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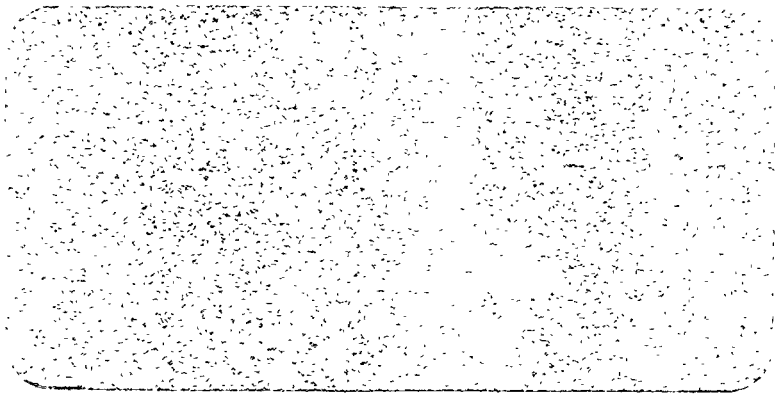

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DOE-EM Privatization and the 2006 Plan: Principles for Procurement Policies and Risk Management

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DOE-EM Privatization and the 2006 Plan:

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I. Introduction

The Department of Energy's Office of Environmental Remediation and Waste Management (EM) has recently set in place programs to restructure the strategic planning mechanism that will drive its clean-up schedule, *The 2006 Plan*, and to create a new set of business relationships with private contractors that will reduce costs — *privatization.* Taken together, the 2006 Plan and privatization will challenge EM to create new business practices to recast its risk management policies to support these initiatives while ensuring that its responsibilities toward the environment, human health, and worker safety (ES&H) are maintained.

This paper argues that the 2006 Plan has transformed EM's traditional, bottoms-up approach based on technical dictates to a top-down approach based on management goals -- a

transformation from an engineering problem to an economic problem. The 2006 Plan evolved from EM's Ten-Year Plan, and seeks to convert the largely open-ended planning approach previously undertaken by EM to a plan bounded by time and dollars (see DOE-EM, *Accelerating Cleanup: Focus on 2006*, discussion draft, June 1997). The plan emphasizes making tradeoffs and choosing activities that deliver the most clean-up for the dollar. It also recognizes that each major player -- stakeholders, DOE, OMB and Congress -- has distinct interests that must be resolved if the process is to succeed. This, in turn, has created the need for a corresponding transformation in risk management practices from compliance-driven to benefit/cost-driven.

DOE intends to employ a process it calls privatization to help meet the goals of the 2006 Plan. In contrast to other forms of privatization, EM uses this term to describe a new set of relationships between itself and the private sector that embody incentives to perform efficiently while meeting ES&H responsibilities. On the surface these relationships focus on writing fixed-price contracts but are in practice much more demanding. Privatization presents both an opportunity and a burden, because achieving cost savings will require developing fixed-price contract management practices that avoid change orders and/or constructive change while still protecting the public interest.

Discussion takes place in three main sections and a conclusion. Section II provides a brief discussion of how DOE has managed the clean-up effort. It notes the transformation from BEMR (*Baseline Environmental Management Report*) to 2006 Plan which in turn implies the shift from compliance to benefit/cost approaches to risk. It then discusses the M&O management

tradition at DOE and how this must change under privatization. Finally, it notes ongoing DOE activities dealing with privatization, including the larger DOE privatization initiative.

Section III discusses the role of risk implied by the 2006 Plan and by privatization. It argues that given a ten-year planning horizon, one must give weight to tasks left undone and the risks they imply, a concept we refer to as terminal risks. We propose a planning process that assumes that the most important risk reduction activities should be prioritized within the relevant constraints. Competing with terminal risk reduction is interim risk management. Whereas terminal risks constitute the set of long term-risks to the environment that the program seeks to eradicate through clean-up, interim risks are risks to public health and worker safety from waste management inherent in preparing for and executing clean-up. We refocus this management problem by pointing out that within the context of privatization, ES&H risks are closely linked to financial risks. This new circumstance presents two management challenges to DOE. One is creating an incentive structure to motivate the firm under privatization to behave responsibly while still acting independently of EM to complete its contractual responsibilities. The second is developing the procurement system necessary to ensure effective competition for projects.

In Section IV we propose solutions. First, we describe the private sector behavior EM confronts. Based on this, we propose management practices that incorporate this behavior. Finally, in Section V we summarize our conclusions.

II. Background

Since the formation of the EM in 1989, planning activities for clean-up have passed through two distinct phases. The first was the engineering or bottoms-up approach that characterized the period from 1989 to 1996. The second, since 1996, comprises the more recent planning activities driven by the 2006 Plan's top down approach. These two approaches have markedly different foundations and require correspondingly different management tools.

We characterize the earlier, or BEMR, period as a bottoms-up approach to planning because it was based on aggregating individual project activities to arrive at program activities. Projects were assessed for extent of contamination, matched with technologies, and scheduled for clean-up in a logical order based upon imminent threats to the environment, public health or worker safety and "reasonable" budget expectations. The overall approach was that of life cycle analysis of the waste legacy, given the goal of complete closure. Closure is, