is often not possible, "clean" generally means that a site is cleaned up to the point that contamination no longer poses an unacceptable threat to human health and the environment. The regulation provides three options for establishing site-specific cleanup levels. Each of the options uses health risk as the main determinant in setting levels.

2. Selecting Cleanup Actions. This step involves evaluating methods that could be used to clean a site and then deciding which of those methods would best achieve cleanup standards. These cleanup actions must also provide permanent cleanup solutions during a reasonable time frame and include monitoring to ensure effectiveness.

   With seven years' experience since MTCA was initially put into place, day-to-day regulatory and cleanup practices have settled into patterns. Approximately 90 percent of all cleanups are done independently, without WDE oversight. Independent cleanups allow many smaller or less complex sites to be cleaned up quickly without having to go through a formal process. The one disadvantage to property owners with this approach is that WDE does not approve the cleanup. This may present a problem to property owners who need state approval of the cleanup to satisfy a buyer or lender.

Key findings and lessons learned include:

- There seems to be a need to create a "no penalty for trying" policy when innovative technologies are applied to site cleanups. The risks and costs of failure to individual and local stakeholders is still too great to get companies to try riskier/more innovative (but legitimate) solutions, when the benefits of the cheaper/better solutions will primarily accrue at a state or national level but the risks are borne locally.

- The MTCA program is pursued in a "get it done" fashion that seems beneficial to everyone. The

process has built good will and public support in implementing a flexible, quality driven cleanup program striving for results.

- Some see the recent Policy Advisory Committee recommendations as placing more emphasis on models and complicated equations when they are scientifically incapable of "proving" that one particular option is "safe" or "safe enough."

- Stakeholder participation is critical to any solutions to site remediation.

3.1.2 Massachusetts Environmental Results Program

The Massachusetts Department of Environmental Protection (MA/DEP) describes the Environmental Results Program (ERP) as a bold move away from government telling business and industry not only how much they can emit but also precisely how to do it, to a program "designed to get government out of the business of telling companies how to achieve environmental standards." The objective is to allow MA/DEP to refocus its efforts on setting standards and aggressively enforcing them. The ERP will eliminate the need for thousands of state permits. Instead, companies will need only "(1) commit...to be accountable to a standard of environmental performance, and (2) report or "certify" annually on their compliance with these standards."

The program is just getting underway. Regulations for photo processors and dry cleaners -- industries composed of mostly small businesses that up until now have often been outside of the regulatory structure -- have just been issued. For these initial sectors, the ERP is structured as a self-certification program. It is being complimented by user-friendly workbooks that detail requirements and options (including pollution prevention strategies) for meeting them. The workbooks also contain a form which companies must submit annually (along with a fee) self-certifying their compliance. The MA/DEP has taken particular care to ensure that the information provided in the self-certification can help their targeting of inspections. Significant educational and outreach efforts with industry are planned.

The MA/DEP found it challenging to develop purely performance-based standards for the two pilot sectors. The final standards include some design specifications. The proposed standards included alternative monitoring requirements depending on the control approach that was to be used. Defining the appropriate monitoring (accountability) requirements was a major problem. The final regulations addressed this issue by imposing the most stringent proposed monitoring requirements on all technologies independent of whether or not the mandated level of monitoring was actually needed to ensure compliance. The MA/DEP has invested additional resources up front to design the ERP program but anticipates lower costs and improved

environmental results in the future. The MA/DEP program was constrained by a lack of regulatory and enforcement flexibility by the USEPA, but was also assisted by the USEPA through grant funding.

The ERP has not succeeded in figuring out how to always design performance standards so that they promote innovation. They hope to be more successful as they address future sectors.

The ERP appears to represent a vehicle for achieving a more effective (less emissions), lower cost (to industry and the state), and less confrontational (more flexible) approach to environmental regulation. It has not yet solved the problem of getting the government out of the business of telling industry how to meet requirements, although the telling is less used now and is being done jointly by government and industry. To date the pilots have succeeded only to a limited extent in easing the path facing new technologies. And even here the "effective" need for information on new technology to be included in the work book before it is likely to be accepted, may have replaced the regulations themselves as a barrier to the widespread deployment of innovative technologies. Separate programs (such as Massachusetts' STEP[3] program) are still needed to ease the path for innovations. Such programs must address, from a system perspective, the full range of regulatory and non-regulatory (market) barriers that create unacceptable risks to innovators in the environmental arena. EPA should aggressively support and provide flexibility for these programs.

3.2 Federal Multi-Task Site Service Contracts

Federal departments and agencies have a long history of contracting with the private sector for services involving the management, operation, and maintenance of large federal facilities. The major National Aeronautics and Space Administration (NASA) sites, DOD National Test Ranges, and DOE Weapons Complex sites, among others, tend to procure these services under various types of cost reimbursement type contracts. Typically these contracts are very large (hundreds of millions of dollars annually and thousands of employees), include a very broad range of services and activities (landscaping to rocket launching to nuclear facilities operation), and employ a variety of contracting techniques which attempt to create incentives by linking the level of performance achieved to contractor profits (fees paid).

With the shift in national priorities from nuclear weapons production to cleanup and restoration of the weapons facilities, the DOE site services contracts are increasingly involved with environmental tasks, from developing new technologies, to cleaning up sites and processing waste. DOE is also heavily committed to implementing contract reforms as part of the broader national goal to reinvent government and get more

[3] Strategic Technology Environmental Partnership

value from increasingly constrained federal funding. With the active cooperation and assistance of DOE, the PBS team reviewed two of these major site services contracts. They are at DOE facilities whose current mission involves significant environmental activities, and where DOE has undertaken a major commitment to implement PBS concepts on a large scale.

3.2.1 INEEL Maintenance and Operating Contract

In 1994 the U. S. Department of Energy (DOE) recompeted its Idaho National Environmental and Engineering Laboratory (INEEL) Maintenance & Operating (M&O) contract, and a new contract was awarded at the beginning of FY 1995. The incumbent (EG&G) was replaced by Lockheed-Martin Idaho Technologies Company (LMITCO), and the contract was structured to link fees directly and exclusively to contractor performance through the application of award fee and incentive fee criteria. The contract covers five years, is expected to cost about $3.6 billion and employs roughly 6,000 people. The work is about 60% cleanup and 40% research and development.

This is a cost reimbursement (time and materials) contract, but it involves the transition (over the five year contract period) from award fees paid based on subjective DOE assessments of the contractor performance to incentive fees based on explicitly-defined and objectively-measured results. In FY 1996 about 25% of the work was in this new performance based incentive fee category. The plan is to increase the incentive fee ratio to 80% of the total contract work by FY 1999.

DOE believes implementation of this performance based contract reduced employment requirements by over 1,000 people while accomplishing essentially the same amount of work and will save about $740 million over the five- year contract period. In addition, unambiguous criteria/specifications are reducing DOE monitoring costs. Based on FY 1996 results, there is a strong incentive for LMITCO to do more work under the performance-based fee approach because they are likely to earn higher fees.

Key findings and lessons learned include:

- There is general agreement between the DOE Idaho Operations Office (DOE-ID) and LMITCO that this performance-based approach is beneficial to both organizations. However, they are both finding it increasingly challenging to expand this approach to cover most of the contract work. One person summed it up as: “the low fruit has already been picked.”

- LMITCO would like to see higher risk of achieving performance levels offset with higher potential profit. They believe that DOE is shifting risk without offering appropriately greater reward incentives. DOE is concerned about how to get more work done with less resources.

- We did not identify any specific innovative technologies being developed or used as a direct result of implementing this contract. However, we did observe that there are strong incentives for both DOE-ID and LMITCO to seek out and implement measures that produce better outcomes at lower costs. These incentives are already producing innovation in management and operational approaches. To the extent that innovative technologies are available and superior to conventional methods, we would expect LMITCO to advocate their use in this contract. However, for innovative technologies to be used, both LMITCO and DOE-ID need to either have high confidence that the technology will work and out perform the alternatives, or they must be willing to accept some level of risk that the new technology may not be successful. In addition, if the actions to be taken are subject to regulatory control, then state regulators may need to be convinced to use a performance-based approach.

- This contract is providing a valuable opportunity for DOE and LMITCO to perfect the art of performance-based contracting, and to transfer the lessons being learned here to other major DOE performance-based contracts planned or in process. It also provides an effective way to train technical, management and contract personnel in the use of PBS concepts and to experiment with various approaches to defining performance and linking it to rewards.

- There appears to be very little regulator and stakeholder involvement. Since a significant portion of the activity is regulated, both DOE-ID and LMITCO would benefit if they made a greater effort to involve stakeholders and regulators in defining the work and performance levels for tasks under this M&O contract. This is especially important for site cleanup tasks where regulators and stakeholders need to take some ownership of performance-based objectives, related incentives, and inherent risks.

- This performance-based contract gives LMITCO the flexibility to use innovative technologies, or innovative approaches to solving problems. By providing this flexibility, some barriers to getting approval to use such approaches are being removed. The incentive to use innovative approaches really comes from the potential of doing the job at lower cost, and likely higher profit to LMITCO.

- While performance-based features in this contract shift more of the responsibility for job-specific performance to LMITCO, DOE still remains responsible and accountable for bringing themselves into regulatory compliance. Consequently, it would be appropriate for DOE-ID, LMITCO, and Idaho state regulators to view their relationship, under the PBS approach, as a partnership.

3.2.2 Project Hanford Management Contract

The Department of Energy awarded the five-year Project Hanford Management Contract (PHMC) as a performance-based Management and Integration (M&I) contract for the Hanford site to Fluor-

Daniel, Hanford on October 1, 1996. PHMC was designed partially in response to concerns about escalating costs of operations. The contract places emphasis on the application of commercial methods of management (rather than federal practices) to the extent practical.

Site funding for the Hanford site through 2001 (including fee pool) is anticipated to be nearly $5.1 billion. The site currently employs approximately 16,000 people. The PHMC is expected to reduce the workforce by about 25% through efficiencies from reduced duplication and from PBS rather than "command and control" operations. Some stakeholder representatives are skeptical about the degree to which actual cost-savings will accrue, and to whom those savings will revert.

Since this is such a new project, there is little concrete information as to the effectiveness of the system. During the Request for Proposal (RFP) process, DOE provided offerors with baseline objectives. The RFP linked management objectives with Hanford multi-year plans already in place, including appropriate Milestones from the Tri-Party (DOE, EPA, and the State of Washington) Agreement. One of the objectives (for Technology Management) in the contract aims to "incentivize" the application of innovative technologies.

Contract performance objectives, goals and related measures are negotiated between the M&I contractor and DOE each fiscal year. The PHMC is expected to reduce cost of operations through more efficient use of resources.

The Site Specific Advisory Board at the Hanford Site, known as the Hanford Advisory Board (HAB) had some limited review of the PHMC. Several stakeholders we spoke with stated that the comments and revisions they offered were not adequately factored into the process and final product. Part of this disconnect probably arose from the fact that the Site was attempting to define performance objectives and measures after the RFP "hit the street," and comments proffered were addressing different products. Specific advice from the HAB, among other things, requested definition of performance objectives to identify expectations during the contract period of performance.

Fluor-Daniel Hanford was to have developed a site-wide Health and Safety Master Plan for an integrated health and safety policy for all Hanford site contractors. The Policy presented was deemed inadequate by site management (as well as by the site-specific advisory board). Therefore, Fluor did not receive a possible

$2 million performance fee. Fluor expressed concern that DOE is attempting to get back into the "details" of management through re-writing specific language.

Since this contract is newly awarded, time is required to see how the applied lessons learned develop. The contract team from DOE has stated their impression that this is the next step, and that the next round of performance-based contracts will improve on the PHMC contract much as they have tried to build off previous experiences.
Some issues and findings from the case study include:

- DOE is attempting to become more responsive to Congressional and community stakeholder concerns about "cost-effective" management; the expectation is that PBS will yield cost effective operations at the site.

- It is unclear whether "flexibility to select innovative technologies" is equivalent to an incentive to use innovative technologies, and also whether the regulatory milestones referenced (arguably driving the baseline schedules and objectives) allow sufficient latitude to use innovative technologies.

- There needs to be a formal process to provide responses to comments in order to prevent such dissatisfaction that valuable input will no longer be provided to improve processes.

- DOE has attempted to clearly define needs, but it is not clear if it is also "re-defining" the approach to allow for changing conditions.

- At what point does definition of performance (outcomes) become definition of operations (methods to achieve outcomes)?

3.3 Federal Site Remediation and Waste Management Projects

There are a number of federal agencies that are engaged in contaminated site cleanup and waste management projects. Foremost among them are DOE, DOD, and EPA. DOE is engaged in a massive long-term effort to clean up the environmental legacy of the cold war, processing nuclear wastes and remediating large tracts of contaminated land and weapons facilities. DOD has an ongoing challenge to clean up the bases and facilities under its jurisdiction worldwide, including facilities targeted under the Base Realignment and Closure (BRAC) mandates. EPA has been engaged with Superfund cleanups for a number of years. These federal environmental activities involve the expenditure of tens of billions of dollars annually, are expected to continue for many years, and represent a significant market for innovative environmental technologies. The four case studies presented here involve three separate DOE projects dealing with waste

processing and site remediation using PBS and fixed-price contracts, and one case study involving DOD and a state government using PBS techniques and extensive stakeholder involvement to test and competitively select a site remediation technology from among several innovative alternatives.

3.3.1 Pit 9 Technology Demonstration at INEEL

The Pit 9 Project is a DOE full-scale demonstration to retrieve and treat an estimated 150,000 cubic feet of mixed transuranic, low-level radioactive and hazardous waste from a burial pit at the INEEL. The three-phase project is being conducted by a subcontractor to the primary DOE contractor, as an Interim Action under CERCLA, in accordance with a Record of Decision (ROD) under the DOE Idaho, EPA Region X, and the State of Idaho INEEL Federal Facility Agreement and Consent Order.

The Pit 9 ROD, signed in October 1993, established 10 nanocuries per gram (nCi/g) transuranic content as a radioactivity related treatment decision threshold. Pit 9 contains contaminants that would currently cause the wastes to be RCRA listed and toxicity characteristic (TC) wastes. The Pit 9 ROD allows retrieved wastes that are less than or equal to 10 nCi/g transuranic content to be returned to the pit without treatment. In addition, treatment residuals containing RCRA listed wastes that are to be returned to the pit must contain no more than 10 nCi/g transuranic radionuclides and meet the ROD delisting criteria. Six listed wastes are delisted through the ROD so long as they are not characteristic waste and meet specific risk-based concentration levels given in the ROD for leachate and for total content. For treated waste residuals that contain more than 10 nCi/g transuranic radionuclides and cannot be reburied in the pit, the ROD identifies RCRA Land Disposal Restriction (LDR) standards as a treatment goal.

In Phase I of the project, two contractors successfully demonstrated several critical aspects of their proposed technologies in "proof of process" tests. One of these contractors was selected to complete the project in two additional phases. Phase II is a Limited Production Test, and Phase III is the final Remedial Action. An additional decision point is included at completion of Phase II, before Phase III is authorized. Two key early 1996 regulatory milestones (90% comprehensive design review and Remedial Action Plan) had not yet been met in early 1997, resulting in $940,000 in fines levied by EPA against DOE. In March, 1997, DOE, EPA, and the state reached a negotiated settlement agreement that required a revised Remedial Design/Remedial Action Scope of Work to be submitted by September 30, 1997, on how the Pit 9 interim action is to proceed.

The lessons learned include successes as well as areas in which improvements could be made in the future:

- Some of the primary lessons learned, as stated by DOE, are to preserve flexibility, allow time to do it right, keep stakeholders involved, and have clearly stated requirements and objectives.

- Completeness and clarity of requirements are key.

- Development of performance-based criteria for innovative cleanups, including demonstrations, needs to consider flexibility for changes, and sufficient project definition (and related check points) to measure progress and manage risks. Determining what flexibility may be needed is itself a part of the risk evaluation and management process. Such flexibility may include developing feasible "fall back" and "follow up" positions to allow technical and regulatory changes to be incorporated.

- Technical refining which may be needed to successfully demonstrate technologies may increase costs and extend scheduled milestones during the overall project in ways that cannot always be predicted at the outset. The use of phased projects with separate performance criteria and decision points at the completion of each phase, as in the Pit 9 project, can be helpful in addressing such problems.

- Risk evaluation and risk management in defining the project, picking the contract mechanism(s), sharing risks, assessing cost effectiveness, and setting the technical performance criteria are factors that must be considered. Risk evaluation and management need to be an integral part of performance-based strategies, whether for contracting, regulatory processes, or regulation development. Inclusion of "performer past performance" criteria in selecting a performer for fixed-price contracts is one way of partially managing risk.

- Good communication must be established and maintained between all involved parties, including stakeholders. Layering of communications, e.g., by multilayered subcontracts, increases the complexity/difficulty of communication.

3.3.2 Advanced Mixed Waste Treatment Project at INEEL

On December 20, 1996, the U.S. Department of Energy Idaho Operations Office (DOE-ID) awarded a $1 billion contract for the design, permitting, construction, and operation of a contractor-owned Advanced Mixed Waste Treatment Project (AMWTP) on INEEL-leased land. The project will process low level alpha and TRU mixed (radioactive and hazardous) wastes located at INEEL; the contract is directly between DOE and British Nuclear Fuel Laboratories, Inc (BNFL), rather than through LMITCO, the site

Management and Operations contractor.

The contract is structured in three phases with "go/no-go" decisions at each phase, and fees awarded only after Phases 1 and 3 are completed. DOE has a follow-on option to have the AMWTP treat additional waste, from INEEL and non-INEEL sources.

State regulators were asked to participate in contract development but declined. Regulatory requirements were not specified in the final contract beyond standard DOE language regarding "all applicable" state and federal regulatory requirements. A draft of the RFP was circulated to the INEEL Citizen's Advisory Board prior to issuance; comments received were factored in to the RFP issued. Part of the contract bid required development of a public involvement plan during the feasibility study. In addition, Phase 1 will include a variety of public comment periods.

This project did not encourage the use of innovative (i.e., "new" or "emerging") technologies. Based on lessons learned from other DOE contract activities, this project was awarded to a team with experience treating similar waste streams with commercially available technologies. DOE remediation activities operate under a rigorous regulatory structure with aggressive milestones identified, which encourages the use of "known" contractors and/or remediation approaches.

Since this contract is newly awarded, time is required to see how the applied lessons learned develop. The contract team from DOE has stated their impression that this is the next step, and that the next round of performance-based contracts will improve on the AMWTP contract much as they have tried to build off previous experiences.

Areas of this contract which may generate the most valuable information include:

- Application of the phased approach - will DOE and BNFL be able to maintain the fee payment schedule they have laid out?

- Regulatory requirements - will DOE, the regulators, and the contractors agree on how to meet layers of requirements for the final permitted and operating facility?

- Contract "management" - what will be the effect of having direct links between DOE and the facility contractors?

- Stakeholder involvement - will the early commitment to stakeholder involvement continue and improve through the contract period; what are the stakeholders' impressions?

3.3.3 Hanford Tank Waste Remediation System Design

On September 25, 1996, the DOE Richland Operations Office awarded a contract to acquire Hanford tank waste treatment services at a demonstration scale using privatized facilities. The project has two phases, with Phase 1 being a "proof-of-process" approach. Phase 1 is further divided into two parts, with the first as a 20-month (ending June 1998) period and the second part lasting 10 to 14 years. Phase 2 is full-scale operations, which would include another competitive procurement process (re-compete for Phase 2) and is expected to integrate technical and management improvements and lessons learned.
Fixed-price contracts for Phase 1 were awarded to two teams: one led by BNFL, the other by Lockheed-Martin Advanced Environmental Systems (LMAES). The two $27 million contracts are for the conceptual design and business plan for Part A deliverables. Part B of Phase I is a commercial demonstration phase designed to treat 6 to 13% of the tank wastes at Hanford on a fixed unit price basis and contract awards are presently scheduled for July 30, 1998.

Primary objectives for the Tank Waste Remediation System (TWRS) procurement are to demonstrate the technical and business viability of using privatized facilities for waste treatment; define and maintain required levels of radiological, nuclear, process and occupational safety; maintain environmental protection and compliance; and, substantially reduce life-cycle cost and the time required to treat Hanford tank waste.

DOE has no experience yet or data, but have estimated that a competitive bid process could reduce costs by as much as $10 billion or up to 30% savings overall compared to previous life-cycle cost analysis. DOE's management of risk relative to cost increases are to be managed to acceptable levels by maintaining "competition" among vendors.

The original intent of DOE was to have competition for the award, with "best in class" proposed teams; two teams encompassing nearly the entire market of vendors submitted proposals. DOE decided to fund both proposals. To protect proprietary information, much information and development of the process was undisclosed; little opportunity for stakeholder input was provided. When stakeholders provided input, they were not satisfied that recommendations were taken into account.

Performance objectives do not appear to create particular incentives for using innovative approaches, yet the contract does not preclude their use. The technologies required to perform this task are, in some cases, newly developed or "cutting edge" technologies in glass vitrification or molten metals separations.

Due to the nature of the problem, it is expected that innovative (i.e., "new" or "emerging") technologies will be required. The demonstration and proof of process in Phase I assumes the need for innovative

technologies, with either these (now) proven technologies, or improved methods being used in the Phase II commercial activities.

Phase II will require another competitive procurement process to select private companies that would invest their own money to design, build, and operate full-scale waste treatment and solidification facilities to process the remaining tank wastes. The availability of private investment for Phase II is expected to be contingent upon satisfactory demonstration of the technologies during Phase I.

Key findings for this case study include:

- Contractors see that DOE is loading them with an enormous amount of risk (technical, legal, financial) and that the contractor will not be proportionally rewarded for assuming that risk with any financial incentive or other means.

- Regulators and some stakeholders see DOE using the privatization approach as a buffer for risk and may not be correctly implementing their regulatory mandate or role in accepting the risk (i.e., responsibility and liability) and ensuring that the nuclear legacy of Hanford's tank waste from plutonium production is being addressed.

- Competition for a "more cost-effective" process was a driver, yet only limited competition occurred, casting doubt on the cost-effectiveness of the final products.

- Risks are unclear; stakeholders were not convinced of the capability nor reliability of responses to specific inputs.

- The "unknown" aspects of the cleanup needs do not seem to lend themselves to clear definition of performance objectives.

- Productiveness of the phased approach used here may not be recognized, due to the extended periods of the "phases;" this presumes a high degree of confidence in the contractors, probably based on the "competitiveness" of the award process.

3.3.4 Plume Containment in Massachusetts

In 1996 the Massachusetts Department of Environmental Protection (MA/DEP), Bureau of Waste Site Cleanup, Contracting and Procurement Division explored piloting a performance-based standards contract to determine award for plume containment at a privately-owned site adjacent to the Massachusetts Military

Reservation (MMR) on Cape Cod. The MA/DEP needed a contracting mechanism with clearly defined performance standards in order to assess an innovative in-well stripping technology relative to a more traditional remediation alternative. The MA/DEP has put the contract on hold. However, due to strong stakeholder pressure on the remediation selection process on the Cape, this technology has been incorporated into a three-way technology demonstration for plume containment at MMR.

As discussed below, this case study is an excellent example of how stakeholder involvement in remediation design and selection can mitigate some of the risk involved in the development and deployment of innovative technologies.

The federal facility nature of MMR led to the creation of a multi-layered public input and oversight process that gave citizens the opportunity to prioritize their sociological, economic, aesthetic, and political (SEAP) criteria in the remediation selection process. In early 1996, communities surrounding MMR rejected a remediation design that would have used traditional pump and treat on a massive scale to remediate five plumes emanating from the base. This action gave an opening for both SEAP influence on technology selection and project design and for the vendors to present another technology as a viable alternative. Everyone interviewed for this case study emphasized that the tenacity of citizen stakeholders in assuring that their criteria got an equal voice in the remediation technology selection was the single most important factor in pushing state and federal officials to consider using the innovative technology. The in-well stripping technology also has the potential to be much less costly than pump and treat.

Even though DEP has put the contract on hold, the process allowed the DEP to expand beyond traditional oversight to a more active partnering in the process of innovative technology development and deployment.

By MMR and the DEP accepting common SEAP criteria as performance standards, the demonstration should provide results that will have common applicability. Both senior Air Force and DEP officials realize the next step is to ensure verification meets Air Force and DEP standards.

There are a variety of institutional and cultural barriers that discourage innovative technology development and deployment both in the DEP and the military. The primary barrier is the risk of failure and associated cost overruns. This creates a false dichotomy between the interests of the implementing organization(s) and the public. For both DEP and military officials, heeding SEAP criteria, and knowing there was public support for their choice, mitigated much of the risk associated with utilizing an innovative technology.

This project is demonstrating that developing effective processes to solicit and integrate SEAP criteria into remedy design and selection can reduce cost as well as institutional and cultural barriers to innovative technology development and deployment. This is especially important in the current climate of declining technology budgets which enhances the cost of failure.

There are a variety of DOD and service branch barriers to innovative technology development and deployment which include: decreasing budgets for remediation and the subsequent downgrading of technology R&D (downsizing of cleanup offices and related R&D facilities has overburdened remaining qualified personnel); historical regulatory-driven relationship with the states; and lack of integrated multi-service protocols or information systems.

In general, the team learned a number of lessons about the difficulties that deployment of innovative technology faces within performance-based contracting. Many of these lessons are applicable to other contracting vehicles as well. These lessons and some observations on possible solutions include:

- Site managers are less inclined to give priority to innovative technologies as part of performance-based contacting.
- If there is a performance-based contract, it might be useful to have a performance based ROD.
- At a complex site, performance may need to be subdivided into multiple units or discrete sections.
- It may be necessary to combine design and construction into a turnkey operation.
- Proprietary information can be a significant cost driver that inhibits the introduction of new technology into remediation design.
- Performance-based bid may require second round bid as new problems come up, particularly design changes due to SEAP-type issues.
- Guardians of public funds are often willing to spend more for what they perceive as a certainty and speed, even though they may not get the results they want or need.
- Failure to heed stakeholder or accumulated SEAP criteria can result in increased costs for site characterization and remediation.

4.0 FINDINGS AND CONCLUSIONS

A performance-based approach to remediation of contaminated sites or regulation holds much promise in achieving more for less. However, this outcome is not a given; proper design and implementation of a

performance-based system is essential. In addition, while performance-based systems can allow for innovation, additional supporting programs at the federal and state level are needed to promote innovation and remove barriers. Careful design is essential to ensure that new barriers to innovation are not created and that environmental quality goals are achieved and not compromised in any way. The definition of what is to be accomplished environmentally, and how it is to be measured, are difficult but essential cornerstones to a successful program.

The cases we investigated represent a broad spectrum of diverse and somewhat unique activities. Our team is composed of individuals with a wide range of technical, regulatory, and management backgrounds. We have a variety of perspectives. This diversity of subject and viewpoint helped us all to learn a great deal about both PBS and the people and organizations that implement them. This section presents our general findings and conclusions. It reflects our consensus (but not necessarily unanimous) view. Specific findings and conclusions related to individual projects are presented in the individual case studies.

4.1 General Findings

Adequately defining the desired "performance requirements" or "expectations of performance" was a problem in all cases studied. This often was the result of a lack of sufficient information in the areas of: project definition, technical requirements or aspects, risk (total and allocation to parties), social, economic, aesthetic, regulatory, and political knowledge of the project. Other key causes included: (1) lack of sufficient (low cost) monitoring methods to define the problem or measure performance, and (2) failure to allow for refinement of requirements in the face of (new) approaches with unforeseen environmental impacts. It also became apparent that applying a performance based contract or approach to large complex remediation sites or problems compounded the uncertainties and in some cases, was being attempted without an adequate level of experience in the techniques being applied.

The phrase "performance-based" covers a range of contracting and regulatory mechanisms that resist easy categorization and that are designed for different applications and purposes. For example, the term performance based is applied without distinction to a contract specification to reduce the number of workers at a lab and to the requirement to achieve specified environmental results. This broad definition of the phrase "performance based" creates confusion and needs clarification.

At some Department of Energy (DOE) sites, DOE is simultaneously implementing performance-based approaches to contracting and contract reforms such as privatization (fixed-price contracting) on major DOE site environmental projects. Many people seem to be unaware of the differences between performance-based approaches and privatization initiatives, and are, therefore, unclear about why and where each is appropriate. DOE's requirement that all "privatized" contracts be fixed price may have

adversely effected some DOE PBS applications. The DOE is trying to achieve better environmental results while shifting the risk of failure to contractors. However, DOE cannot totally shift ultimate responsibility to the contractor and, therefore, must share in the risk of non-compliance. Further, where the risk is high and/or solutions unknown, industry is likely to charge a steep premium before accepting financial liability.

Stakeholder involvement is key in the development and overall performance of a sustainable performance-based system. However, the opportunities to involve the stakeholder in key decision making or performance matrix definition is shrinking due to the related processes of Request-For-Proposal (RFP) development, contract negotiation and ultimately contract award. Once a contract is awarded it becomes very expensive to alter or change (but this may be necessary). Stakeholder involvement that did occur was often too early in the process and the input provided by the stakeholders wasn't reflected in the final contracts or products produced. Confidentiality cannot be used as a reason to by-pass the stakeholder process.

4.1.1 PBS as Part of a Larger System

Performance-based approaches will function properly only if they are accompanied by corresponding changes in the total system environment within which they operate. Developing and implementing a performance-based system also requires a culture shift in the government organizations attempting to implement it.

To assure successful application of performance-based systems, more training and guidance to personnel may be needed. Resources needed to design and implement performance-based systems are often, at least initially, more expensive for the contracting/regulatory agency. They may also require the application of different skills by agency personnel (e.g., inspectors to assess actual environmental performance and not just the existence of operating control equipment).

Accountability/monitoring requirements for contractors and/or the regulated entity are often more extensive and expensive than under the traditional "command and control" systems. In addition, performance-based approaches to site remediation face greater problems when the contamination or problem being addressed is inadequately characterized or when a feasible solution is unknown. Provision should be made for future development and demonstration of new technologies to measure performance.

4.1.2 PBS and Innovative Technology

Performance-based regulations and contracts are necessary to allow, but seldom sufficient to promote, the

commercialization and deployment of innovative environmental technologies.

Performance-based systems must anticipate the need to respond to the proposed application of new technologies. This response may require, for example; (1) additional time be provided for debugging at start-up or (2) the addition of new performance criteria once the proposed technology application's environmental impacts are seen (stakeholders can play an important role in defining these new criteria). Regulatory authorities and site managers are inclined to give low priority to innovative technologies even as part of performance-based contracting because of an unwillingness to assume the potential risk of failure. In an environment increasingly demanding the completion of site remediations, delays and potential cost overruns due to the application of innovative technology are viewed as unacceptable - even if the innovation promises better results at lower costs. Managers charged with cleaning up sites (or regulating emissions from sources) are too pressed by other priorities, and too parochial, to be responsible for promoting the commercialization and deployment of innovative technologies. From their perspective, the national benefits of technology innovation are too remote and abstract to justify the risks involved. This means that separate programs must be established and maintained to oversee and promote the introductions of new technologies into the market place.

Application of innovative technologies face a wide variety of regulatory barriers (i.e., barriers other than normal market risks faced by any new technology) beyond those that are addressable by performance-based systems. Examples of other issues at the federal and state level that must be addressed to promote deployment of innovative technologies include:

- Technology demonstrations acceptable to regulatory authorities;
- . Sound, reasonably priced monitoring mechanisms for verifying ongoing effectiveness;
- . Incentives for sources to control to levels beyond those mandated by standards;
- . Suspicions of new technologies by regulators, permit writers, enforcers, and environmentalists;
- . Market segmentation and inadequate lead time for new technologies to be developed to meet new requirements;
- . Emission point specific instead of facility wide performance standards that limit plant wide solutions;
- . Lack of time for fine tuning new applications;

- Lack of soft landings in the event of inadequate performance, and;
- . Risk/liability aversion by key stakeholders.

Lack of multi-state acceptance of (domestic or international) demonstration results, drives up the cost of developing and/or using innovative technologies for the federal, state and private sectors alike.

Incentives that promote the use of innovative technologies must exist for each and every stakeholder - performer, customer, regulator, financier, developer and citizens. Such comprehensive incentive systems did not exist in the performance-based systems we studied.

Without some type of soft landing, compliance cushion, or flexibility for using innovative approaches, continuation of the enforcement programs necessary to maintain environmental quality will represent a barrier to the deployment of innovative technologies.

The flexibility necessary to use, change, and refine innovative technologies during implementation is hindered by rigid regulatory schedules, and by RODs, contracts, permit conditions, or other requirements and implementation practices that prescribe or unnecessarily favor specific technologies. More flexibility to innovate/refine during implementation can be afforded by using PBS in a systems context, combined with more flexible contracts and regulatory schedules. Performance-based approaches must be accompanied by corresponding changes in the total system environment within which they operate. For example, performance-based contracts may need to include: performance- based RODs, combined design/construction RFPs, performance-based criteria that recognize that different criteria may be needed for different technologies, and technical panels willing to accept performance based proposals. Similarly, performance-based regulations may require: modified approaches to regulation, permitting, enforcement and source self-monitoring accepted at both the State and Federal levels. If designed inappropriately, performance-based standards can become as much of a barrier to innovative technologies as design specific standards, e.g., if their testing requirements rule out the opportunity for small companies to market innovations, or create perceived or real disincentives for buyers/users.

4.2 General Conclusions

Performance-based approaches to contracts and regulatory requirements designed and implemented as part of a comprehensive program, can provide the flexibility needed for innovation, lower costs, and better

performance. Issues identified here should not be viewed as insurmountable impediments, rather the information obtained from this analysis of performance-based systems (in environmental site remediation and regulation) can be used to enhance the future development of such systems. Traditional command and control systems face similar problems and do not offer all of the benefits of a comprehensive performance-based systems approach. The following represents some general themes and findings of our study.

Successful promotion of innovative technology requires that all incentives and disincentives faced by each stakeholder be addressed. Elimination of technology specific requirements (standards) in favor of performance-based standards addresses only one piece of the total problem.

Programs specifically and solely charged with promoting the commercialization and deployment of innovative technologies must be continued. This includes programs addressing regulatory and enforcement barriers (at EPA and the states) as well as demonstration and development type programs. Only advocacy programs are encouraged to and can regularly take the risks inherent in using techniques and methods that include innovative technologies.

Financial and contractual, as well as regulatory, incentives to encourage use of innovative technologies must be provided if giant leaps or breakthrough innovations are to be realized.

There is a need to continue doing case studies on performance-based systems including contracts and regulations in order to better define the total system changes necessary to provide appropriate incentives and risk allocations, particularly since they vary with the system being addressed.

Federal agencies demonstrating innovative waste remediation technologies should (for major demonstrations) be required to invest a portion of their funding into ensuring that the results will be acceptable to a wide range of those regulatory agencies who may be called upon to approve the technology's use at other sites.

Federal and state agencies and industry should integrate stakeholder input early and consistently into (1) the process of developing performance-based systems that encourage innovation, and (2) technology demonstration and deployment activities.

Mutual acceptance of demonstration and deployment results by state, federal, academic, and industrial entities is needed. There needs to be further definition of what mechanisms are most appropriate for this cross-cutting acceptance and what structures are needed to implement them within and among the various sectors.

There is a need for a nationally maintained data system with adequate distribution mechanisms to provide information on technology and system verification efforts acceptable to multiple parties.
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APPENDIX A

ACRONYMS

ACRONYMS

AMLLW	Alpha Mixed Low Level Waste
AMWTP	Advanced Mixed-Waste Treatment Project
ARAR's	Applicable or Relevant and Appropriate Requirements (Under CERCLA)
ASTSWMO	Association of State and Territorial Solid Waste Management Officials
BDAT	Best Developed Available Technology
BNFL	British Nuclear Fuels Laboratories, Inc.
BRAC	Base realignment and Closure
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
DEAR	Department of Energy Acquisition Regulations
DOD	Department of Defense (United States)
DOE	Department of Energy (United States)
DOE/EM	Office of Environmental Management, U.S. Energy Department
DOE-ID	Department of Energy Idaho Office
DOE-RL	Department of Energy Richland Office
D&D	Decontamination and Decommissioning
EPA	Environmental Protection Agency (United States)
ERP	Environmental Results Program (Massachusetts) - see Appendix E
ERP	Environmental Restoration Program - see Appendix K
FAR	Federal Acquisition Regulations
FFCA	Federal Facilities Compliance Act
FL	State of Florida
GAO	General Accounting Office (United States)
HAB	Hanford Advisory Board
ID	State of Idaho
IL	State of Illinois
INEEL	Idaho National Environmental and Engineering Laboratory
ITRC	Interstate Technology and Regulatory Cooperation (Working Group)
LA	State of Louisiana
LDR	Land Disposal Restriction
LMAES	Lockheed-Martin Advanced Environmental Systems Company
LMITCO	Lockheed-Martin Idaho Technologies Company
LPT	Limited Production Test
MA	State of Massachusetts
MACT	Maximium Achievable Control Technologies
MADEP	Massachusetts Department of Environmental Protection

MMR	Massachusetts Military Reservation
MTCA	Model Toxics Control Act (State of Washington)
M&I	Maintenance and Integration (Type of Contract)
M&O	Maintenance and Operation (Type of Contract)
NASA	National Aeronautics and Space Administration
nCi/g	Nanocuries per gram
NEPA	National Environmental Policy Act
NJ	State of New Jersey
NPL	National Priority List (Superfund Cleanup Sites)
NRC	Nuclear Regulatory Commission
OH	State of Ohio
OR	State of Oregon
OSHA	Occupational Safety and Health Administration
PA	State of Pennsylvania
PBS	Performance Based Systems (Contracts and/or Regulations)
PCB	Polychlorinated Biphenyls
PHMC	Project Hanford Management Coordination (Contract)
PINE	Printing Industry of New England (Trade Group)
POL	Petroleum, Oil, Lubricants
POP	Proof-of Process
RBCA	Risk Based Corrective Action
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposals
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
R&D	Research and Development
SD	State of South Dakota
SEAP	Socio-economic, Aesthetic, and Political (criteria)
SEB	Source Evaluation Board
SSAB	Site Specific Advisory Board
STEP	Strategic Technology Environmental Partnership (Massachusetts program)
TCE	Tetrachloroethylene
TPA	Tri-Party Agreement (Hanford Site)
TRU	Transuranic Waste
TWRS	Tank Waste Remediation System
TX	State of Texas
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank(s)
WA	State of Washington

WDE	Washington (State) Department of Ecology
WIPP	Waste Isolation Pilot Plant
XL	Environmental Excellence and Leadership Program (USEPA)

APPENDIX B

ITRC Contacts, Information and User Survey

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APPENDIX C

State Responses to PBS Survey

STATE RESPONSES TO PBS SURVEY

1. Florida: One contracting area identified

An initiative is in the development stage to apply performance-based contracting to the state-funded petroleum cleanup program, with the aim of lowering the cost of cleanup and reducing the level of regulatory oversight of cleanup contractors. Florida Department of Environmental Protection/Bureau of Waste Cleanup hopes to implement several performance-based contracts within the next 6 months. Identified issues involve how cleanup milestones should be established, monitoring well concentrations, and contaminant mass reduction. It is also expected that this initiative will encourage consultants to experiment more with innovative processes and techniques. *[Tom Conrardy, Florida FDEP/Bureau of Waste Cleanup, 904-448-3935, fax 904-922-4368]*

2. Idaho: Three contracting areas identified

The U. S. Department of Energy has three contracting initiatives at the Idaho National Environmental and Engineering Laboratory (INEEL) which are using performance based contracting approaches. One is the site Maintenance and Operating contract for the INEEL which is a cost plus award fee type contract. The other two contracts are for waste processing and site cleanup work using the DOE privatization strategy which involves fixed price contracting. *[David Eaton, Lockheed-Martin Idaho Technologies, 208-526-8094, fax 208-526-1061]*

3. Illinois: Two regulatory areas identified

Regulations currently in place to allow use of performance-based standards for treatment of Potentially Infectious Medical Wastes (PIMW) by generators. Current coverage limited to thermal, chemical, and irradiation treatment methods. The new approach has increased the use of some alternative technologies. *[Ted Dragovich, Disposal Alternatives Unit, IL/EPA 217-524-3306, fax 217-524-3291].*

Voluntary cleanup program is in development which will allow the

participant to select the remedy based on end use and risk. First step is formal proposal to environmental judicial branch of Illinois government on September 15, 1996. Inherent issue is use of risk-based corrective action. Expectation is that this approach will reduce the cost of remediation. *[Rick Lucas, manager, State Sites Unit, IL/EPA 217-782-0462]*

4. Louisiana: One regulatory and one contracting area identified

State is working on a Risked Based Corrective Action (RBCA) Program that establishes a consistent set of cleanup criteria for various media which allows the regulated entity to choose the technology used to meet the criteria. The Program, initiated by the previous DEQ Secretary, was prompted by a need to establish consistency in Department ordered cleanups and to satisfy minimum remediation standards promulgation as required by ACT 1092 -- the Voluntary Investigation and Remedial Action Bill. The first draft of the RBCA document was issued August 1995 with 900 comments received from the public after an informal comment period. The document is currently being revised and policy issues identified. Issues presently identified include self-implementation, soil reuse, administration of Program, promulgation criteria, groundwater classification, time-frame, and funding. Expectations are that there will be wide use of alternative technologies to achieve the consistent levels of cleanup specified.*[John Halk, Program Manager LDEQ/IASD, tel 504-765-0487/fax 504-765-0484].*

Developing a Performance-Based Remediation Program for cleanup of Underground Storage Tanks (UST) where costs are eligible for reimbursement by the Louisiana Motor Fuels Trust Fund. The effort was prompted by excessive cost overruns and schedule delays to date in cleanup of UST's. By initiating a Performance-Based Remediation Program, the expected benefits are more timely cleanup, cost savings to Trust Fund, less paper work in processing reimbursement claims. *[Raul M. Busquat, Enforcement Program Manager, LDEQ/UST Division, tel 504-765-0243/fax 504-765-0366]*.

5. Massachusetts: One regulatory and one contracting area identified

Environmental Results Program has been initiated where selected sectors of industry are allowed to certify compliance with established performance-based criteria -- no state issued environmental permits are issued and compliance is verified through an audit/enforcement program. The Program was undertaken as part of an overall effort to streamline permitting and to refocus resources to enforcement and compliance assurance. A year-long demonstration project is ongoing with 20 diverse, small companies. The first two industry sectors, dry cleaners and photo processors, will certify compliance in 1997. Regulations are now being developed for performance standards and certification. Identified issues include difficulty in simplifying performance standards so that small business can obtain compliance (multiple statutes/federal requirements), and significant up-front development costs. Benefits from a business perspective are greater likelihood of high level corporate attention to regulatory compliance leading to better compliance. Furthermore, the view is that new technologies will likely be needed to treat industrial discharges for these industry sectors creating a new market. *[Lee Dillard, Assistant Commissioner for Waste Prevention, Mass. DEP, tel 508-767-2775/fax 508-792-7692].*

Planned procurement (mid September 1996) of a plume containment system to treat approximately 300 gallons per minute of groundwater with chlorinated solvent contamination without causing water table drawdown impacts to wetlands. The action was prompted by local concern for impact to water resources and desire for emerging technologies better suited for operations in residential area. Issues include the time required to develop specific performance objectives for the site (i.e., length of containment and source control); payment (retainage and schedule for payment); demonstration of innovative technology viability (either cite other demonstrations or demonstrate on site). Benefits foreseen are an ability to consider various technology applications on a competitive basis and avoidance of the numerous change orders and invoices associated with time and materials contracts. *[Gregg Hunt, Environmental Analyst, Mass. DEP, BWSC, 617-292-5550]*

6. New Jersey: One regulatory area identified

A Site Remediation-Voluntary Cleanup Program is in place that provides numeric cleanup criteria and without specifying the

technology. Prompted by casework backup, the Program has been effective with 100's of sites having been remediated. Issues arise where the technology requires a permit because of an air or water discharge, or other reasons such as need for a wetland description. Coordination with the permit group may be difficult. Also, under the circumstance of a volunteer selecting the wrong technology, continuation may be discouraged but changing the technology cannot be required. Benefits are quick and efficient cleanup and encouragement for innovative technology. *[Brian Sogorka, NJDEP, tel 609-633-1348/fax 609-292-0848].*

APPENDIX D

Washington Model Toxics Control Act

CASE STUDY

Washington State Department of Ecology
Model Toxics Control Act

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team to explore and understand how states and federal agencies are using performance based approaches for contracting and regulating environmental activities. The results presented herein are based on a review of pertinent documents plus interviews with individuals and organizations who had direct involvement with these activities. Site interviews were conducted on December 18, 1996. Information about the Team members who conducted these interviews and prepared this case study, the documents which were reviewed, and a listing of the individuals and organizations interviewed is provided at the end of this document. During the study we made a significant effort to identify and foster a dialogue with stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and goal of initiative

In the 1980's, contentious debate by various parties over the implementation of the federal Superfund program in Washington State caused confusion and delays in thousands of hazardous waste site cleanups, and characterized the overall implementation of the federal program. In an effort to resolve the issue, in 1988, a citizen-mandated cleanup law was developed. Passed by voters, as Initiative 97, this law is known as the Model Toxics Control Act or MTCA. The Act became effective in March of 1989.

Crafted as a compromise proposal, the MTCA mandated that site cleanups maintain the federal Superfund program goals and objectives while becoming as streamlined and efficient as possible. Strict cleanup standards ensure that human health and the environment will not be compromised yet the Act allows cleanup actions to be addressed on a site-specific basis by selecting a cleanup method that will best meet established cleanup standards.

Passage of the MTCA by Washington State voters forced previously antagonistic sectors to work with the Washington State Department of Ecology (Ecology) in building a broad, consensus-based framework to develop the MTCA regulations. As a result, business, environmental, and local government groups accepted the resulting MTCA regulations which were then codified as Chapter 70.105D of the Revised Code of Washington (RCW).

Since its passage, MTCA has been subject to numerous amendments. Most of these amendments can be characterized as ones, which clarify specific issues, or as targeted efforts to make the program more effective.

While the MTCA was established prior to the 'performance-based' systems entering the environmental regulatory vernacular, its record is clearly a model for other performance-based regulatory systems. However, one area the case-study team found the MTCA to be deficient in was providing clear incentive to overcome the risk of using innovative technology in site cleanups.

2. Description of initiative

A hazardous waste site is any site where a report of a release of a hazardous substance(s) or suspected presence of hazardous substance(s) may threaten human health or the environment and requires Ecology to investigate. If an initial investigation confirms contamination is present and cleanup is necessary, the property is entered on Ecology's Site Information System (SIS). SIS is a computerized database used to track progress on all confirmed or suspected hazardous waste sites. Sites that are confirmed to require cleanup are ranked and placed on the state Hazardous Sites

List. Owners, operators and other persons known to be potentially liable for the cleanup receive an "Early Notice Letter" from Ecology notifying them that their site is suspect, encourages them to review information about the site and work cooperatively with the department if further action is necessary. The MTCA is not applicable at facilities that are managed under the state's Dangerous Waste Regulations, which implements the federal Resource Conservation and Recover Act (RCRA). MTCA funds hazardous waste site cleanup through a tax on the wholesale value of hazardous substances. The tax is imposed on the first in-state possessor of hazardous substances at a rate of 0.7 percent, or $7 per $1000.

The MTCA cleanup regulations define a two-step approach for establishing cleanup requirements for individual sites. The first step, which is set by the state, is to establish cleanup standards. The second step, which is usually determined by the affected party, often in consultation with Ecology and or other parties, is selecting and implementing the cleanup action. In the second step, Ecology, if involved, provides regulatory oversight but does not always specify a method or cleanup technology.

Step 1: Establishing Cleanup Standards. The standards provide a uniform, statewide approach to cleanup that can be applied on a site-by-site basis. The two primary components of the standards, cleanup levels and points of compliance, must be established for each site.

Cleanup Levels: MTCA cleanup levels determine at what level a particular hazardous substance threatens human health or the environment. The goal is to address all material above those concentrations with some remedy. The cleanup levels also define the baseline of what constitutes a "clean close;" that is where no further action, monitoring or institutional controls would be required.

Under MTCA cleanup levels are set based upon *risk.* Since Washington State law recognizes that eliminating all risk is often not possible, "clean" is generally defined to mean that a site is cleaned up to the point that contamination no longer poses an unacceptable threat to human health and the environment.

For cancer causing substances, the acceptable level for each substance at a site must be below that which could cause illness in humans. If more than one substance at a site affects the body in the same way, the effect of all of those substances combined must be considered when establishing cleanup levels. For non-cancer-causing substances, the cleanup level for each substance at a site must be below that which could cause illness in humans and also the combined effect of more than one substance having the same effect on the body must be considered when establishing the cleanup levels.

The MTCA regulation provides three options for establishing site-specific cleanup levels. Each of the options uses health risk levels as the main determinant in setting levels:

Method A

Method A provides a table with cleanup levels for 25 of the most common hazardous substances found at sites. These levels are determined by using acceptable risk levels established in the standards and health based concentrations as described in applicable state and federal laws. Method A is designed for cleanups that are relatively straightforward or involve only a few hazardous substances. Typically, this approach is used at small sites that do not warrant the costs of conducting risk assessments and site studies. Natural background concentrations, concentrations based on other state or federal laws, and laboratory-testing limitations can also be used to establish cleanup levels for those compounds not having a value in the Method A table.

Method B

For sites contaminated with substances not listed under Method A, Method B is the most commonly used option for setting cleanup levels. Method B levels are set using a simplified site risk assessment, which focuses on site characteristics such as: 1) how hazardous substances interact with each other, 2) what the combined health effects may be, 3) how the movement of contaminants on- and off-site could threaten human health and the environment, and 4) all applicable state and federal laws must be followed. The risk level for individual cancer-causing

substances cannot exceed one-in-a-million. If more than one type of hazardous substances is present, the total risk level at the site may not exceed 1-in-100,000. Natural background concentrations and laboratory testing limitations of a substance can be considered when setting cleanup levels.

Method C

This method is used when cleanup levels under Methods A or B are technically impossible to achieve, lower than background concentrations, or may cause more environmental harm than good. This method may also be applied to qualifying industrial properties. Persons who use this method must provide proof that the cleanup levels will protect human health and the environment. The main differences between this method and Method B, is that the lifetime cancer risk is set at 1 in 100,000 for both individual substances and for the total risk caused by all substances on a site.

Points of Compliance: Points of compliance define where on a site the cleanup levels must be met. Generally, the point of compliance is the entire site, but technological limitations, environmental conditions and other factors can make it impossible to meet levels throughout a site. In such cases (e.g., a landfill) Ecology can establish conditional points of compliance. Conditional points of compliance requires cleanup levels to be met in specified areas of the site, usually as close to the area of contamination as possible. Any hazardous substances left on the site must be contained within a specified area that protects humans from exposure to the contaminants.

Step 2: Selecting Cleanup Actions. This step involves evaluating methods that could be used to clean up a site and then deciding which of those methods would best achieve cleanup standards. The cleanup action must also provide a permanent solution during a reasonable timeframe and include monitoring to ensure effectiveness. Ecology requires the use of permanent cleanup methods wherever practical but does not typically specify the type of technology or process that must be used. Instead, MTCA preferred methods and results in this order:

a.) Reuse or recycling,
b.) Destruction or detoxification,
c.) Reduction of the amount of waste,
d.) Immobilization of waste,
e.) On-site disposal or off-site disposal at an engineered facility, and
f.) Isolation or containment.

Many sites in Washington are cleaned up by some combination of these methods. Cost cannot be used to justify establishing a cleanup level that may compromise human health or the environment. It can, however, play a role in determining cleanup actions. When site cleanup is being conducted under Ecology's oversight, the department describes the method of site cleanup in a draft "Cleanup Action Plan" which is circulated for public review and comment. Based upon public review, the plan is then finalized and used as the basis for any negotiations with potentially liable parties who may be doing the site cleanup.

Other factors that can affect cleanup actions include property use, applicable State and Federal laws, environmental conditions, and the developmental state of a technological process. Although cleanup technologies are developing rapidly, many contaminants are still difficult or impossible to remove from the soil and water. For this reason, some flexibility is provided to consider technological limitations when setting cleanup levels.

Public protection after the site cleanup requires monitoring to confirm and verify that the cleanup actions worked and remain effective over time. If hazardous materials remain at the site at levels which exceed Method A or B cleanup levels, Ecology will review the site every five years to ensure continued protection of human health and the environment. These periodic reviews are subject to public notice, review and comment.

3. When initiated and current status

Since MTCA was put into place in 1989, day-to-day regulatory and cleanup practices have settled into patterns.

Approximately 90 percent of all cleanups are done independently, without Ecology oversight. Independent cleanups allow many smaller or less complex sites to be cleaned up quickly without having to go through a formal process. Since the MTCA was enacted, Ecology has worked cooperatively with the legislature, industry, property owners, and other stakeholders to modify the Act when necessary to reach cleanup solutions.

Some of the amendments to the MTCA, which reflect this are: MTCA was modified in 1993 to establish an explicit private right of action to recover cleanup costs. In 1994 the definition of industrial properties was expanded so more sites could take advantage of the industrial cleanup standards. Other legislative modifications have included agreed orders, institutional controls, prospective purchaser agreements, safe harbor, policing activities, and an exemption from the State Hazardous Waste Management Act for state only dangerous waste. The resulting amendments have increased the number of options for site cleanup available to property owners or potentially liable persons. These options include formal agreements such as consent decrees and agreed orders and the Independent Remedial Action Program.

4. Related changes

Early on, it became apparent that the lack of formal Ecology approval (i.e. a letter) of a property owner initiated cleanup, was a potential hindrance in instances where the property owner transferred or sold property and needed state approval of the cleanup to satisfy a buyer or lender. This was rectified by a MTCA amendment that allows a property owner to request a formal review of the cleanup by Ecology through the Independent Remedial Action Program (IRAP). Under IRAP, the property owner submits a cleanup report along with a fee to cover the department's review costs. Following the review, Ecology either issues a letter stating that the site need "No Further Action" or identifies what additional work is needed at the site. This has proven to be a popular program that meets Ecology's customers needs.

5. Approach replaced

Prior to MCTA, Ecology relied upon Remedial Investigation, Feasibility Study (RI/FS), and Cleanup Action plans resulting in a Record of Decision. The Record of Decision (ROD) is a legal agreement that documents the cleanup actions and other related work requirements to meet the required cleanup standards and action plans established. Before the ROD becomes final, it must undergo a public review and comment period that includes public hearings. At some hazardous waste sites in Washington, the Environmental Protection Agency (EPA) retains the oversight role in the cleanup and at these sites the federal Superfund process remains in effect. A typical example of these types of sites is Native American Indian Reservations, and some military installations.

6. Definition of performance

The MTCA does not change the environmental goals of the federal Superfund program. However, the process to attain the goal is altered and is intended to be more efficient. MTCA provides specific cleanup levels for a vast number hazardous substances, which is then implemented at a "point of compliance." Ecology has recognized that in certain situations technical or environmental conditions preclude achieving a specific cleanup level at a particular point of compliance. An example of this might be that for a certain contaminant, a specific cleanup level is indicated but cleanup technology or laboratory detection capabilities may not yet be achievable. In these situations, Ecology can establish conditional points of compliance that typically would be at the lowest reliable measurement and would be periodically reviewed.

The monitoring requirements for implementation of MTCA site cleanups seem to fall under two types: administrative and technical. The property owner(s) can pick and choose the degree of involvement of the regulatory agencies with the understanding of the respective advantages and disadvantages that go along with each cleanup solution chosen. From a technical perspective, monitoring at site cleanups must be conducted at each site to verify that cleanup actions worked and remain effective. If contaminants are left at the site which exceed Method A or B cleanup levels, Ecology requires monitoring, institutional controls and review of the site every five years to ensure continued protection of

human health and the environment and publishes those reviews for the public to review and comment.

PART II - ASSESSMENT OF SYSTEM

1. Results to date

The MTCA cleanup approach to contaminated sites has resulted in faster and cheaper cleanups and reduced regulatory costs to the potential liable parties, taxpayers and Ecology / EPA. Over the last seven years, 90 percent of site cleanups have been initiated. This includes three-quarters of Washington State's sites listed on the National Priority List (NPL). By using MTCA, Ecology estimates that the remainder of the NPL sites can be cleaned up around the 2005.

The MTCA program is pursued in a "get it done" fashion that seems beneficial to everyone. Because of this attitude to site cleanup, the local small business community, heavy industry, regulators, environmental groups and local governments are able to reach consensus much quicker, more effectively than the previous approach. The process has also built good will and public support for how Ecology has fulfilled its legislative requirement's in implementing MTCA's mandate of a flexible, quality driven cleanup program striving for results.

In terms of foster or encouraging innovative cleanup technology, there is little concrete incentive, either financial or by other means of risk sharing by either the regulator or responsible parties. However, there is some regulatory flexibility in the MTCA cleanup regulations that can allow innovative technology deployment to play a part in getting to a final result: a clean site. This usually means a responsible party must creatively (and aggressively) use the cleanup methods and action flexibility in the MTCA or be able to convince their Ecology site managers to accept the technology performance results.

Some examples of innovative technologies that have been used or tested in the state on MTCA sites include: 1) the use of insitu-vitrification of a Polychlorinated Biphenyl's (PCB's) site, 2) pesticide anaerobic biodegradation, and 3) steam enhanced vapor recovery, and phytoremediation of Tetrachloroethylene (TCE) contamination. Utilizing the full potential of this flexibility afforded by MTCA's cleanup methods and action plans will probably take some policy guidance that recognizes the role that innovative technology can play in bringing down long-term costs of hazardous waste management.

While streamlined in terms of implementation, a MTCA cleanup remains a complicated process. Oftentimes citizens have difficulty in understanding the process or finding the proper venue to participate. On the other hand, by virtue of technical, legal, and monetary resources, big industry has been known to use provisions within MTCA for site-specific risk assessments that may result in more contamination being left in-place with a greater reliance being placed on institutional controls.

Ecology perceives that "good will" and "trust" is an important factor between the regulators and the potentially liable parties and determines in large part as to how much oversight is required by the agency. If Ecology perceives that a project is too complex for "government" to understand, then it stands to reason that no one else can understand it either. That is when friction arises and legalistic approaches interfere. It has taken some time for the cleanup program to mature and to really focus the necessary time and resources on the high priority sites / issues and how to achieve the overall cleanup goals.

2. Stakeholder role in design/implementation

Since the development of MTCA regulations in 1989, there has been extensive public and stakeholder involvement. It was the opinion of many of the officials and other stakeholders interviewed for this case study that broad interest-based consensus has served the Statute well over the years and has provided a model for other state environmental agencies to consider when developing their own cleanup program.

The most recent expansion of stakeholder input began in 1995, when the Washington State Legislature tasked Ecology with establishing a Policy Advisory Committee (PAC). The PAC was asked to study and re-evaluate how the MTCA is carried out and to provide advice to the Legislature and the department on any administrative or legislative actions that could make the process more effective.

The PAC, which is an ongoing body, consists of twenty-two members with designated alternates representing a wide range of interests from public and private sectors as specified by the legislation. On December 15, 1996, the PAC formally transmitted their preliminary recommendations to Ecology and to the appropriate legislative committees on the priority issues identified for review. Since then, Ecology has accepted the PAC findings and recommendations and is in the process of implementation.

As Mr. J. Daniel Ballbach, Presiding Officer of the PAC wrote in his letter of transmittal, "Strong feelings permeate hazardous waste site cleanups and tough policy questions arise with the simplest of perceived issues?We had to remind ourselves of our consensus mandate and yet not let the requirement weaken our resulting recommendations?I believe a better Model Toxics Control Act can be achieved from these recommendations. The right people were at the table."4

3. Lessons learned

- There seems to be a need to reinforce a "no penalty for trying" approach to innovative technology within the MTCA to reduce current high cost for failure.

- The "culture of innovation" is not broad enough to get to the wide spectrum of the public that it needs to reach to get companies, owners, and potentially liable parties to try riskier / more innovative (but legitimate) solutions.

- A simple example of the regulatory streamlining approach that MTCA has pursued is to have a single regulator, either the EPA or Ecology that potentially liable parties communicate with during and after their site cleanup.

- Stakeholder participation is critical to any solutions and you have to have a sense of "involvement" by those stakeholders if you want to have sharing of consequences.

- The MTCA PAC's Final Report provides an excellent source of recommendations to improve the effectiveness of the cleanup program but doesn't directly address the use of innovative technologies explicitly.

PART III - OTHER STAKEHOLDER VIEWS

According to Ecology, everyone has benefited from a more efficient and effective cleanup program. Other public comments either from interviewees for the case study or gleaned from public record, has been more critical of the recent changes. These criticisms suggest that making the MTCA regulations more flexible in terms of risk assessment and land-use has subverted a strong, consistent cleanup standards approach to better protect human health and the environment through goals and objectives along with non-degradation policies, and pollution prevention. This critical

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4 Letter; from J.D. Ballbach, Presiding Officer of PAC to Hon. K Fraser, Hon. G. Chandler, M. Riveland, Director, Department of Ecology, dated December 15, 1996.

audience believes that it is not good policy to place more emphasis on models and complicated equations that are scientifically incapable of “proving” that one particular option is “safe” or “safe enough."

PART V - REFERENCES

The Model Toxics Control Act Cleanup Regulation, Chapter 173-340 WAC, Amended January 1996, Publication No. 94-06.

Model Toxics Control Act Policy advisory Committee Final Report, December 15, 1996.

Letter; J. Daniel Ballbach, Presiding Officer, Model Toxics Control Act Policy Advisory Committee to Honoarable Karen Fraser, Chair, Ecology and parks Committee, Washington State Senate, Honorable Gary Chandler, Chair, Agriculture and Ecology Committee, House of Representatives, and Mary Riveland, Director, Washington Department of Ecology, dated, December 15, 1996.

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7. Ohio: Two regulatory areas identified

Ohio EPA is supporting an application by Clermont County to participate in USEPA's Project XL Program on the cleanup of the East Fork Little Miami River watershed. The objective of the USEPA's Environmental Excellence and Leadership Program (Project XL) is to promote "regulatory flexibility for communities in exchange for greater environmental benefits". *[Thomas A. Schneider, Fernald Program Manager, Ohio EPA, Office of Federal Facilities Oversight, tel 513-285-6466/fax 513-285-6404].*

Efforts are underway to work with DOE at a local site level as well as nationally on the development of new technologies. The Ohio EPA Office of Federal Facilities Oversight (OFFO) works through DOE sponsored groups such as the Community Leaders Network, Site Technology Coordination Group, Innovative Treatment remediation Demonstration, Innovative Remedial Technology Evaluation Program, Rapid Commercialization Initiative, etc.OFFO's participation in these groups provides Ohio an opportunity to view developing technologies and provides DOE feedback on potential regulatory issues affecting the technologies implementation. *[Thomas A. Schneider].*

8. Oregon: One regulatory and One contracting area identified

Voluntary Cleanup Program is ongoing in response to need for an alternative way to address sites that did not qualify for the enforcement program. It has been found that the cooperation and flexibility afforded under the Program has often lead to a solution more acceptable to both parties. The Program allows use of innovative technologies and where they haven't worked something else has been tried. *[Bill Mason, Program Manager/Senior Hydrologist, Oregon DEQ/Voluntary Cleanup, tel 541-686-7838 x257/fax 541-686-7551].*

More performance-based contracting has been used for the remedial investigation portion of the work with contractors on retainer, whereas, the for the remedial action, a less performance-based approach has been taken. The contracting approach was revised in response to a need to issue task orders more expeditiously (1-week procurement). *[Bill Mason].*

9. Pennsylvania: One Regulatory area identified

Initiated Land Recycling/Act 2 Program in 1995. *[Steve Taglang,*

Environmental Policy Analyst, PA DEP, tel 717-783-9981/fax 717-783-2703].

10. South Dakota: Two regulatory areas identified

Certain voluntary environmental audits are allowed by legislation that if conducted in accordance with the State's terms and conditions protects the regulated entity against civil or criminal penalties for violations found or disclosed. Self-auditing was instituted to reduce the amount of inspection, fines, and permitting performed by the DENR, thereby stretching limited State funds and alleviating some of the regulatory burden on business. Self-audit issues include "bad actor" concerns and the question of what diligence can be expected from the regulated community. *[Matt L. McDermott, Hydrologist/Project Manager, South Dakota DENR, tel 605-773-3296/fax 605-773-6035].*

A Risk-Based Corrective Action (RBCA) policy has been adopted for environmental cleanup. Under the RBCA policy, cleanup levels and remedial actions are based on the nature and severity of risk posed by the contamination. RBCA directives are aimed at reducing risk, which can include remediation of the contamination or removing an exposure pathway. The method of remediation is not specified but the Petroleum Release Compensation Fund determines what work is compensated. Issues raised concern future liability for remnant contamination, adjacent property devaluation, public's right to know, and impact on indicators other than human health. RBCA has the potential to direct limited funds to those releases which pose the most serious risk; and the site-specific contamination levels developed through the RBCA process have saved the State's Petroleum Release Compensation Fund a considerable amount of money compared to past practice of remediation to a rigid, one-size-fits-all regulatory practice. Implementation of innovative technology has been negatively impacted to date because of an advocacy for natural attenuation but this advocacy may encourage future interest in innovative assessment and monitoring technologies. *[Matt L. McDermott].*

11 Texas: One regulatory area identified

A new performance-based program to manage remediation of unauthorized discharges into the environment is under

development. This was prompted by a need for consistency across program areas and a need to establish clear guidelines to direct remediation efforts. Revised Texas Risk Rules are currently in the conceptual stage, with proposed rules planned for the end of the calendar year 1996. They will apply to all remediation programs: PST, CERCLA, Voluntary, RCRA Corrective Action, etc. Issues include consistency and self-implementation. Benefits envisioned are better utilization of limited resources to address contamination and increased use of innovative technology due to increased flexibility. *[Nancy R. Worst, Texas Natural Resources Conservation Commission, Innovative Technology Program MC110, tel 512-239-6090/fax 512-239-3939].*

12. Washington: Two regulatory and two contracting areas identified

Two DOE contract efforts are underway (a) to issue performance-based contracts for the Project Hanford Management Coordinator (PHMC) work, and (b) the proposed privatization of the Tank Waste Remediation system contract. The focus of the efforts is to introduce a strong project management approach and to produce results and cost savings through "pay for performance" type contract awards based on specific products and results. The PHMC contract was awarded to Fluor Daniel. Flexibility is being built into the process to stimulate the deployment of user sponsored innovative technologies to meet critical mission objectives (i.e., the Hanford Tank Initiative). *[Tom Tebb, Senior Environmentalist, Washington Department of Ecology, tel 509-736-3020/fax 509-736-3030].*

Regulatory efforts were undertaken to revise the Tri-Party Agreement (TPA) addressing Project Manager role and designation of a lead regulatory agency for the purpose of identifying a single point of contact. Expected issues are in the area of jurisdictional authority. The TPA has been amended to reflect the desired changes. *[Tom Tebb].*

Washington State Superfund laws allow flexibility in choosing remedies rather than specifying a particular treatment. This is an ongoing regulatory approach for state Superfund work. *[Lynn Coleman, Environmental Engineer, Washington Department of Ecology, 360-407-7194].*

APPENDIX E

Massachusetts Environmental Results Program

CASE STUDY

Massachusetts Environmental Results Program (ERP)

INTRODUCTION

In January of 1997, the Performance based Contract and Regulations Subcommittee met in Boston with Massachusetts State officials and other stakeholders to conduct interviews for this case study (see interviewee list). In preparing this case study we also reviewed selected documents (see list of references) and talked by telephone with stakeholders who were not available for interviews while we were in Boston. In addition, we sought feedback on our draft case study from key stakeholders. Never the less, the case study team itself retains responsibility for this write-up which represents our best understanding of the situation and lessons that can be learned from it.

PART I - DESCRIPTION OF PERFORMAMCE BASED SYSTEM

1. Background and goal of initiative

The Massachusetts Department of Environmental Protection (DEP) has initiated a new program, the Environmental Results Program (ERP). This initiative was conceived and developed at the highest levels of the Department. Implementation and management of the ERP has now been assigned to the newly created Business Compliance Division of the Bureau of Waste Prevention.

DEP literature describes the program as " …a bold move away from government telling business and industry not only how much they can emit but also precisely how to do it, to a program….designed to get government out of the business of telling companies how to achieve environmental standards." The objective is to allow DEP to refocus its efforts on setting standards and aggressively enforcing them. The ERP will eliminate the need for thousands of State permits. Instead, companies will need only "…(1) commit that they are willing to be held accountable to a certain standard of environmental performance, and (2) report or 'certify' annually on their compliance with these standards."

More recently the objectives have included: (a) refocusing the DEP's resources onto compliance and enforcement rather than permitting and (b) enhancing the regulatory reach of the program to

encompass a number of small facilities that were not in reality being covered by past programs. The concept that the program will allow and encourage innovative environmental (technology) approaches exists but does not appear to be a primary driver.

The ERP began with a demonstration program encompassing twenty-three (23) volunteer companies from a full range of industries. Nineteen (19) companies are still in the demonstration program. Two sectors were then chosen as initial foci: dry-cleaning and photo processing. Both of these sectors have strong industry associations that have worked closely with DEP on development of the ERP program for their sectors. The program design also drew some lessons from an earlier voluntary project with the printing industry.

The printers project had employed a workbook and performance standards that had been developed in conjunction with the Printing Industry of New England(PINE), a trade group. The printing industry workbook focused on providing user friendly information to printers on how to comply with regulations and on how to operate in an environmentally friendly manner. This approach was possible in the printing industry because of the highly standardized and uniform environmental control practices that existed throughout the printing industry in Massachusetts. Similar uniformity exists for most of the ERP's selected industrial sectors.

The regulations for the initial ERP sectors were promulgated while this case study was being completed. The ERP's next goal, dependent upon the success and lessons learned from the initial and the demonstration program, is to bring three additional sectors (printing, combustion facilities, and state sewer connections) into ERP program.

To shape the ERP program, the DEP created an external advisory panel. The panels primary mission was to help the State convert existing permit programs into self-certification programs. Participating advisors represented the pilot industries and other stake holders. The advisory panel began work in the Spring of 1996.

2. Description of initiative

The ERP will be structured as a self-certification program. The program will be introduced through user-friendly workbooks (including translated editions) which contain a certificate expressing compliance. Businesses will re-certify their compliance status annually. There will be a fee associated with the self- certification. The DEP will input the raw data collected through the self-certification form into a database and conduct audits to assure compliance. The DEP has taken particular care to ensure that adequate information to design a targeted auditing and oversight program will be available from the data provided on the self-certification forms. Significant educational and outreach efforts with the regulatees is planned as the ERP program is implemented in the initial sectors.

The ideal performance standard based ERP would impose on sources only a numerical performance standard(s) and the minimally necessary associated monitoring and reporting requirements. As discussed below, the reality is that an ideal ERP is very difficult to design. Hence the ERP program for the initial sectors diverge from this ideal.

The DEP deliberately chose for its two initial sectors industry groups with companies that mostly fall below size limits for federal permitting requirements. The rationale was that the federal standards would keep a lot of big companies from participating because they are already covered by Federal rules that the US EPA was not likely to quickly or easily modify to comport with the ERP approach. The sectors chosen also offered the advantage that while facilities within the chosen sectors needed permits, many facilities in these sectors did not actually have the required permits.

3. When initiated and current status

See above.

4. Related program changes

The ERP program is likely to generate/require a number of related changes in Massachusetts's DEP programs.

- The number of permits issued by the state will go down, freeing up resources for other uses. The new emphasis is anticipated to be on more complex environmental permitting problems and on compliance inspections/auditing (This impact of the ERP will compliment the Governor's goal of eliminating 10,000 permits).

- The new emphasis on complex permitting and enforcement may generate a skill mix problem for the DEP. These new priority functions may require different, and often more skilled personnel, than were needed to perform the prior functions. For example, the new task of verifying compliance based on a review of monitoring records is a more difficult, higher level skill, than the old task of simply verifying that a known (required) piece of control equipment is installed and turned on.

- The enforcement program is seeking to figure out how to: (1) manage and target its investigations based on data generated from the carefully designed, self certification forms and (2) ensure that industry is kept honest in their certifications.

- The issue of how to deal with new technologies proposed for use in the sectors covered by the ERP will have to be addressed if the program is not to become a new barrier to technology innovation.

- The State is wrestling with how to obtain from the federal EPA the necessary flexibility to fully implement the ERP program.

- The State has found that the monitoring approaches an ERP program requires are not standard. He ERP program requires that different and often additional questions be answered by the monitoring systems and that a higher level of confidence be provided by the data. Often they are either not available or not cost effective across all sources.

- The State has found it necessary to carefully coordinate its ERP program with local and independent authorities within the state (e.g., the Massachusetts Water resources Authority).

5. Traditional approach that was replaced

The ERP program is replacing a traditional command and control type environmental permitting program.

6. Definition of performance

Photo Processors --- Photo processors are subject to a performance based limit of no more than 2 mg/l of silver in their effluent and a monitoring requirement (discussed elsewhere).

Other requirements include an operation and maintenance requirement (operate to manufacturers specs), prohibition on ground water discharges, prohibitions on discharging any substance that could harm the sewerage treatment system (including fire/explosion hazards, corrosive materials, viscous materials that could inhibit flow, oxygen demanding pollutants and high temperature discharges), and design constraints on holding tanks (These additional requirements illustrate the ERP's difficulty in limiting the new regulatory requirements to a simple straightforward performance standard).

Dry Cleaners - Similar sets of requirements apply to dry cleaners.

The dry cleaning requirements also contain a proposed process for determining equivalent emissions control technology. The draft equivalency requirements called for diagrams of the control technology, information on vented emissions with and with out the control technology, information on solvent mileage, identification of maintenance requirements, explanation of why the information provided is accurate, applicability of the information provided to other cleaning systems, and data

on cross-media effects (Again the ERP had difficulty relying solely on a performance standard backed by standard monitoring requirements when considering what to ask of industry when a new control technology was to be employed).

7. Monitoring requirements

See below.

PART II - ASSESSMENT OF SYSTEM

1. Costs

We did not obtain specific cost numbers, but did obtain some sense of cost changes anticipated in certain areas.

- The cost of designing the rules and enforcement procedures for the ERP program are imposing sizable up front costs on the DEP.

- The DEP anticipates long term savings from a reduced permitting work load will result in a net cost savings for the program.

- We have the impression that from an industry point of view, the cost of self certifying should be less than the cost of obtaining a permit.

- Photo processors that are not in compliance will have to spend about $2,500 to comply, but this should be paid back in savings from recovered silver within a few years.

- Firms are expected to realize savings from streamlined record keeping requirements and the elimination of duplicative standards (e.g., both local and state water discharge standards). For other industries, the State hopes to be able to lengthen permit life from one to five years and to drop the requirement for pre-construction reviews.

- Facilities will reduce the quantity of wastes they generate and improve their hazardous waste handing capabilities. This should lower their potential liability costs.

2. Benefits

The State believes that the program will:

- Enlarge the true scope of regulatory coverage with respect to number of facilities covered. For example, the two initial sectors, if successful, will increase the effective coverage of the regulatory environment from approximately 100 to 1600 dry cleaners and from 20 to 500 photo processors.

- Result in significant environmental improvement, e.g., a 99% reduction in silver emissions.

- Significantly reduce the State's permitting burden by eliminating the need to issue permits to numerous small sources whose aggregate emissions are actually quite small.

- Help the State target its inspection resources.

- Allow the State to focus its permit resources on a limited number of major sources rather than numerous minor sources.

- Benefit industry by eliminating the costly and time consuming permit review process.

- Provide industry with a more level competitive playing field by expanding the extent of program coverage to include all facilities in the industry.

- Workbooks should reduce the time facilities must invest to understand what requirement apply to them.

- Some believe that the companies will also end up identifying more pollution prevention opportunities and hence increase their savings.

3. Results to date

That State has found it difficult to design the program as a solely performance based program. Because of this difficulty, the hoped for performance based standards have been translated by the guidance manual and details of the regulations into standards that often requires use of specified technologies. This has resulted in constraints remaining on the introduction of new or innovative technologies. The issue of appropriate accountability, i.e., required self-monitoring for compliance assurance, has been the key sticking point.

A related issue is when and how should new technologies be added to the guidance manuals? Unless there is an easy, rapid process, the guidance manual can become another barrier to entry for new technologies. One version of the regulatory impact analysis referred to a state certification process for new technologies, but it was not clear how this would work.

An illustration of the problems likely to face new technologies under the ERP program occurred when Kodak wanted to introduce a new silver recovery technology for photo finishers. Several issues immediately arose. The State was uncomfortable with the new technology because it was not "proven" and hence would not accept it just at face value, i.e., allow companies to self certify using the new technology and applying the proposed monitoring requirements. In effect, the State wanted to verify the performance of the technology before it would allow it to be used. This belies the standard being a performance standard, but it appears reasonable given that the technology involved a "black box" reagent, the chemical content of which Kodak did not want to disclose. The State was concerned that this might lead to the introduction of an additional contaminate in the waste that would not be caught by the established monitoring requirements. In addition, the situation was further complicated when the new technology did not work satisfactorily in its first demonstration. This caused the State to want to impose additional monitoring requirements on companies using the new technology.

This situation with Kodak demonstrated that the appropriate monitoring requirements for a performance based system might be a function of the control approach selected by industry and not just the environmental goal desired. For example, the standard control option for photo processors did not require sensitive set up procedures and hence proper initial operation was not an issue to be considered in establishing the sector's monitoring requirements but became an issue for the new technology. The issue was finally resolved by DEP agreeing the technology could be utilized under the ERP at the 2 part per million standard if users would sample 12 times a year (including within one week of start-up) rather than the once a year sample that would probably otherwise have been required for use of the current standard technology. As explained below, for equity reasons this expanded monitoring requirement was imposed on all facilities.

The State had great difficulty in trying to figure out how to deal with the issue of a new technology that effectively consisted of a black box whose contents were unknown. Options considered included: vendor certification (Kodak did not want to take the liability); vendor applications for each individual user; and a pure performance based standard (the monitoring requirements would then have been more onerous on those choosing to use the new technology). An additional possible solution was to run new technologies through The Massachusetts Strategic Environmental Technology Partnership (STEP) program, and then modify the regulation and guidance documents on a real time basis with different monitoring requirements for different technologies (The Massachusetts STEP program is a comprehensive assistance program for new technologies). In the end, the State ended up requiring all photo-processors to monitor once a month for equity reasons even though this frequency of monitoring was not required for compliance assurance purposes when the most widely used control technology was employed (Note that the user industry might have been happy with a straight technology standard since the standard would have just codified standard industry practice and none of their competitors could gain a competitive

advantage by adopting a cheaper technology).

The state also found that its ability to develop the program was hampered by inflexibility at the Federal level (be it for statutory, regulatory or environmental reasons). Partly in response to this, the state decided to start with source categories whose size was below federal size cut-offs. In addition, Federal rules constrained the state's flexibility. For example in the case of the dry cleaners' rule, the state wanted to change the Federal requirements by reducing the time that records must be kept from 5 to 3 years (a problem for EPA because of the time it takes to prosecute cases) and to allow the use of instrumentation to detect leaks rather that force people to sniff for leaks (an approach viewed by industry as posing a health risk to workers). The state finds that it is not in a good position to alter monitoring requirements and the EPA is slow to respond to State requests for flexibility. To help address these issues the state has proposed that the ERP program be a state XL project.

The state found that it had to deal with a number of other issues:

- Honesty in self-certification;

- Local regulations which were accepted and incorporated into the ERP program (e.g., the Massachusetts Water Resources Authority's operator certification program). Such local regulations represent another constraint on the ability of the state to provide for innovative technologies.

- Citizen suits.

4. Stakeholder role in design/implementation

The State established a broadly based advisory committee to help them design the program. But as usual in such situations, issues arose as to the true degree of collaboration with and involvement of the stakeholder group.

5. Equity impacts

N/A

6. Design/implementation issues/barriers

These have been addressed above. They include: problems specifying appropriate monitoring procedures; provisions for incorporating new technologies; changes to internal permitting and enforcement programs.

7. Lessons learned

- Flexibility for innovative technologies was only one of multiple goals for the program. Primary drivers appear to be resource savings, compliance and environmental enhancement and reductions in the number of facilities requiring permits. As a result emphasis on ensuring flexibility for easy entry of environmentally sound innovation did not always receive adequate attention.

- State efforts were constrained by the Federal government rules and policies.

- Program development required an extra up front investment and will require a change in the State's compliance/permit approaches (including the skill mix of personnel).

- Improved environmental results are expected.

- ERP may end up imposing a new barrier on innovative technologies even though the standard is expressed as a performance standard. This is because the program relies on an information workbook and self-certification. It is possible that effective use of Massachusetts's STEP program and rapid updating and dissemination of workbook revisions could address this issue.

- The monitoring requirements necessary to assure that new technologies are in conformity with performance based standards are likely to be different from the monitoring requirements developed for existing technologies. The State will thus be faced with a need to develop such requirements on a case by case basis to balance the resource burden on the new technology with the environmental confidence as to its performance needed by the State. The alternative is to impose greater monitoring requirements on all facilities (as the state chose to do in one of the initial sectors). If this issue is not to become a barrier to innovation the State will have to commit the necessary resources to rapidly address this issue as new technologies are proposed for use. This will probably require a separate program to specifically evaluate new technologies.

· ERP could not always solely employ performance standards. Sometimes the monitoring necessary to assure performance was technologically unavailable or too expensive to consider viable.

- State sometimes had to leave local regulations in place—these local requirements were often not performance based. In the case of one new technology they had to work with the local water treatment facility to eliminate the need the local authority's requirement that it be operated by a certified operator.

- State felt constrained by EPA's rules and inflexibility.

- Because different control approaches bring up different issues, acceptance by the state of new technologies requires a review that goes beyond merely accepting data based on monitoring results applicable to other technologies. In other words, the whole regulatory control system must be adjusted to reflect the desired new approach.

PART III - OTHER STAKEHOLDER VIEWS OF SYSTEM

- Some stakeholders have expressed concerns that "eliminating permit reviews could potentially result in some facilities installing inadequate controls…."

- When asked about barriers to innovation in the new system, Stig Boleman, of PINE, argues that it is just as hard for a new technology to be introduced under the old permit system, that there is not a lot of innovation in his industry anyway, and that there is still a free market incentive for new approaches (e.g., European competition or lower cost controls) to find their way into the market.

- Industry still needs regulations as environmental control costs money and hence industry will not act unless it is required to act.

- The command and control system has made a lot of progress even if it does have some flaws.

- Verification of the performance of innovative technologies is critical.

- Government has been focusing too much on pre-operational permitting and not enough on monitoring and enforcement — ERP needs to focus on correcting this.

· DEP will not be able to benefit from reallocating its resources if its resources are being cut at the same time.

- The educational value of permitting will be lost.

- The risks from Irreversible harm may still necessitate up front permit reviews.

- Businesses and their lawyers, lenders and insurers may end up wishing for the old days of command and control certainty.

- Performance standards will often be harder to verify on inspections than were design standards.

- And finally, performance based systems (and market based systems) are not self enforcing.

PART IV - REFERENCES

1. Case study team

Barry Korb (Maryland Department of Business & Economic Development)
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2. Interviews (phone or in person)

Bolgen, Stig
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DeGabriele, Steve
Gomes, Jim
President, Environmental League of Massachusetts
McCarthy, Gina
Panos, Bill
Reinhardt, John
Tran, Sara.

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· "The Environmental Results Program," a brochure put out by Massachusetts DEP

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APPENDIX F

INEEL M&O Contract

CASE STUDY

U.S. Department of Energy Contract with
Lockheed Martin Idaho Technologies Company (LMITCO)
for Operation and Maintenance Services at the
Idaho National Environmental and Engineering Laboratory (INEEL)

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team to explore and understand how states and federal agencies are using performance based approaches for contracting and regulating environmental activities. The results presented herein are based on a review of pertinent documents plus interviews with individuals and organizations who had direct involvement with these activities. Site interviews were conducted on January 7-9, 1997 in Idaho Falls and Boise, Idaho. Information about the Team members who conducted these interviews and prepared this case study, the documents which were reviewed, and a listing of the individuals and organizations interviewed is provided at the end of this document. During the study we made a significant effort to identify and foster a dialogue with stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and goal of initiative

DOE site Management and Operating (M&O) services are typically acquired under Cost-Reimbursement type contracts where fee is determined as a percentage of the costs. These M&O contracts cover many diverse and often unique tasks -from site security to nuclear reactor operations. Tasks are individually defined, priced, and managed using task orders. This case study examines how DOE has applied performance based concepts to one of it's large M&O contracts, with the aim of achieving superior performance at reduced costs.

2. Description of initiative

In recent years DOE has been implementing a variety of procurement reforms intended to increase the value it receives from it's contract expenditures. One of these involves linking the fees paid on M&O contracts directly to contractor performance on individual tasks.

3. When initiated and current status

In 1994 DOE recompeted the Idaho National Environmental and Engineering Laboratory (INEEL) M&O contract. As a result, at the beginning of FY 1995 the incumbent (EG&G) was replaced by Lockheed-Martin Idaho Technologies Company (LMITCO), and the contract was structured to link fees directly and exclusively to contractor performance through the application of award and incentive fee criteria.

4. Related changes

The contract covers five years with an option for an additional five years. At the time of award total contract value was estimated at about $1 billion per year with related employment of about 6,000 people. DOE mandated downsizing, reduced budgets, and LMITCO implemented efficiencies have reduced the expected cost of the five year contract from $5 billion to about $3.6 billion. The work is about 60% environmental cleanup and 40% Research and Development.

5. Traditional approach that was replaced

In the past DOE has used contracts based on cost-plus fixed fee or cost plus award fee using subjective DOE assessment of contractor performance on most of it's M&O contracts. This contract involves the transition from award fee based on subjective judgements to award fee based on explicit and objectively measurable performance based results.

6. Definition of performance

LMITCO provided specific examples of performance based incentive fee tasks used during FY96. They include performance incentives related to operation of the Advanced Test Reactor (ATR) such as: cost efficiency, operating efficiency, unplanned outages, safety management, new business revenues, etc. Other areas relate to fuel transfers, safety and health performance indices, Voluntary Protection Program implementation, and contract indirect cost reductions.

The maximum fee LMITCO can earn each year is based on contract costs. In FY 96 the maximum fee available was about $45 Million based on costs of about $700 Million. FY 97 estimated costs are $627 Million.

Fee payments in this contract are earned by LMITCO under two separate approaches: Award Fee and Incentive Fee. Award fee is based on DOE's subjective assessment of LAIT performance, whereas Incentive fee is based on much more explicitly and mutually defined performance goals which can be objectively measured.

Over the 5-yr contract, the annual performance based incentive fee pool is being increased from 20% to 80%, as indicated in the following table.

Distribution of Fee by Year and Type

Type Fee	FY95	FY96	FY97	FY98	FY99
AWARD	80%	75%	60%	40%	20%
INCENTIVE	20%	25%	40%	60%	80%

7. Monitoring requirements

Most of the data required to measure actual performance against predefined benchmarks is derived from routine LMITCO reports to DOE-ID.

PART II - ASSESSMENT OF SYSTEM

1. Costs

DOE-ID believes implementation of this PBS contract has reduced employment requirements by over 1,000 people while accomplishing comparable work, and will save about $740M over the 5 year contract period. In addition unambiguous criteria/specifications are reducing DOE monitoring costs.

2. Benefits

There is a benefit to taxpayers from cost reductions. The benefit to LMITCO is the opportunity to earn higher fees without additional exposure to cost risks.

DOE views the Advanced Test Reactor operational performance improvement, nuclear fuel relocation ahead of schedule, and reduction of costs ahead of schedule as direct benefits from the performance based criteria that were applied. Innovation and flexibility are allowed and development of innovative technology is encouraged.

3. Results to date

DOE-ID and LMITCO jointly negotiate the performance criteria for the incentive fee pool. They seem to agree that it is becoming increasingly difficult to define and shift more work into the performance based incentive fee pool category. As they put it, "the low fruit has already been picked." For example, permitting and fuel movement milestones were incorporated in incentive fee tasks early on and were based on in-place agreements with regulatory agencies and the Idaho Governor's office. Nevertheless, there is a significant motivation for LMITCO to define work in a PBS/incentive fee context -- they are likely to earn more money, as the following data indicates:

FY 1996 Fee Paid by Pool Type

FY96 Fee Pools	Available ($M)	Paid	% Paid
Award Pool	$34.8	$16.3	47%
Incentive Pool	$10.3	$ 7.3	71%

Fines and penalties in some cases cannot be paid by DOE and must come out of corporate profit. For some endeavors this could be a disincentive for LMITCO to commit to certain PBS goals.

4. Stakeholder role in design/implementation

Stakeholders interviewed were not aware of any formal process, but DOE-ID thought stakeholder views are being taken into account. LMITCO was not aware of any stakeholder involvement. Site Specific Advisory Board (SSAB) involvement has been only with DOE in past ("hands off approach to contractors") but now LMITCO will be represented at Board meetings. There does not appear to be a formal DOE process for response to stakeholder input.

5. Equity

There seems to be general agreement between DOE-ID and LMITCO that this performance based approach is beneficial to both organizations. However, LMITCO would like to see the greater risk associated with achieving higher performance levels linked to higher potential rewards. They expressed concern that DOE is shifting risk without offering appropriately greater incentives. On the other hand, DOE is concerned about how to get more work done with less available resources.

6. Implementation issues/barriers faced and how they were addressed

The INEEL Site Specific Advisory Board (SSAB) requested to be involved in Governor's agreement but was "turned down." SSAB was not formed yet when LMITCO contract was being developed. The SSAB could, but hasn't wanted, to date, to be involved in contract RFP or contract criteria development. They make environmental recommendations and review major NEPA documents and environmental clean up plans. INEEL SSAB uses consensus building process and could input on regulatory development, prioritization of funding and prioritization of performance criteria on a risk basis.

7. Lessons learned

This contract is providing a valuable opportunity for DOE and LMITCO to perfect the art of performance based contracting, and to transfer the lessons being learned here to other major DOE performance based contracts planned or in process. It also provides an effective way to train technical, management and contract personnel in the use of PBS concepts and to experiment with various approaches to defining performance and linking it to rewards.

This performance-based contract gives LMITCO the flexibility to use innovative technologies, or innovative approaches in solving problems. By providing this flexibility, some barriers to getting approval to use such approaches are being removed. The incentive to use innovative approaches really comes from the potential of doing the job at lower cost, and likely higher contractor profit.

- We did not identify any specific innovative technologies being developed or used as a direct result of implementing this contract. However, we did observe that there are strong incentives for both DOE-ID and LMITCO to seek out and implement measures that produce better outcomes at lower costs. These incentives are already producing innovation in management and operational approaches. To the extent that innovative technologies are available and superior to conventional methods, we would expect LMITCO to advocate their use in this contract.

However, for innovative technologies to be used, both LMITCO and DOE-ID need to either have high confidence that

the technology will work and outperform the alternatives, or they must be willing to accept some level of risk that the new technology may not be successful. In addition, if the actions to be taken are subject to regulatory control, then state regulators may need to be convinced to use a performance based approach.

There appears to be very little regulator and stakeholder involvement. Since a significant portion of the activity is regulated, both DOE-ID and LMITCO would benefit if they made a greater effort to involve stakeholders and regulators in defining the work and performance levels for tasks under this M&O contract. This is especially important for site cleanup tasks where regulators and stakeholders need to take some ownership of performance-based objectives, related incentives, and inherent risks.

While performance based features in this contract shift more of the responsibility for job-specific performance to LMITCO, DOE still remains responsible and accountable for bringing themselves into regulatory compliance. Consequently, it would be appropriate for DOE-ID, LMITCO, and Idaho state regulators to view their relationship, under the PBS approach, as a partnership.

DOE Acquisition Regulations, (which represent a conservative approach to risk taking), and DOE sensitivity to outside perceptions may be having a negative impact on attempts to identify and/or add more performance based work under this contract. An example offered by LMITCO involves DOE's full cost recovery policy on "work for others" (direct and indirect costs, overhead, depreciation). Inflexibility on this policy virtually precludes LMITCO from generating additional revenues for DOE, achieving higher productivity with DOE assets, and providing unique services to non-DOE customers by selling unused capacity in the Advanced test Reactor at competitive prices based on the incremental cost to provide the irradiation services.

A concern was expressed by all parties interviewed that the contract requires compliance with constantly changing as well as "no value added" DOE Orders/Directives. Also Orders are referenced rather than the specific requirements from the orders, leaving the contractor with the burden of interpreting the orders, and the risk of not satisfying DOE after the fact. Others stated that exclusion clauses can be used for unforeseen changes in Orders/regulations. "Everyone wins when you clearly define objectives."

PART III - OTHER STAKEHOLDER VIEWS OF SYSTEM

1. USEPA perspective:

"If you can write unambiguous criteria/specifications, you can reduce costs."

2. State Oversight stakeholder perspective:

PBS and Privatization are irrelevant unless the people putting the contract together and then doing the work are technically knowledgeable and competent. At issue is the need to use technically knowledgeable people to establish the technical bases for a contract and whether DOE has that experience. DOE has the expertise in the complex and should pull together the right people from throughout the Complex to provide the technical expertise; "turf" may have hindered this. Have to have adequately defined project and contract conditions (criteria). Often inadequate/incorrect definitions of these are responsible for lack of success. Performance based fee is not sufficient incentive. There needs to be the disincentive of not getting paid for work (not just fee) unless performance is acceptable. The contract is not fostering innovative technology use but it is not hindering it..

3. State Regulator perspectives:

State provides the avenue for stakeholder comments on cleanups, but little response received. Response is issue specific. No public involvement in regulatory processes such as air permitting. Conflicting opinions on whether tribal inputs are sufficient. "Track 1/Track 2" assessments of potential clean up areas at INEEL to determine which areas needed to be cleaned up: Three agencies and M&O contractor developed guidance document on how to make these decision and presented to public. Has been very successful and saved everyone money. Gave Naval Reactor Facility landfill, and Borax (SL-1 landfill) as examples of successful performance based process and regulatory agency involvement way up front. However, these were much simpler projects involving only landfill covers.

PART IV - REFERENCES

1. Case study team

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Dave Jewett and Patrice Kent, Thermo-Electron/Coleman Research
Peggy Knecht, Lockheed-Martin Idaho Technologies Company

2. Sources of information

Marshall Garr, DOE-ID, LMITCO Contract Administrator
Joe Mc Gough, DOE-ID, Contract Administrator
Scott Jenkins, LMITCO, Contract Administrator
Charles Rice, INEEL Citizen's Advisory Board Chairman
Robert Ferguson, Manager, INEEL Oversight, State of Idaho Governor's Office
Rensay Owens, State of Idaho Division of Environmental Quality
Beatrice Brailsford, Snake River Alliance
Wayne Pierre, EPA Region 10

3. References collected or reviewed

- Marshall Garr Briefing Handout
- Memo from Hoyles (DOE-ID) to Pearman (DOE-HQ) 12/17/96 subj: "Administration of Performance Based Incentive (PBI) Fees"
- Modification M022 to LMITCO M&O Contract (Rev 1, 8/17/95) defining performance based incentives #1, 2, 3a, 3b, 4a, 4b, 5, 6, 7, 8, and 9.

APPENDIX G

Project Hanford Management Contract

CASE STUDY

Project Hanford Management Contract Between the US Department of Energy and Fluor-Daniel Hanford, Inc for a Management and Integration Contractor for the Hanford Site

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team to explore and understand how states and federal agencies are using performance based approaches for contracting and regulating environmental activities. The results presented herein are based on a review of pertinent documents plus interviews (conducted in December 1996) with individuals and organizations who had direct involvement with these activities. Information about the Team members who conducted this case study, the documents which were reviewed, and individuals and organizations interviewed, is provided at the end of this case study. Throughout this study we made a significant effort to identify and foster a dialogue with stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and goal of initiative

The Department of Energy awarded the five year (through FY-2001) Project Hanford Management Contract (PHMC) as a performance-based Management and Integration (M&I) contract for the Hanford site to Fluor-Daniel, Hanford (“Fluor”). PHMC was designed partially in response to concerns about escalating costs of operations. Site funding for the Hanford site through FY-2001 (including fee pool) is anticipated to be nearly $5.1 billion.

The purpose of the Request for Proposals (RFP) was to identify a team which offered “best in class” (recognized as exhibiting

excellence in quality and customer satisfaction in a given task area) for a variety of tasks. Fluor became the M&I contractor at the site (following a short transition period) on October 1, 1996. The contract places emphasis on the application of commercial methods of management (rather than federal practices) to the extent practical.

The RFP linked management objectives with Hanford multi-year plans already in place, including appropriate Milestones from the Tri-Party (DOE, EPA, and the state of Washington) Agreement. The Tri-Party Agreement (TPA) is the regulatory structure within which remediation activities at Hanford must operate.

2. Approach replaced

Historically, DOE has tended to conduct site remediation activities with or through their onsite Management and Operations (M&O) contractor(s). This structure segments the effort into separately contracted design, build, operate stages. In an M&O contract, the federal agency plays a very direct, hands on role throughout the process which may not support the most effective implementation of environmental activities.

In the past DOE has used contracts based on cost plus fixed-fee, or cost plus award fee using subjective DOE assessment of contractor performance on most of its M&O contracts. This contract involves the transition from award fee based on subjective judgements to award fee based on explicit and objectively measurable performance-based results.

PHMC is expected to reduce DOE’s direct involvement in individual operations; the agency has provided the contractor with operating objectives, with the expectation that the contractor’s team (“best in class” for each operation) will meet or exceed those objectives. One method being used to ensure the objectives will be met is to link fees directly to contractor performance on defined tasks.

3. Related changes

DOE expects that work will be completed in a more cost-effective manner. The contract places emphasis on the application of commercial methods of management (rather than federal practices) to the extent practical. The Department of Energy (DOE) sought

to change the culture and way it conducted business at the site from “cost-plus” in part due to concerns about escalating costs of operations.

The site currently employs approximately 16,000 people. The PHMC is expected to result in a reduction in workforce of about 25%, through efficiencies from reduced duplication and from performance-based, rather than “command and control,” operations. Some stakeholder representatives are skeptical about the degree with which actual cost-savings will accrue, and to whom those savings will revert.

4. When initiated/current status

The contract award to Fluor was announced in August, 1996, with completed transition to Fluor management at the site October 1, 1996. Since this is such a new project, there is little concrete information as to the effectiveness of the system.

Additional time is required to follow how the applied lessons learned develop. The contract team from DOE has stated their impression that this is the next step, and that the next round of performance-based contracts will improve on the PHMC contract much as this one has tried to build off previous experiences.

5. Definition of performance

DOE Headquarters guidance provided categories for performance expectations; the purpose of the expectations were an attempt to define objective results. It was expected that the process would also be used to “build in” both positive and negative incentives to encourage the contractor to meet or exceed defined tasks. The process outlined for designing the PHMC was for Hanford DOE to establish a strategy and objectives to be met for the Hanford site, leaving “how to do what” to achieve those objectives to the integrating contractor with specific operations being performed by particular “best in class” team members.

During the RFP process, DOE provided offerors with baseline objectives. A stated performance objective of the PHMC is to reduce cost of operations through more efficient use of

resources. One of the objectives under Technology Management aims to “incentivise” the application of innovative technologies.

The site specific advisory board at the Hanford site (Hanford Advisory Board, or HAB) had some limited review of the PHMC. Several stakeholders we spoke with were not satisfied that the comments and revisions they offered were adequately factored into the process and final product. Specific advice from the HAB, among other things, requested definition of performance objectives to identify expectations during the contract period of performance. Part of the communication disconnect probably arose from the fact that the Site was attempting to define performance objectives and measures after the RFP “hit the street,” and comments proffered were addressing different products.

Contract performance objectives and goals and related measures are negotiated between the M&I contractor and DOE each fiscal year. Incentives are determined on a straight mathematical adjustment, determined in relation to available budget. No re-negotiation of that formula is possible for ten years. Most expectations and objectives are specifically linked to incentive payments; for those not directly linked, the Contractor must meet at least 75% of those to receive the incentive fees.

PART II - ASSESSMENT OF THE SYSTEM

1. Costs and benefits

According to agency (state and DOE) representatives, benefits are expected to accrue to “taxpayers” from monies and time saved. There will also be the social benefit of a large site which may be brought back into “productive” use by the community at large. At least one state regulator said that he felt DOE is seeking pragmatic solutions to intricate and difficult problems at the Hanford site.

On the other hand, some stakeholder representatives stated that the biggest winners will be Fluor and other site contractors. According to this view, the contractors will be receiving some form of “cost reimbursement,” whether it is called that or not. Also, site workers will receive their individual paychecks whether the site is remediated or not.

Some stakeholders have raised that point that DOE Headquarters' initiatives are being put forward without adequate back-up in technical and/or management expertise. A recent GAO report also notes:

> "... the high rate of cost overruns, schedule slippages, and terminations on DOE's major acquisitions can be traced to four key factors: unclear or changing missions; incremental funding of projects; a flawed system of incentives both for DOE employees and contractors; and a lack of sufficient DOE personnel with appropriate skills to effectively oversee contractor operations."[5]

The GAO report did not address the PHMC, and was directed specifically at project problems, and further, the report noted some important problems could be ameliorated "... by contract reform ... [if] DOE ha[s] enough properly trained staff to oversee implementation of the reforms."[6] PHMC is viewed as a type of contract reform which may address these problems; DOE and stakeholders also recognized the importance of having the right people in the right positions. One RFP/contract objective specifically addressed reducing or eliminating key personnel transfers.

2. Results to date

As stated before, since this is such a new project there is little concrete information as to the effectiveness of the system. One objective/milestone date for Flour has recently occurred.

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[5] GAO, pp 2-3

[6] Ibid., p 45.

Fluor-Daniel Hanford was to have developed a site-wide *Health and Safety Master Plan* for an integrated health and safety policy for all Hanford site contractors. The *Policy* presented was deemed inadequate by the site (as well as by the HAB), therefore Fluor did not receive a possible $2 million performance fee[7]. Fluor expressed concern that DOE is attempting to get back into the "details" of management through re-writing specific language.

3. Stakeholder role in design/implementation

There was some stakeholder review of the PHMC through the Hanford Advisory Board, a site specific advisory board comprised of members representing a variety of interests in the Hanford region. Specific advice from the HAB, among other things, requested definition of performance objectives to identify expectations during the contract period of performance. HAB members did not feel their proffered advice was fully taken into account in the final M&I contract.

One explanation for limited stakeholder involvement was given by a stakeholder. He noted that those who are crafting an RFP work on the process full-time, and are technically and/or procedurally experienced at the subject matter. When a stakeholder with other professional duties (i.e., a "concerned volunteer") is given a short turn-around time to review such a document, comments are necessarily limited to specific goals, issues or points. If even those comments do not appear to be addressed (as apparently was the case with the PHMC), that stakeholder is not as likely to provide thoughtful proactive input in other instances, and the agency will lose valuable insights.

4. Lessons learned

Identifying "best in class" prior to award may have pre-disposed teams against really getting <u>all</u> of the best in class team members.

DOE is attempting to become more responsive to Congressional and community stakeholder concerns about "cost-effective" management.

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[7] Briggs and Stang: p A-1

DOE attempted to clearly define needs for the contract.

The “flexibility to select innovative technologies” in not equivalent to an incentive to use innovative technologies.

The regulatory milestones referenced in the contract (which drive the baseline schedules and objectives) may not allow sufficient latitude for Fluor to use innovative technologies. DOE and the contractor will together adjust goals, depending on newly available information which may provide more opportunity for innovation.

DOE noted that one of the more important difficulties in this process is in DOE’s ability to “define what we want.”

There is some level of stakeholder distrust that this (PHMC as performance-based contracting) is anything but “business as usual.”

DOE appears serious in its “judgement” of performance objectives.

At some point the definition of performance can become a definition of operations.

There needs to be an formal DOE process for responding to comments received from stakeholders. This is needed in order to prevent such dissatisfaction that valuable input will no longer be provided to improve processes.

PART III - OTHER STAKEHOLDER VIEWS OF SYSTEM

By and large, the people interviewed expressed support for the idea of performance-based contracting. With complete and specific identification of real objectives, the cost and time savings touted by performance-based systems supporters may be realized.

Generally, the external stakeholders interviewed do not seem hopeful of the PHMC being an effective performance-based management contract, as it is currently structured. Having some portions of the contract tied to performance incentives and

others not appears to compartmentalize the Hanford project too much to see the expected benefits of performance-based systems. Also, one interviewee noted that the award fee was too small to be a “real” incentive for the contractor.

Public interest and contractor respondents thought that part of the PHMC design implied an attempt by DOE to shift responsibilities from the agency to the contractors. Regulators noted that DOE is still responsible for meeting regulatory milestones.

In addition, the privatization goals have had the effect of encouraging a (partial) return to a security consciousness which marked the Cold War national security mindset of the site. This was “cloak of silence” was remarked upon by some, and seems counter to the openness initiative begun by Secretary O’Leary, and supported by Secretary Pena.

PART IV - REFERENCES

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APPENDIX H

Pit 9 Technology Demonstration at INEEL

CASE STUDY

CERCLA Interim Action at the Pit 9 Waste Site Located at the Idaho National Engineering and Environmental Laboratory (INEEL)

PART I DESCRIPTION OF PERFORMANCE BASED SYSTEM

Introduction

This case study was undertaken as part of a larger effort by the Interstate Technology and Regulatory Cooperation Work Group (ITRC) Policy Team to explore and understand how states and federal agencies are using performance based approaches to environmentally remediate contaminated sites. The information presented here is based on a review of pertinent documents plus interviews with individuals and organizations who are involved with or interested in the three-phase Pit 9 cleanup effort. The Team members who conducted this case study, the documents that were reviewed, and the individuals interviewed (case study "participants") are listed at the end of this study. Subcontractors were not interviewed. Lockheed Martin Advanced Energy Systems (LMAES), the Lockheed Martin IdahoTechnologies Company (LMITCO) subcontractor performing Phase II of the Pit 9 work, was requested to comment on drafts of the case study, but declined. The case study team has made a significant effort to identify, and foster a dialogue with, stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the remediation work.

1. Background and goal of initiative

The Pit 9 Project is a U. S. Department of Energy (DOE) full-scale demonstration of retrieval and treatment of buried mixed transuranic waste. As well as being a first-of-a-kind demonstration, the project is being conducted as an Interim Action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The project is managed by LMITCO, the INEEL Management and Operations contractor to the DOE Idaho Operations Office (DOE-ID) and is being overseen by DOE-ID in conjunction with EPA Region 10 and the State of Idaho under the INEEL Federal Facility Agreement and Consent Order (FFA / CO tri-agency agreement). The project was conceived out of the need to determine capabilities to cost effectively retrieve and treat buried radioactive and radioactive mixed waste, and obtain characterization and contaminant migration data for buried waste at the INEEL. Pit 9 is approximately 380 feet long, 125 feet wide, and averages 17.5 feet deep (soil surface to basalt bedrock). It was estimated to contain approximately 110,000 cubic feet of transuranic (TRU) contaminated wastes from Rocky Flats, Colorado, and approximately 40,000 cubic feet of low level and mixed wastes from the

INEEL. These wastes were deposited in the pit between 11 / 67 and 6 / 69. The pit was also estimated to contain over 30,000 gallons of organics and approximately 66 pounds of TRU radionuclides.

2. Regulatory Framework

As a CERCLA Interim Action, Pit 9 involves three government agencies (DOE, EPA, and Idaho Department of Health and Welfare), via the INEEL FFA/CO tri-agency agreement, as well as the INEEL M&O Contractor (LMITCO) and the performer, the LMITCO subcontractor LMAES. The agencies jointly developed the Pit 9 Record of Decision (ROD), signed in October 1993, which established the regulatory requirements for the project.

According to the ROD, the selected remedy was a “physical separation/chemical extraction/stabilization process.” The Applicable or Relevant and Appropriate Requirements were identified in the ROD.

Two vendors were to demonstrate several critical aspects of their versions of the selected remedy in Phase I, proof-of-process (POP) testing. The two sets of planned POP tests were described in the ROD, including simplified process flow diagrams. One successful Phase I vendor was to be selected to demonstrate its complete remedy in Phase II, Limited Production Testing (LPT). After each of these phases a decision would be made whether to proceed with the next phase. Following the LPT phase, the agencies would determine whether to proceed with the final planned phase of the demonstration, Phase III, full scale remediation of Pit 9. The subcontractor must have demonstrated that the integrated processes would meet the performance criteria in order to proceed. If the goals of the LPT as defined in the Pit 9 ROD were not met, Pit 9 contamination would be addressed in an “Explanation of Significant Differences” document (ESD), amendment to the ROD, or in the Remedial Investigation/Feasibility Study for the TRU-Contaminated Pits and Trenches. Schedules for submittals to the regulatory agencies of related Work Plans and Facility/System Designs for this interim action were included in the Remedial Design/Remedial Action Scope of Work (RD/RA SOW) and Remedial Design Work Plan (1/1995).

3. Description of initiative

A decision was made early in the project to subcontract with the private sector to allow them an opportunity to demonstrate their capabilities. This approach was driven by several considerations: a) private firms were approaching DOE and claiming they could do it better, faster, and cheaper, b) over 30 private firms responded to an EG&G Idaho request for expression of interest, c) industry was claiming the job could be done with low risk using off-the-shelf technologies, and with no need for additional R&D. The INEEL M&O contractor (EG&G Idaho, transitioning to LMITCO in late 1994) was tasked by DOE with subcontracting the Pit 9 effort, administering the subcontract, and providing oversight for environmental, health, and safety compliance.

The subcontracting strategy used an “estimated fixed-price”

approach, based on the estimated amount of feed/product material to be processed through the treatment facility, for material treated to specifications in Phase III. Some advance payments were allowed, to assist with the cost of up front capitalization of facilities. The performance and schedule risks were to be borne by the subcontractor, rather than LMITCO. The subcontractor was required to sign a "guarantee of performance." If the subcontractor failed to successfully complete Phase II, advance payments provided during Phase II would be reimbursed to the contractor. The Phase II/III fixed price subcontract was for $179 million. The subcontractor is responsible for all design, construction, permits/licenses, operation, and decontamination and ultimate disposition of the facilities necessary to accomplish the scope.

4. When initiated and current status

A Request for Proposal (RFP) was issued November 19, 1991, to 18 firms. Three private sector teams responded with proposals. The EG&G Idaho Source Evaluation Board (SEB) for the proposals concluded that two of the proposals were acceptable and essentially equivalent, however the SEB had reservations about the maturity of the proposed technologies, including their integration, for the intended application. As a result, Phase I of the project was expanded from a paper study and limited laboratory demonstrations. In the expanded Phase 1 project, both proposing teams were to conduct a pilot scale or bench scale demonstration of several aspects of the treatment system that were identified as "critical."

The Phase I POP was completed by both subcontractors in December 1993. The Request for Price Proposal was issued on December 7, 1993. The two teams responded with proposals in April 1994, and a $179 million fixed price subcontract for remediation of Pit 9 was signed with Lockheed Environmental Services and Technologies (LESAT)[8] in October 1994. This subcontract included progress and milestone payments, unit rates for removal/handling of material not requiring treatment, unit rates for treating up to 250,000 cubic feet of soil/waste, and a final payment upon completion of decontamination and removal of the Pit 9 facilities at the conclusion of the project.

The subcontractor initiated work on Phase II in August 1994. Design/fabrication of the separation and waste processing subsystems proceeded in parallel with site construction (roads, utilities, buildings, etc.). As stated

[8] LESAT has since been renamed Lockheed-Martin Advanced Energy Systems, Inc. (LMAES)

previously, Phase II was to be a limited production test of the integrated retrieval and treatment systems, with all aspects being tested, as opposed to Phase I which tested only isolated aspects previously identified as "critical." Two key Pase II regulatory milestones (90% comprehensive design review and the Remedial Action Work Plan) were missed in early 1996, and the EPA has levied $940,000 in fines against DOE as a result. In early 1997, LMITCO had paid LMAES $54 million in milestone and progress payments, however if LMAES fails to successfully complete Phase II, LMITCO is to be reimbursed for all these payments in accordance with the Corporate Guarantee of Performance.

5. Related changes

In March, 1997, DOE, EPA, and the state reached a negotiated settlement agreement that required a revised RD/RA SOW to be submitted by September 30, 1997, on how the Pit 9 interim action is to proceed.

6. Traditional approach that was replaced

The Pit 9 subcontracting approach replaced the site cleanup approach DOE has traditionally used in which the M&O prime contractor would have performed the remedial action internally, under their cost plus type contract.

7. Definition of performance

The ROD established a 10 nanocurie per gram (nCi/g) transuranic content as a radioactivity related treatment decision threshold. Pit 9 contains contaminants that would currently cause the wastes to be RCRA listed and toxicity characteristic (TC) wastes. The ROD allows retrieved wastes that are less than or equal to 10 nCi/g transuranic content to be returned to the pit without treatment. In addition, treatment residuals containing RCRA listed wastes that are to be returned to the pit must contain less than or equal to 10 nCi/g transuranic radionuclides and meet the ROD delisting criteria. The subcontract specification requires that treated material to be returned to the pit meets RCRA LDRs and the INEEL low level radioactive waste disposal acceptance criteria.

The ROD stated that

> "The residuals resulting from the treatment process would still be defined as listed wastes under RCRA. However, delisting is the compliance option that will be used to meet LDR requirements. Delisting requires a demonstration that the wastes meet risk-based levels and no longer present a threat to the public or the environment. In addition, the wastes would be treated to meet characteristic hazardous waste standards in accordance with 40 CFR 261 Subpart C. Treatment residuals to be managed onsite [those that are treated to less than or equal to 10 nCi/g TRU] as part of the Pit 9 interim action that are treated to the levels specified in Table 4 [of the ROD] are being delisted through this ROD and satisfy the substantive requirements of 40 CFR 260.20 and .22 and *A Guide to Delisting of RCRA Wastes for Superfund Remedial Responses*, OSWER Superfund Publication 9347.3-09FS, September 1990."

Six listed wastes — carbon tetrachloride, tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, sodium cyanide, and potassium cyanide — are delisted through the ROD so long as they are not characteristic waste and meet the specific risk-based concentration levels given in the ROD for leachate and for total content. For treated waste residuals that contain more than 10 nCi/g transuranic radionuclides and, therefore, cannot be reburied in the pit, the ROD identifies RCRA Land Disposal Restriction (LDR) standards as a treatment goal. If these LDR standards are not achieved, the concentrated waste residuals will be temporarily stored onsite. A final decision on the ultimate disposition of such stored residuals would be made in the RI/FS for TRU contaminated Pits and Trenches at the INEEL. The LDR standards to be used as the goals are given for the six listed wastes and for mercury and lead characteristic wastes. The Pit 9 subcontract specification also requires that the concentrated TRU treatment residuals meet WIPP waste acceptance criteria and RCRA LDRs.

In addition to treatment levels, the ROD specified that the selected remedy will be protective of human health and the environment, as measured by specified carcinogenic risk level and Hazard Index limits. In addition, the ROD stated that because the residual contamination in the pit may pose a direct contact threat, but does not pose a groundwater threat, relevant and appropriate requirements include: (a) a cover, which may be permeable, to address the direct contact threat; (b) limited long-term management including site and cover maintenance and groundwater monitoring; and (c) institutional controls (e.g., land-use restrictions or deed notices) to restrict access.

The original subcontract required the Phase II LPT test to be initiated by August 15, 1996, and complete by December 13, 1996. The subcontract also required the subcontractor to meet the CERCLA Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan schedule on a "best efforts" basis. The Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan for Operable Unit 7-10 (Pit 9 Interim Action), Revision 1, January 1995 (INEEL.-94/0110) required a set of 12 Interim Action deliverable due dates, based on the same completion date as the subcontract, of which four were designated as "primary" documents that were enforceable milestones:

Pre-final Comprehensive Pit 9 Remedial Design (includes 90% Treatment Facility and Systems Design)	January 8, 1996
Remedial Action Work Plan	February 22, 1996
Draft Remedial Action Report	Within 60 days of final inspection
Draft O&M [Operations and Maintenance Activities] Report	Within 90 days of completion of O&M activities

8. Monitoring requirements

The ROD stated that relevant and appropriate requirements include monitoring during operations and limited long-term management that includes site and cover maintenance and groundwater monitoring. Monitoring requirements contained in DOE orders also apply to the subcontract.

PART II ASSESSMENT OF SYSTEM

1. Costs

At the time of the case study, Pit 9 remediation design was still in progress while construction was continuing. This approach could increase the potential for costly construction reworks.

2. Benefits

The phased approach, with separate performance criteria for each phase, was viewed as a benefit in that it reduced overall cost risk and environmental risk in comparison with no phasing. Another stated benefit to the PB approach is that PB clean up standards can better define accountability.

3. Stakeholder role in design/implementation

NEPA reviews, public meetings, tribal interactions, and National Academy of Science reviews took place. A proposed plan was released or public comment but it was widely criticized for lack of technology details and information. A second plan (revised proposed plan) was then issued containing descriptions of the two proposed processes. Thirteen public meetings on the plans gave input to the ROD. If the ROD were to be changed as a result of sufficient change in remedy, public meetings may be necessary. Formal responses were made to comments received at the CERCLA public meeting.

There is a stakeholder concern that public involvement may be reduced with privatized contracts, mainly because of potential proprietary information issues, and that the Site Specific (Citizens') Advisory Board (SSAB) may be depended on too much to serve as the means for public involvement. Getting the right (public) involvement on setting criteria, etc., and formal response to stakeholders is important from a stakeholder perspective.

4. Equity

[No entry]

5. Implementation issues/barriers faced and how they were addressed

There was much stakeholder and regulator confusion between performance based contracting (PBC), fixed price contracting, and privitization, although all were clear on what performance criteria were. This confusion made it difficult to untangle some stakeholders' and regulators' issues on performance based requirements in contracts from their issues on contracting mechanism.

The following sections discuss specific issues that were identified by the case study participants.

Cost Risks:

There were some stakeholder concerns expressed in the case study that budgeting should not be excessively weighted to the beginning or end of a project. This relates partly to control of cost and performance risk by subdividing the project into subtasks, with each subtask having performance criteria and payment scheduling based on meeting the performance criteria for each subtask. If performance based criteria are placed only at the end of large complex projects and performers are paid only after successful completion of the entire project, very large costs would be incurred at the end of the project and the performance risk would be at a maximum. In addition, this would make congressional funding of federal projects more difficult than for evenly spread out costs, and the entire cost burden to completion would be borne by the performer, greatly increasing the cost risk to the performer. A stakeholder concern, however, was also that any payment before specific performance requirements were met would be "inappropriate" in that they could be paying for "nonperformance."

A combination of project phasing and advance payment provisions in conjunction with the performance criteria were used to address the cost / performance risks to LMITCO / DOE. The advance payment structure minimized the need for the subcontractor to leverage funding needed before actual waste treatment was begun. This minimized or eliminated the potential impact of the expected 7 to 15% "cost of money" on the work that could be performed within the fixed price contract. The cost risk to LMITCO was addressed with the Corporate Guarantee of Performance, which binds the contractor to repay advance payments in the event Phase II contractor performance is inadequate.

Additional efforts were made to address cost considerations. The parties to the INEEL FFA / CO agreed that the Pit 9 Project could best be accomplished as a CERCLA interim action under the FFA / CO.

Performance Risks:

Risk evaluation and risk management were perceived as important by some participants in defining the project, picking the contract mechanism, and setting the technical performance criteria. The importance of evaluating the applicability of a technology as an aspect of risk evaluation and risk management and setting performance criteria was identified in the context of when and how to use performance based contracting. Several stakeholders and regulators submitted that uncertainty in the effectiveness of a given technology in a situation that is significantly different from those in which it has been previously used are problematic for the use of performance based criteria. This was attributed to the fact that, in setting criteria, there has to be sufficient experience in using the technology to ensure criteria can be met, and sufficient knowledge of the project to write the specifications / criteria effectively. Similarly, one can infer that, to a considerable degree, the evaluation of whether a situation is "significantly different" is subjective. A technology demonstration project is a demonstration exactly because the technology is either new and / or the situation is different from previous uses of the technology, but the extent to which the situation is different may not be clear until the demonstration is ongoing. One of the normally allowed, but not welcome, outcomes of a technology demonstration is lack of success because of insurmountable technical factors not previously identified. Technology demonstrations may experience numerous incremental changes in hardware and / or processes to obtain the desired technical performance. Phasing of the Pit 9 subcontract was used to help address such issues.

Participants emphasized the importance of breaking down a project into subtasks and phases with sufficient performance criteria and decision points to ensure risks are managed to acceptable levels and tailored to the degree of uncertainty in the project. But to do this, potential uncertainties in the data and expertise needed to write and implement the requirements must be evaluated. Such uncertainties are much higher for demonstration projects than for projects that are repeats of commercialized process applications previously performed. Again, the three-phase structure of the Pit 9 subcontract was used to address such issues.

Several participants voiced the concern that "Dilution of control by layered subcontracts increases risk in proportion to loss of direct control" and that layering of communications due to the layering of subcontracts is a problem. Federal Acquisition Regulations prohibit DOE from directing activities of subcontractors to DOE prime contractors, adding to potential communication difficulty. Effective communication between all involved parties, at all stages of a project, is important as a form of risk management.

Some thought that there is lack of guidance on how to do PBC right and that requiring PBC before proper guidance is available is nonproductive and may be counterproductive where regulatory deadlines are involved. For innovative technologies, these factors, the lack of historical base, and the presence of regulatory agreements milestones could work against the use of PBC. However, others thought that this doesn't mean that PBC cannot be used, it means it must be used judiciously with proper project definition, selection of performer, etc.

The risk to DOE/LMITCO of subcontractor nonperformance was partly addressed by phasing the project and requiring a Corporate Guarantee of Performance to be signed by Phase II bidders, in addition to the other terms of the subcontract.

Some participants stated that looking at what is tolerable risk is important, that it is important to accept [residual] risk, and that "risk can't be shifted by subcontracting." In this context, however, some regulators and stakeholders participants seemed to confuse risk with liability, and regulatory liability with financial/contractual liability, expressing the view, for example, that "performance based" [privatized] contracting was being erroneously perceived by DOE as a panacea to shift liability to private companies. A stakeholder stated that "liability" should be appropriately "shared." Similarly, a regulators' stated position was that "liability" can't be shifted from DOE "when statutory drivers are involved." One participant stated "Using PB contracting to "throw the burden on someone else is a blueprint for failure." This confusion made it difficult to untangle participants' risk evaluation and management issues from participants' liability issues.

Performance Criteria:

Clarity and completeness of requirements and the adequate communication of all requirements were perceived as key by all participants. An example of related difficulties in the Pit 9 cleanup was given as: the subcontract lacked a complete, explicit list of deliverable documents required. In addition, documentation requirements were more specifically delineated, and as viewed by some, expanded, after the contract was let.

Participants thought it was important for the contract writers to have access to the necessary expertise to set performance criteria. Case study participants emphasized the importance of clear, open, and effective communication between and among implementers, stakeholders, and regulators with respect to setting and meeting performance criteria. There was a broad perception that "Open discussion and input to [the] regulatory agency and response to regulatory agency concerns is a critical factor in the success or failure of environmental projects -- minimize risk by involving regulatory agencies as far in advance as possible." For the Pit 9 project, EPA and state regulators worked with DOE to identify the appropriate air and hazardous waste management regulations that were required to be met. However, some stakeholders wanted DOE to have even more "up front buy-in" from regulators on deliverables and also wanted reduced DOE "protectiveness" of direct communication of the subcontractor with regulators. The technical capability needed for performance criteria development was stated to be available within the DOE complex and DOE is beginning to use cross-complex teams, but expertise within the department is "stove piped."

One regulator thought it is proving difficult to work with only a small number of performance criteria in a contract that uses innovative methods. This is in turn related to project phasing and project subtask identification needed to manage cost and performance risks to acceptable levels. Whether the ROD and the subcontract explicitly

and clearly included all the performance requirements was questioned by some participants.

Additional stakeholder issues were related to the difficulty in selecting performance based criteria that are acceptable to stakeholders as well as those responsible for project management, implementation, and regulatory oversight. Specific stakeholder issues were (a) external versus DOE regulatory oversight for environmental, health and safety arenas and (b) the use of "soft" (site specific) risk based standards in the ROD, even though these were based on accepted CERCLA methodologies. One stakeholder disagreed with the rejection of an Agency for Toxic Substances and Disease Registry negative assessment of the site specific 10 nCi/g soil and waste "reinterment" level and thought that the federal (EPA) drinking water limit of "4 mrem/yr" maximum dose to a member of the public should have been used as the total allowable dose from all potential exposure pathways to set the reinterment level.

Although not specifically Pit 9 related, ROD commitments to specific treatment facilities, either existing or planned, were criticized by a stakeholder as unnecessarily prejudicing the "selection process" (presumably the performer or technology selection process). There was a stakeholder perception that continuous independent regulatory monitoring of cleanup performance was needed.

Flexibility:

The view was expressed that performance based contracting can be used effectively in any moderately complex project, providing the necessary flexibility is built in and there are sufficient project definition/check points ("phasing") to measure progress and manage risks.

It appeared to some participants that the fixed price subcontract and tight schedule of regulatory deadlines could make changes difficult. For example, for Pit 9, Phase II process redesign to achieve a more efficient process increased estimated subcontractor costs and time to completion for this phase. This was done to reduce acid use, quantity and corrosivity of secondary waste generated, and tailor the chemical washing process to the wider-than-expected variations in waste characteristics. In early 1997, the subcontractor was assessing a revised technical path forward and the regulatory agencies had agreed to a next step that required a September 1997 DOE submittal of a new plan for a path forward.

Many participants thought that flexibility in schedule/regulatory milestone dates was needed to support the use of innovative technologies. However, one participant asked: "If there are no time constraints, can PB activities such as setting compliance parameters and compliance points work?" A stakeholder also felt that allowing deadlines to be extended and other contract "loopholes" could be "disincentives" to performance. The Pit 9 subcontract provided some milestone flexibility by requiring a "best effort" basis for the Remedial Design/Remedial Action Scope of Work milestones.

A stakeholder and regulator stated that risk of failure should be minimized, and feasible "fall back" and "follow up" positions developed to ensure a project can recover efficiently in the event of a failure or of future reopening by a regulatory agency.

6. Lessons learned

The lessons learned include successes as well as areas in which improvements could be made in the future:

Some of the primary lessons learned, as stated by DOE, are to preserve flexibility, allow time to do it right, keep stakeholders involved, and have clearly stated requirements and objectives.

Completeness and clarity of performance requirements are key.

Development of performance based criteria for innovative cleanups, including demonstrations, needs to consider flexibility for changes, and sufficient project definition (and related check points) to measure progress and manage risks. Determining what flexibility may be needed is itself a part of the risk evaluation and management process. Such flexibility may include developing feasible "fall back" and "follow up" positions to allow technical and regulatory changes to be incorporated.

Technical refining which may be needed to successfully demonstrate technologies may increase costs and extend scheduled milestones during the overall project in ways that cannot always be predicted at the outset. The use of phased projects with separate performance criteria and decision points at the completion of each phase, as in the Pit 9 project, can be helpful in addressing such problems.

Risk evaluation and risk management in defining the project, picking the contract mechanism(s), sharing risks, assessing cost effectiveness, and setting the technical performance criteria are factors that must be considered. Risk evaluation and management need to be an integral part of performance based strategies, whether for contracting, regulatory processes, or regulation development. Inclusion of "performer past performance" criteria in selecting a performer for fixed price contracts is one way of partially managing risk.

Good communication must be established and maintained between all involved parties, including stakeholders. Layering of communications, e.g., by multilayered subcontracts, increases the complexity / difficulty of communication.

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Persons & Organizations interviewed

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EPA Region X - Wayne Pierre
INEEL Site Specific advisory Board - Charles Rice
Lockheed Martin Idaho Technologies Company - Clair Fitch, Gary Longhurst, and Philip Kohn
Snake River Alliance - Beatrice Brailsford
State of Idaho Division of Environmental Quality - David Hovland and Dean Nygard
State of Idaho INEEL Oversight - Robert Ferguson
U.S. DOE, Idaho Operations Office - Frank G. Schwartz

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APPENDIX I

Advanced Mixed Waste Treatment

(H-11)

Project at INEEL

CASE STUDY

Advanced Mixed Waste Treatment Project (AMWTP) U.S. Department of Energy Contract with British Nuclear Fuels Laboratories, Inc. (BNFL) for the Treatment of Mixed Low Level Alpha and TRU Waste at the Idaho National Environmental Engineering Laboratory (INEEL)

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team to explore and understand how states and federal agencies are using performance-based approaches for contracting and regulating environmental remediation activities. The results presented herein are based on a review of pertinent documents plus interviews with individuals and organizations who have direct involvement with these activities. Information about the Team members who conducted this case study, the documents which were reviewed, and individuals/organizations interviewed, is provided as an appendix to this case study.

Throughout this effort we have made a significant effort to identify and foster a dialogue with stakeholders from the affected community, as well as local, state, and federal agency officials involved in regulating or overseeing the remediation work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and goal of initiative

On December 20, 1996 the U.S. Department of Energy (DOE) Idaho Operations Waste Management Office (ID/EM-34) announced the award of a $1.06 billion contract to a team lead by British Nuclear Fuels, Inc (BNFL) for the design, permitting, construction, operation, and closure of a Advanced Mixed Waste Treatment Project (AMWTP) facility. The AMWTP facility will be owned by BNFL and sited on property leased from the Idaho National Environmental Engineering Laboratory (INEEL). The AMWTP facility will process low level mixed (radioactive and hazardous) wastes that had been generated by, and are currently stored at, the INEEL.

The approach being used in the AMTWP came about, in part, from a 1994 ID/EM-34-funded feasibility study which solicited private sector approaches to Alpha Mixed Low-Level Waste ("alpha" or "AMLLW") treatment. The feasibility study indicated that private industry could use available technologies to treat alpha- and transuranic (TRU) mixed low-level waste products using existing technologies at great cost and time savings from DOE estimates. The INEEL location was selected by DOE as potentially the most cost-effective site for a fixed facility, in part because INEEL has sixty percent of the stored alpha and TRU inventory in the DOE complex.

The AMWTP contract is also one of the first major tests of DOE's new management and acquisition approach to containing and, where feasible, cleaning up the cold war environmental legacy. Key features of this new strategy include using market forces (competition), industrial innovation (performance-based specifications), privatization (primarily fixed-price contracting), and where available and proven effective, innovative technologies. DOE hopes this new approach will prove to be faster and less expensive than previous contracting methods.

2. Description of initiative

The AMWTP contract represents a significant departure from historical DOE contracting practice. The contract is directly between USDOE-ID/EM-30 and BNFL which is quite different from the standard DOE practice of having a contractor management layer (a facility Management and Operations contractor) between the federal agency and the contractor responsible for a specific activity at a site.

Another innovation of the AMWTP contract is its phased approach. The project is broken into Phase 1 (Licensing, Permitting, and Environmental Compliance), Phase 2 (Facilities and Process Demonstration), and Phase 3 (Operations, RCRA Closure, and Decommissioning & Decontamination). Financial compensation is tied to meeting the phase goals. It is hoped by DOE that this approach will provide sufficient incentive to BFNL and its subcontractors to meet contract goals in a timely and cost-effective fashion.

The AMWTF contract emphasizes performance-based contracting

methods. Given the time and performance measures of the contract, it appears that the application of “innovative technologies” as such are not explicitly encouraged.

3. When initiated and current status

The BFNL contract went into effect on January 20, 1997. At the time the case study was undertaken, ID/EM-34 and BNFL had just begun negotiating more specific details of Phase 1 of the contract.

4. Traditional approach that was replaced

Historically, DOE has tended to play a very direct, hands-on role throughout the site remediation activities and to contract with or through their on-site Management & Operations (M&O) contractor(s) the various design, build, operate stages. ID/EM34 undertook the AMWTF contract in part to identify whether the M&O structure tends to drive up costs and, because of contracting issues, to unduly insulate DOE project managers from project activities.

5. Related Changes

The team developing the Request For Proposals (RFP) and Scope of Work (SOW) used a process that incorporated information and “lessons learned” from other agency and private sector fixed price efforts. In addition, other DOE-EM performance-based contracts were reviewed, such as the INEEL Pit 9 project, the Tank Waste Remediation System (TWRS), and the Lockheed Martin Idaho Technologies Company (LMITCo)/INEEL Management and Operations contract.

Specific technologies are not defined within the BNFL contract and it is expected that currently available technologies will be applied in the facility. If the originally proposed technical solution does not achieve the various deliverable and performance milestones, the BNFL team may change approaches to meet the schedule.

6. Definition od performance and monitoring requirements

Performance and fee payment are determined measured by "deliverables" identified within separate defined phases:

Phase 1 (Licensing, Permitting, and Environmental

Compliance) offers a firm-fixed-price payment schedule, with payments tied to specific deliverables (e.g., RCRA part B permit). During this phase the contractor funds any technology demonstrations required to achieve necessary permits, licenses, or other regulatory approvals. Phase 1 will include a variety of public comment periods, and is expected to take not more than three years to complete (with an anticipated completion date of approximately January, 2000).

Phase 2 (Facilities and Process Demonstration) will begin upon successful completion of Phase 1, and will be completed not later than December 31, 2002. Based in part on lessons learned from INEEL's Pit 9 project (see “Pit 9 Case Study” also conducted by this team), DOE will not pay the contractor any fees during Phase 2.

Phase 3 (Operations, RCRA Closure, and Decontamination & Decomissioning of the facility), is contractually scheduled to begin by 2003. Commencement of Phase 3 is dependent upon the successful (mutually defined by DOE and the BNFL team) completion of Phases 1 and 2. During Phase 3, the contractor will recover any remaining Phase 1 costs (beyond those covered by the agreed-upon fixed fee) and all Phase 2 costs via a contractually set fixed-unit-price for treatment of the first 25,000 cubic meters of waste treated. A separate fixed unit price (already agreed upon) will be paid for any of the remaining 40,000 cubic meters of waste treated.

DOE has a discretionary option to have the AMWTP treat up to an additional 120,000 cubic meters of INEEL and non-INEEL mixed waste. If off-site waste is to be treated, the off-site generator is responsible for characterization and shipment of the materials. Under the “Settlement Agreement” with the state of Idaho, site wastes can be stored up to six months prior to treatment, this limitation will apply to any wastes treated under this option.

Once the AMWTP facility is through with operations it will be closed using RCRA procedures. The RCRA closure is funded from a fund established by the BNFL team specifically for closure activities.

PART II - ASSESSMENT OF SYSTEM

1. Costs and benefits

The contract award was strongly influenced by the awardee's program management record as well as BFNL's previous successful deployment of a major component of the AMWTP plant's infrastructure, a commercially available technology.

Having an experienced operator is expected to save time and costs which have traditionally been associated with a contractor's learning curve. DOE's confidence that the performance will occur in a timely manner is bolstered by BNFL's previous experience with the proposed technology application.

2. Results To Date

At the time the case study was undertaken, the contract had just been awarded. Case study subjects were thus limited in their observations.

Contract:

The contract was awarded, in part, because of the experience and reputation of the BNFL team. The team has had experience treating similar wastes with “off-the-shelf” technologies. This team also had the lowest evaluated price.

Regulatory Requirements:

The contract left regulatory requirements for the facility as general rather than defining specific sections for compliance; the BNFL team was responsible to identify compliance requirements. The major compliance points identified thus far are:

- The AMWTP will operate under the Resource Conservation and Recovery Act (RCRA). BNFL must obtain a RCRA part B permit for plant operation, it has not yet been determined whether DOE will be named as co-permittee.

- The facility will meet DOE and/or Nuclear Regulatory Compliance (NRC) nuclear and radiological

requirements.

- The facility will meet DOE and/or OSHA non-radiological requirements.

- The AMWTP facility is subject to “all applicable” State and EPA environmental requirements.

- Compliance with the EPA's proposed rule, Maximum Achievable Control Technologies (MACT), which, when finalized, will affect air quality regulations.

- The INEEL Compliance Agreement storage and treatment plans under the Federal Facilities Compliance Act (FFCA) for DOE mixed waste.

In addition, INEEL's existing Site Treatment Plan requires a facility to treat Mixed Waste for final disposal; a separate “Settlement Agreement” with the Governor’s Office of Idaho requires treatment of wastes to begin by March, 2003, with radioactive/TRU wastes out of the state by 2018.

Hazardous components of the waste stream must be treated to meet Land Disposal Restriction standards. The contract states that the TRU wastes’ final containment must meet Waste Acceptance Criteria (WAC) for the Waste Isolation Pilot Project (WIPP) in southeastern New Mexico. WIPP-WAC includes repackaging of TRU components.

3. Design and implementation issues

INEEL has sixty percent of the stored alpha and TRU inventory in the DOE complex. Alpha mixed low level waste (AMLLW) is co-located with TRU waste, and has many similar physical and chemical characteristics. Radiological content is the primary differential; Alpha waste is 10 - 100 nanocuries per gram, and TRU waste is over 100 nanocuries per gram. There is a combined total of approximately 65,000 cubic meters of the two materials. The wastes are currently contained in drums, boxes and bins.

The major technologies BFNL is proposing to use to treat this waste is reputed to handle both alpha and TRU without engineering modification.

4. Stakeholder role in design/implementation

Citizen Participation:

Part of the DOE ID/EM-34-funded 1994 feasibility studies required the development of a public involvement plan. At that time one of the participating teams met with 24 stakeholder groups; comments and issues raised at that time were addressed in the RFP.

ID/EM-34 circulated a draft of the RFP to the INEEL Citizen's Advisory Board and other groups, including labor unions and the citizen group, Snake River Alliance. ID/EM-34 factored the comments received into the final RFP. According to citizens surveyed by the case study team, there was a general feeling that their comments were addresed.

Phase 1 of the AMWTP contract has a public involvement section which incorpates public review that is part of the regulatory process, as well as other opportunities for input.

Industry Participation:

The 1994 feasibility studies also solicited private sector approaches to AMLLW treatment. Three industry teams made up of multiple corporate players submitted responses to the requests for information. The studies indicated that great time and cost savings over DOE estimates could be generated by private industry using available technologies to treat both TRU and alpha waste streams.

Private industry also indicated: a willingness to invest in a mixed waste treatment facility; adequate competition for that type of work existed; that a fixed-price contract would result in sufficient private interest; and a fixed (rather than mobile) facility would be cost effective. INEEL was chosen by DOE as the most cost-effective pilot location.

Other Participation:

While information was closely held during the RFP process,

Idaho state regulators were asked to participate in contract development and evaluation of bids. While DOE felt this would have been valuable, the state determined the potential for conflict of interest was too high and declined

.

DOE did, however, bring technical expertise from throughout the DOE complex for the Source Evaluation Board (SEB) responsible for selecting the winning contractor team. In addition, complex-wide expertise was sought on improved risk management models.

5. Lessons Learned

- Rather than "re-inventing the wheel," the AMWTP contract team at INEEL took advantage of expertise from around the DOE complex, both to develop the RFP and for the Source Evaluation Board.

- Regulatory requirements were not specified in the signed contract beyond standard DOE language regarding “all applicable” state and federal regulatory requirements. Disagreements regarding which requirements are “applicable” have arisen in other projects and appear to be currently affecting progress in the INEEL Pit 9 project.

  The Environmental Safety and Health Authorization Plan, currently under development, is expected to mitigate this type of concern within the AMWTP. However, the integration of the proposed MACT rule presents a challenge in that performance and design of the facility may need to undergo time-consuming and expensive changes to meet an undefined regulatory goal.

- The phased approach being used in the AMWTP is receiving a great deal of praise, as is DOE’s apparent resolution to provide payment only for defined “products.”

- State regulators interviewed for this case study noted the importance of specific contract and permit milestones. They also noted, however, that it is important to maintain the environmental goals of the project in addition to “completion of the contract.”

- All parties interviewed perceive stakeholder input to be

important in the AMWTP to deploy effective technologies. In that regard, the AMWTP stakeholder involvement process can be considered progressive as there was opportunity for public comment prior to the issuance of the RFP. A commitment to continued dialogue was discussed by DOE officials, however, no formal method to address even existing stakeholder concerns was presented during the interview process.

- Upcoming stakeholder issues expected include the development of an "involvement" process (rather than comment) during demonstration and/or operation of AMWTP. Several parties indicated this could strengthen advocacy or support for the AMWTP. In addition, a variety of transportation issues are expected to arise should the option for acceptance of off-site wastes be exercised.

- Since this contract is newly awarded, time will be required to see how DOE's new approach proves out. One good sign is the DOE contract team is aware that the AMWTP contract is an early step and expects that the next round of performance-based contracts will improve on the AMWTP contract, much as the AMWTP team has tried to build off the lessons learned from previous performance-based contracts.

Lessons learned from the AMWTP contract will improve the “next generation” of DOE (and other) performance-based contracts. Specific areas the case study team has identified as being of particular interest from this contract include:

- Application of the phased approach - will DOE and BNFL be able to maintain the performance and payment schedule they have laid out?

- Regulatory requirements - will DOE, the regulators, and the contractors agree on how to meet layers of requirements for the final permitted and operating facility?

- Contract “management” - what will be the effect of having direct links between DOE and the facility contractors?

- Stakeholder involvement - will the early commitment to stakeholder involvement continue and improve through the contract period; what are the stakeholders’ impressions?

PART III - REFERENCES

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APPENDIX J

Hanford Tank Waste Remediation System Design

CASE STUDY

Hanford Tank Waste Remediation System
Privatization Contracts for Phase I

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team to explore and understand how states and federal agencies are using performance based approaches for contracting and regulating environmental activities. The results presented herein are based on a review of pertinent documents plus interviews with individuals and organizations who had direct involvement with these activities. Site interviews were conducted on December 16-18, 1996 in Richland, Washington. Information about the Team members who conducted these interviews and prepared this case study, the documents which were reviewed, and a listing of the individuals and organizations interviewed is provided at the end of this document. During the study we made a significant effort to identify and foster a dialogue with stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and Goal of Initiative

Recently, changes in the American condition placed an emphasis on slowing and reversing the escalating Federal Deficit and escalating cost of government. In June 1993, Secretary Hazel O'Leary formed a contract reform team to evaluate the contracting practices of the Department of Energy and to formulate proposals for improving those practices. Secretary O'Leary aggressively pursued those proposals and embraced privatization of government owned and operated services as one of many mechanisms to achieve improved environmental cleanup performance while reducing overall cost.

The purpose of privatizing a portion of the Tank Waste Remediation System (TWRS) is to reduce the overall cost and to transfer a significant share of the responsibility, accountability, and liability to the contractor that will be required in the remediation of 177 large underground storage tanks at the Hanford site, near Richland, Washington. This is the Nation's largest environmental

remediation project[9].

2. Description of initiative

The U.S. Department of Energy (DOE) Richland Operations Office (RL) is acquiring Hanford tank waste treatment services at a demonstration scale using privatized facilities. That is facilities that are privately developed, financed, constructed, owned, operated, and deactivated. DOE must be able to purchase an identifiable, measurable deliverable product (e.g., vitrified tank waste) that can be defined with a performance specification at a fixed-price. Under the current privatized approach, contractors are unwilling to commit immediately to full-scale facilities on a fixed-price basis because of the uncertainties with regard to waste characteristics, the effectiveness of their technology with Hanford waste, and the regulatory framework for protection of workers, and the general public. DOE is also faced with uncertainties including specifications against which to purchase deliverables, the basis for accepting the deliverables, the structures of the contract and the basis for handling change orders. To address these concerns and possibly others, the approach to privatization will be conducted in two phases; demonstration and full-scale production. Phase I is a *proof-of-concept* approach that is broken into two parts, Part A and Part B.

Part A is a 20 month (ending June 30, 1998) period to establish the technical, operational, regulatory, business and financial elements required by privatized tank treatment facilities. The 20-month period is divided into: a 16-month period for the Contractor to provide Part A deliverables and a four-month period during which the Part A deliverables will be reviewed and DOE will determine whether to authorize the Contractor to perform Part B.

Part B is a 10 to 14-year period to provide waste treatment services in privatized facilities at fixed unit prices. Three Low Activity Waste (LAW) feed envelopes will be provided in Part B with an option to include High Level Waste (HLW). If the Contract includes HLW services, one HLW feed envelope will also be provided. Once Contractor treatment services are no longer needed, DOE will direct the Contractor to deactivate all Contractor-provided facilities.

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[9] DOE press release; dated 9-25-96

Phase II or full scale operations would commence upon satisfactory demonstration of the technologies used and infusion of other experiences and lessons learned from all aspects of Phase I. After which, another competitive procurement process would be conducted to select private companies which would invest their own money to design, build, and operate full-scale waste treatment and solidification facilities to process the remaining tank wastes. The availability of private investment for Phase II is expected to be contingent upon satisfactory demonstration of the technologies during Phase I.

In January 1998, DOE will receive proposals from each of the contractor teams identifying their revised bids for phase IB (construction of treatment and process facilities). With this approach, DOE believes that creative new ideas and innovative technologies will be suggested from the private vendors.

3. Traditional approach that was replaced

Previously, the Maintenance and Operating (M&O) Contractor, Westinghouse Hanford Company (WHC) was responsible for TWRS related work on a cost reimbursable basis. In addition, WHC had opportunities to gain additional “award fee” monies for performance that exceeded DOE expectations or milestone schedules. Under this previous framework, estimated costs of treating 99% of Hanford’s tank waste exceeded 40 billion dollars. Through privatization, DOE is expecting to reduce this cost by approximately 30%.

4. When initiated and current status

Because of the technical requirements and complex nature of remediating Hanford’s tank waste, only two consortiums of companies bid on phase IA request-for-proposal. These companies are, in some cases considered “best in class” with national and international expertise in managing and treating highly radioactive nuclear waste.

BNFL, Inc. and Lockheed Martin Advanced Environmental Systems were (LMAES) each awarded a $27 million fixed-price contract for the conceptual design and business plan for Part A deliverables on September 25, 1996. Part B of Phase I is a commercial demonstration phase designed to treat 6 to 13% of the tank wastes at Hanford on a fixed unit price basis and contract awards are presently scheduled around July 30, 1998.

Phase I Contract Award Teams are:

BNFL, Inc. Team	**LMAES, Inc Team**
Bechtel National, Inc.	M4 Environment L.P.
GTS Duratek	Flour Daniel Inc.
SAIC	Numatec
	Duke Engineering and Services, Inc.
	Babcock and Wilcox
	Nukem Nuclear Technologies Corp.
	Molten Metals Technologists, Inc.
	Los Almos Technical Associates, Inc.
	AEA Technology
	OHM Remediation Services Corporation

At the time of our Case Study, the contractors were four-months into their 20-month schedule and have developed schedules for regulatory deliverables and interfaces to meet the aggressive schedule. The Washington State Department of Ecology (Ecology) has agreed to those schedules and is committing the necessary resources to meet them. DOE has established their radiological regulatory unit to meet Nuclear Regulatory Commission (NRC) requirements for licensing and has established a risk evaluation approach to asses and mitigate potential problems such as lack of financing, legal, regulatory or technical complexities associated with the concept.

5. Definition of performance

In general, privatization of TWRS is intended to be pay for service type of contract, which by its nature will significantly reduce monitoring requirements. However, to augment performance expectations by both DOE and the contractors an *Integrated Process and Product Development* approach to manage interactions between DOE and the Contractors has been developed as a mechanism of sorts to monitor ongoing progress and to resolve any technical or regulatory issues.

The basic description of services and/or deliverables for Phase I is provided in the statement of work section of each contract but consists primarily of objectives. Objectives can be grouped in the following manner:

General

- Establish confidence that Tri-Party Agreement milestones can be achieved
- Demonstrate there is a commercially viable business

Technical

- Demonstrate production throughput, process efficiency and radionuclide removal
- Understand and overcome unanticipated problems in retrieval, and treatment of tank waste

Procurement

- Establish conditions sufficient to write good contracts for Phase II

Cost

- Develop pricing for deliverables
- Understand framework to keep costs down

For phase IA, DOE's Request for Proposal[10] (RFP) identifies the requirements that the contractor and DOE must fulfill. Specifically, under Section C, Statement of Work, the section includes an introduction, a description of DOE interactions with the contractor, a summary of the regulatory environment; a description of services and deliverables; standards; specifications; and interface descriptions. For phase IB, contract performance agreements are currently being developed and will be incorporated into the next RFP and awarded contract(s).

PART II - ASSESSMENT OF SYSTEM

1. Costs, benefits, and results to date

DOE has no experience yet or data, but have estimated that a competitive bid process could reduce costs by as much as $10 billion or up to 30% savings overall compared against previous life-cycle cost analysis. These contracts do not explicitly require use of innovative technologies for faster, better, cheaper clean up solutions but the technologies required to perform this task are in some cases newly developed or "cutting edge" technologies in glass vitrification or molten metal separation technologies.

It is still too early to tell if any "show stoppers" are out there that will make this procurement approach inappropriate. However, the strategy has three areas of potential concern identified by stakeholders and regulated community. 1.) A financial strategy built on DOE's

[10] TWRS Privatization Request For Proposal

assumption that consistent funding for both the set-aside account and operations/maintenance at the tank farms will continue, 2.) The premise of "competition" to solicit "best in class" teams, and 3.) How risk is shared between DOE and the contractors in terms of financial, regulatory, and health and safety.

In regards to the financial strategy, in Fiscal Years (FY) 1998,and possibly FY 1999, DOE has and is having trouble securing from Congress sufficient funds to maintain the reserve (set-aside) funding. Without an adequate reserve, privatized tank waste processing facilities will not be constructed. Financial institutions will not risk large sums without a solid commitment of available resources from which to draw upon. Furthermore, DOE is required to have sufficient Budget Authority in advance to cover privatized contractors' investments in facilities, equipment, interest, etc. in the event that DOE would terminate the contracts for convenience. Law does not allow DOE to incur expenses without proper Budget Authority. In discussions with Congress, DOE has not had good examples of privatization to support their cause, nor has DOE aggressively promoted their reasoning and objectives for the TWRS privatization initiative. Therefore, one can conclude that the financial foundation upon which this approach is built is less than solid.

DOE believes that the risk of cost increases can be managed to acceptable levels by maintaining "competition" among vendors. Under the premise of "competition," DOE was to select from 3 vendors down to 2 vendors for Part A of Phase I. Because of the magnitude and complexity of the task, only two consortiums were able to bid on the project and for the most part, their respective teams encompass almost all of the potential market place contractors. One could perceive that true competition doesn't really exist rather industry is dictating to DOE how much it will cost and why they should continue to fund both contractors under the guise of "competition." A guise that could cost tax payers more money for duplicative sets of infrastructure to support these contractors and their respective treatment facilities. In this case when only two potential consortium's even considered bidding on the project, competition as the primary vehicle to drive down costs may not make as much sense as pricing incentives in the contract. The primary reason for this conclusion is that historically, DOE's contractors have been pushed to give unrealistic bids resulting in awards to the cheapest bidder but not the technically most competent, resulting in escalation of costs. Due to the "competitive" environment

and procurement sensitive information, many opportunities for stakeholder input previously open are longer available. This lack of opportunity for input can give a negative impression to stakeholders, and regulators on one of the most technically uncertain, complex jobs the DOE has yet to undertake.

DOE contends that as responsible stewards of taxpayer dollars, the department will pay only for results and believes that the privatization strategy will result in more jobs and economic activity over the next five years than traditional contracting. Our concerns are that the privatization strategy has the "potential" to reduce costs but has not been adequately demonstrated in other DOE cleanups. A key factor in any performance based procurement approach is establishing good specifications or performance objectives so as to be clear on what is expected and why. Through various contractual negotiations, the contractors have the ability to obscure performance objectives or to add additional financial incentives to mitigate risk and keep the privatization concept alive. Contractors see that DOE is loading them with an enormous amount of risk (technical, legal, financial) and that the contractor is not be rewarded for assuming that risk with any financial incentive or other means. Regulators and some stakeholders see DOE using the privatization approach as a buffer for risk and may not be correctly implementing their regulatory mandate or role in accepting the responsibility (i.e., liability) and assuring the Nation, States and Regional Stakeholders that the legacy of tank waste from plutonium production at Hanford is being addressed.

2. Stakeholder role in design/implementation

The opportunity to receive input from stakeholders was provided but not always acted on. The Site Specific Advisory Board (Hanford Advisory Board or HAB) formulated at least four different recommendations[11] (Advice #18, #24, #32, and #47) on TWRS privatization. DOE provided responses to those recommendations that for the most part were either non-specific in nature e.g., unknowns will be dealt with when they arise, deemed procurement sensitive or not acted on by DOE-RL for various reasons some legitimate some not.

[11] Letters, Hanford Advisory Board, from M. Reeves to J. Wagoner, DOE, C. Clarke, EPA, M. Riveland, Ecology, dated from October 1995 to May 1996.

3. Implementation issues/potential barriers

During our Case Study interviews we identified other issues or potential barriers for successful implementation of the privatization strategy. The following is a brief summary of those issues.

NRC vs. DOE on nuclear safety and equivalency, and licensing of new treatment facilities. Evolving DOE and NRC radiological regulatory requirements seem to be an issue and how these requirements will be enforced by an "independent organization" within DOE has some stakeholders and regulators concerned. As a result, the specific performance criteria to nuclear radiological requirements are currently being negotiated between DOE and their contractors.

Contracts that have DOE Orders, as performance standards can put burdensome risk on contractor due to the fact some or all of these orders may be revised in the future. Performance criteria need to be clear and contractor's risk managed to an acceptable level.

DOE Acquisition Regulations (DEAR) and procurement processes that may be out-of-date to support the government time to reflect changes in the private market place.

DOE staff and management may not be prepared or have suitable skills for a performance-based environment. May inadvertently sabotage the effort due to lack of training, knowledge or the ability to change the organizational paradigm of command and control.

4. Lessons learned

It is still to early to tell if any good lessons learned could be shared. However, some "process" type of lessons learned could be identified and they consisted of:

Regulators and Stakeholders need to take an active role in the development of Request for Proposal (RFP).

DOE should have specific, non-negotiable performance objectives for contractor to meet.

DOE should not transfer its responsibility or liability completely to a private contractor. Ask sharing approach should have been explored further prior to award of contracts.

DOE should build in additional opportunity for regulator

and stakeholder input during and after contract award.

DOE should consider that “privatization” of the most complex and expensive clean up of the entire complex might not be a good or an appropriate fit. DOE should aggressively pursue a fall back strategy should privatization fail.

The contracting mechanism may not lend itself to efficient and cost effective turnover of operations from one contractor to the next. In fact, it may cost more due to need bring the next contractor “up to speed” so to speak over some length of transition time.

PART III OTHER STAKEHOLDER VIEWS OF THE SYSTEM

The people interviewed expressed concern over the scale and applicability of privatizing treatment of Hanford’s tank waste. Many expressed specific concerns over what is considered a “legitimate market” and whether privatization of Hanford’s tank waste is truly an opportunity to realize competitive bids.

In addition, concerns were expressed over DOE’s ability to properly characterize and deliver specific tank waste streams (feed envelopes) to the contractors. This concern is in large part due to DOE’s failure over the past several years to properly characterize the waste in the tanks sufficiently to resolve all safety and operating requirements. The contract specifically requires DOE to deliver characterized tank waste to the contractors. Some stakeholders believe this is an opportunity for the contractor to blame of inadequately characterized waste. This could result in failure to timely deliver and retrieve the tank waste properly resulting in the contractor being paid regardless of performance or other specific requirements.

PART IV - REFERENCES

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APPENDIX K

Plume Containment in Massachusetts

CASE STUDY

Massachusetts Department of Environmental Quality Performance Based Contract for Plume Containment on Cape Cod, Massachusetts

INTRODUCTION

This case study was undertaken as part of a larger effort by the ITRC Policy Team subgroup on Performance Based Systems to explore and understand how states and federal agencies are using performance based approaches to environmentally remediate contaminated sites. The information presented here is based on a review of pertinent documents plus interviews with individuals and organizations who are involved with attempts to establish a performance based contract for plume containment at a site on Cape Cod. The Team members who conducted this case study, the documents which were reviewed, and the individuals interviewed, are listed at the end of this study. Throughout this effort we have made a significant effort to identify and foster a dialogue with stakeholders from the affected community as well as local, state, and federal agency officials involved in regulating or overseeing the remediation work.

PART I - DESCRIPTION OF PERFORMANCE BASED SYSTEM

1. Background and goal of the initiative

The Massachusetts Department of Environmental Protection (DEP) Bureau of Waste Site Cleanup (BWSC) Contracting and Procurement Division explored using a performance based contract for remediation of plume containment at a privately owned site on Cape Cod, Massachusetts. This privately owned site, adjacent to the Massachusetts Military Reservation (MMR), was the initial subject of this case study. A key catalyst for the DEP decision to consider a performance based contract was that this type of contract would readily allow assessment of innovative technology relative to more traditional remediation alternatives.

The site Massachusetts DEP considered use of the performance based contract at was an abandoned, privately owned junkyard leaking a variety of contaminants into a EPA-designated sole source aquifer in sandy, unconsolidated sediment. The dissolved

contaminant plume, which is more than 150' underground, is approximately 5,400' in length, 1,100' in width, and 50' in thickness and moves at a rate of over 400' per year through an open aquifer. The plume runs under a residential development serviced by the water authority and towards a nature conservation area with a lake. While the degree of contamination does not meet high risk criteria, rather meeting risk criteria in the low to medium risk range, there are downgradient receptors (i.e. private drinking water wells) that required keeping groundwater concentrations from increasing.
The factors which led the DEP Bureau of Waste Site Clean-up (BWSC) (which oversees procurement of clean up contractors for the DEP) to explore a performance-based contract at the site were:

1) Innovative technology was being considered[12] but the innovative technology was essentially unverified in the United States. A performance based contract using a "pre-qualifying demonstration phase" would ensure that the DEP would be able to evaluate if the innovative technology met the performance criteria;

2) the DEP contracting officials could "pilot" a performance based contract, an innovative contracting vehicle that they knew was increasingly being used in the private sector[13].

In the initial investigation of the case study, it was discovered that the DEP had put the contract on hold, but that the innovative technology was being put into a U.S. Air Force three-way technology demonstration project at the Massachusetts Military Reservation. The authors decided to pursue the case study since evaluating innovative technology was a key consideration for DEP use of a performance based contact. By

[12] Stakeholders had successfully influenced the DEP to consider innovative technology in the remediation selection process and vendors of an innovative in-well stripping technology were aggressively marketing their solution as a cheaper, superior alternative to traditional remediation solution.

[13] An out-of-state contractor not connected with the project provided information to DEP contracting officials on the advantages and increasing use of performance-based contracts in the private sector.

incorporating the MMR demonstration,[14] it would be possible to see what, if any, performance-based factors were common to the DEP and MMR in terms of the technology selection and remedial response objectives[15].

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[14]Massachusetts Military Reservation (MMR) is currently an active, multi-service National Guard and Coast Guard installation. MMR (formerly known as Otis Air Force Base) has a major contamination problem with fuel and chlorinated solvents which have resulted in five plumes, all of which have migrated off base into residential neighborhoods. Historical use makes the Air Force the principal responsible party.

[15] At the time this case study was written, MMR had no results on the in-well stripping technology. Additional

2. Description of initiative

Cape Cod and neighboring islands are a summer recreational and year-round retirement destination for a significant cross-section of the country's political, scientific, and economic elite. According to all case study subjects this demographic anomaly has provided an unusually complex overlay of influences on site characterization as well as remediation design and selection for plume containment in this area. For the purposes of this case study, this complexity made it difficult to unravel the exact relationship between the piloting of a DEP performance based contract and the subsequent acceptance of a innovative technology into a performance based demonstration on the Massachusetts Military Reservation. Nonetheless there are common denominators.

Vendors of an innovative, in-well stripping technology had been unsuccessful in getting their technology into the remediation toolbox at MMR. There were both site specific and DoD procurement system-wide reasons for this lack of success. Site-specific reasons included remediation design, contracting, and regulatory constraints. DoD rationales included cutbacks in targeted R&D funds due to ongoing questions of the relevance of the military cleanup to the readiness debate in the Pentagon. In addition, Congressional and Pentagon earmarking of limited environmental technology research and development dollars has both narrowed the range of technologies that can be verified and increased the risk of innovative technology demonstration. A

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information on the status of the remediation response at MMR can be obtained from federal, state, and industry officials interviewed for this case study. Contact information is listed at the end of the case study.

possible additional factor noted by one Pentagon official was that the technology is marketed by a range of companies and is in use at several DoD sites. If so, a problem for the military is how to coordinate and distribute demonstration results within or among the service branches and between DoD and other federal and state agencies.

The in-well stripping technology was initially developed and deployed in Europe. While some of the case study interviewees noted use of the in-well stripping technology in Europe could preclude its designation as an innovative technology. Although the technology has been refined and is marketed by a handful of U.S. vendors, there is little stateside verification data. This factor is exacerbated by the lack of transferability of the European standards used in the European verification data. Another complicating factor is the different U.S. vendors of the technology had refined the system and were marketing it as "sole-source patented." The patents are actually on components of the technology, not the technology itself. This substitution of marketing hyperbole for verifiable technical data on a technological process proved to be an initial stumbling block to both MMR and DEP consideration.

Re-awakened interest in the innovative in-well stripping technology for the MMR plume came about because of citizen pressure on the remedy selection process at MMR. The federal facility nature of the plumes emanating from MMR had led to the creation of a multi-layered public input and oversight process. That process had given citizens the opportunity to develop and give high priority to acceptance of socio/economic/aesthetic/political (SEAP)[16] criteria for the

[16] The SEAP acronym coined for this study by the authors describes the complex interplay of issues which allowed stakeholder interest to play such a positive and priority-setting role in forcing the introduction of innovative technology into the DEP and MMR site characterization and remedy selection process. As general categories, socio-economic considerations can be roughly defined to range from environmental justice to demographic criteria such as income, education, gender, and regional and local economic drivers. Aesthetic considerations include community values as well as immediate and future land-use options. Political consideration is potential and perceived risk to human health and safety as well as historical relations between the

remediation, and have these criteria accepted into the remediation selection process by federal and state officials.

In the most general sense, the introduction of the SEAP criteria can be viewed as the reason for public and DoD rejection of a traditional pump-and-treat "60% Environmental Restoration Program" (ERP)[17] for the MMR plume remediation. This design was to use traditional pump and treat on a massive scale to treat five plumes emanating from the base. The rejection of the 60% ERP provided the opening for SEAP criteria influence on remediation technology selection and for the vendors to present their “innovative” in-well stripping technology as a viable alternative.

The design for a "60% ERP" was presented to the public in Spring 1996. A local citizen quickly determined that the design would have drawn so much water from the local water table that cranberry bogs, a major agricultural resource, would have dried up. The failure of the "60% ERP," as well as the escalating cost of the cleanup and its effect on the Air Force, which was the major responsible party, led to a reassignment of the MMR environmental program management from the Army National Guard[18] to the Air Force. During that transition period, it was discovered that plume characterization was inaccurate and moving more rapidly and erratically than previously understood.[19] This

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affected communities, state and federal agencies, and policymakers in Washington.

[17] It should be noted that the 60% ERP was designed to capture all five of the MMR plumes at one time using off-the-shelf technology. A 60% design is a normal stopping point in engineering design to allow for review of what the engineer has done.

[18] A portion of MMR is a active firing range "owned" by the Army National Guard, making the Army the responsible party. The ERP being developed by the Air Force for plume containment does not include the Army firing range. At the period this case study is being written, the impact zone of the range is the subject of a threatened closure by the EPA's Region I if the Army cannot prove the contamination is not affecting local water supplies.

[19] A major problem at MMR has been site and plume

increased tension between MMR and surrounding communities. Election year politics soon brought increased scrutiny by state and federal officials. By early fall 1996, MMR was high on the agenda of the Air Force.

As the MMR team reorganized and began exploring a new ERP approach, citizen and local government officials continued to actively apply SEAP criteria to the final remediation technology choice. Because of the geographical proximity of the junkyard to MMR, the SEAP criteria were also raised to DEP personnel handling the junkyard plume. Residents objected to the effect of locating a football field-sized treatment center in a residential neighborhood. Southeast Regional DEP officials began to prospect alternative technologies for the junkyard plume to meet SEAP criteria.

The innovative in-well stripping technology vendors, still having difficulty getting their technology reviewed at MMR, shifted their aggressive marketing strategy onto the DEP. The DEP contract officials became interested in a performance based contract as a method to evaluate which vendor might meet performance criteria at the site.

Acquiescence to SEAP criteria on technology selection at the junkyard site by the DEP during an MMR public oversight meeting proved pivotal to MMR's agreeing to allow the technology into the— demonstration toolbox at MMR.

Once the vendors had secured military acceptance of including

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characterization. This is due in part to human error, inadequate understanding of the hydro-geologic and velocity characteristics, and the need for more accurate site characterization technology.

their innovative technology in the MMR demonstration project, they stopped courting the DEP. That, combined with continuing issues related to site characterization, timelines, and identification of responsible parties, led the DEP to put their performance based contract on hold.

All sectors (federal, state, industry, citizens) involved in upper Cape plume containment agree that the tenacity of citizen stakeholders that their criteria get an equal voice in the remediation treatment choice was the single most important factor in pushing state and federal officials to consider the in-well stripping technology as a potentially viable choice in the remediation technology toolbox.

Plume containment on the Cape is an excellent example of how stakeholder involvement in remediation design can mitigate some of the risk involved in the development and deployment of innovative technologies.

3. When initiated and current status

The DEP began exploring a performance based contract for the junkyard plume cleanup in the spring of 1996, but the contract was put on hold in the fall of 1996.

The in-well-stripping technology (by two vendors) is in a three-way technology demonstration at MMR. The criteria for remedy selection will undergo public review and the MMR program manager will make a determination by mid-summer 1997 as to technology selection for the MMR-emanating plume containment on and off base. While the in-well stripping technology is not being considered as the sole system of technology for the plume containment remediation, it is, because of SEAP criteria, being considered for use in areas off base.
An innovative technology incubator/center has been proposed by the State of Massachusetts at MMR. The Air Force is cooperating by providing facilities. Both DEP and the Air Force are looking into the viability of using the incubator/center to demonstrate, and verify for broader acceptance, innovative technologies that can be used in the military cleanup programs.

At the time the case study was being written, the Air Force and DEP were considering a partnership to produce verification data from on the in-well stripping technology demonstration. ITRC members were helpful in facilitating that process.

4. Related changes

The acceptance of an innovative technology into the MMR demonstration changed the relationship of the state to the MMR cleanup authority. The state became an innovative technology deployment partner to a federal facility as well as a regulatory authority.

5. Traditional approach that was replaced

The performance based contract explored by the DEP differed from their traditional contracting mechanism by requiring that the contractor remediation method meet performance standards in reaching a regulatory goal rather than specifying how to meet the regulatory goal.

Some DEP officials interviewed for the case study were not sure that award based on meeting performance standards was much of an innovation on more traditional contracting models. However, these officials felt the symbolic advantage of the terminology was useful given the political hothouse of MMR plume containment.

At MMR, the three-way technology demonstration (combined with a willingness to re-revisit plume characterization) is hoped to result in a more sophisticated remediation design than the “60% ERP” which was driven by meeting statutory cleanup requirements.

6. Definition of performance

Performance was defined to meet remedial objectives and standards without specifying technological choice.

Part II - ASSESSMENT OF SYSTEM

1. Costs

DEP: Since the site had no discernable "responsible party," DEP contract officials had to weigh whether they could justify spending state trust funds to demonstrate a technology that was not in wide use in the United States. The vendors promised it would significantly reduce the cost of traditional pump and treat. However, DEP officials were wary. With innovative technology it is difficult to wade through the "snake oil" and

viability. The vendors both marketed their technology as a "sole-source" patent. It took considerable time and resources for DEP officials to wade through the marketing hyperbole to the reality that they were dealing with a single technology with some different mechanical components.

There were also considerable labor hours expended to investigate and craft the prototype performance based contract and negotiate the potential demonstration. Since the vendors backed off from interacting with the DEP contracting officials once their technology was accepted at MMR, there was a residual sense that some of this expenditure would not be recouped.

MMR: Ostensibly funding has not been a factor in the MMR cleanup as senior Administration officials have repeatedly promised the resources necessary to clean the plumes. While SEAP criteria as a performance criteria indirectly affected the cost of the three-way MMR technology demonstration, there was no discernable additional cost to include the in-well stripping technology as one of the three to be tested. At any rate, if the technology vendor's cost-and-performance claims prove out, in-well stripping promises to reduce life-cycle costs approximately a third over traditional pump and treat. Nonetheless, the MMR cleanup is consuming 10% of the Air Force cleanup budget for active installations. To rationalize the effect of this resource drain on other facilities clean-up programs, Air Force officials would like to produce some results that will have wider applicability.

Vendors: Lack of U.S.-based verification data led to increased marketing expense as well as potential demonstration costs. Assessment by the vendors was this could marginalize smaller innovative technology vendors.

2. Benefits

By MMR and the DEP accepting the same SEAP criteria as performance standards, the demonstration should provide some verification results that will have common applicability. Both senior Air Force and DEP officials realize the next step is to ensure verification meets Air Force and DEP standards. And in place is the framework to get public input on their results.

Vendors: If the demonstration is successful, vendors can, at a minimum, establish some baseline Massachusetts verification

data. If the technology meets the ERP design criteria and is selected as part of the MMR remediation technology toolbox they should be able to recoup at least some of their marketing costs.

Actual innovation: The acceptance of SEAP criteria into contracting/demonstration design has made these performance standards an integral part of the design for plume containment on Cape Cod. While there is still a high degree of tension among the community of stakeholders involved at both the DEP and MMR sites, from the standpoint of sharing the "risk" associated in the use of innovative technology, all parties have become part of the solution whether the technology is accepted or not.

3. Results to date

DEP performance based contract on hold. Technology demonstration will not be completed until mid-summer 1997. SEAP criteria accepted.

4. Stakeholder role in design/implementation

All parties involved in Cape Cod plume containment agree that stakeholder insistence that their SEAP criteria get an equal voice in the remediation treatment choice was the single most important factor in allowing innovative technology into the plume remediation technology toolbox. By accepting SEAP criteria, the DEP then needed to prospect contracting alternatives that would allow them to prove out technology that could meet these criteria.

5. Equity

Since the junkyard site had no discernable "responsible party," DEP contract officials had to weigh whether they could justify spending state trust funds to demonstrate a technology that was not in wide use in the U.S. Vendor's acceptance (at least theoretically) of accepting demonstration costs helped to mediate this risk.

Through constructing a contracting vehicle that could provide verification data, the state became a partner in innovative technology development and deployment. Unfortunately, DEP was a stalking horse for the vendors. Once their technology was accepted at MMR, the vendors no longer courted the State. The effect was to relegate DEP back to the role of regulator rather

than partner in innovative technology development and deployment.

Stakeholders: by assigning a high level of priority to SEAP criteria, stakeholders implicitly showed willingness to allow public funds to be put "at risk" in demonstrating the innovative technology.

6. Design and implementation issues

When the DEP asked the vendors to assume the demonstration costs, there ensued a protracted negotiation. From the DEP standpoint, the vendors seemed willing only to demonstrate if guaranteed an exclusive contract. There was enough variability between vendors equipment and performance that this was considered too restrictive by the DEP.

MMR and Air Force officials cited a variety of factors as to why the innovative technology was not being considered as a complete alternative to traditional pump and treat at MMR as well as difficulties in the introduction of innovative technologies. The primary reason was risk. Some of the factors involved included fiscal, procurement and contracting policies, and meeting mandated as well as self-imposed deadlines.

The Air Force believes that given a steady and adequate funding stream, they will meet a self-imposed deadline to have in place "completion systems" at a minimum of 75% of their facilities using currently available technology (including natural attenuation) by the year 2007. Given that plan, they feel their limited technology R&D dollars would be better spent on assessment and monitoring systems. However, there is debate within the military, other federal and state agencies, and the public as to whether the new innovative methods (i.e. risk assessment, natural attenuation, bio-remediation, etc.) will prove out to meet generic, regulatory, or public health and safety goals. The Air Force has been in the forefront of proving out natural attention and bio-remediation systems and officials are keenly aware that their plans could crumble if these "non-invasive" systems do not gain public and regulatory acceptance.

In the case of MMR, officials noted that the existing technology was adequate (or needed only minor retooling), although it did

not necessarily meet all the citizen criteria. This technocratic methodology (which is not the exclusive purview of the military) appears to have been one of the primary factors in the series of failed assessments and designs that have plagued the MMR cleanup.

7. Lessons learned

The following is based upon points raised by various case study subjects during the formal interviews and in follow-up discussion. The "lessons learned" were refined by the case study team.

- A performance based contract can create a situation where the state becomes a partner in innovative technology development and deployment.

- There is a variety of DoD and service branch barriers to innovative technology development and deployment which include:

  a) Decreasing budgets for remediation and the subsequent downgrading of technology R&D, verification, and deployment;
  b) procurement policies and lack of flexible contracting mechanisms;
  c) budget-driven accounting decisions override program planning;
  d) stovepiping of problems and solutions (i.e. R&D based on site specific application rather than generic, cross-service/agency technology development);
  e) downsizing of cleanup offices and related R&D facilities has overburdened remaining qualified personnel;
  f) historical regulatory-driven relationship with states; and
  g) lack of integrated multi-service protocols or information systems.

  Recommendations:
  a) develop system approach to remediation R&D;
  b) increase budgets targeted towards demonstration and widely disseminate results;
  c) require program managers look at remediation alternatives for projects budgeted over certain amount;

d) institutionalize product-driven partnerships to de-emphasize adversarial, regulatory-driven relationship with the states;
e) develop protocol to integrate SEAP criteria into remediation process.

- Site managers under time and funding constraints are less inclined to give priority to innovative technologies as part of performance based contracting.

- If there is a performance-based contract it might be useful to have a performance based ROD.

- At complex sites performance may need to be in units or discrete sections

- May need to combine design and construction into a turnkey operation

- Willingness to take the risk to use innovative technology may be increased by issues related to proprietary information. Unlike traditional remediation systems, the contracting agency may not be able to get design for free.

- Performance-based bid may require second round bid as new problems come up, particularly design changes due to SEAP-type issues.

- Guardians of public funds are often willing to spend more for what they perceive as certainty and speed, even though they may not get the results they want or need.

- Although stakeholder advice and SEAP criteria per se could not always be expected to lead to use of innovative technologies and improved environmental solutions, in this case, heeding stakeholder advice and using SEAP criteria resulted in including “innovative” technologies in a technology demonstration that could eventually improve cleanup results, avoid disastrous impacts on the local economy, and lower the costs of remediation. This is also noteworthy because these “innovative” technologies had previously been excluded from consideration. This case study clearly demonstrates the importance of obtaining and using stakeholder input when setting performance standards for environmental

cleanups.

- State-federal partnerships in demonstration of “innovative” environmental technologies may be viable means to share the risk and cost burdens.

- Performance based criteria and contracting for demonstrations may be useful to ensure that innovative and traditional technologies can be compared in a valid way.

PART III - REFERENCES

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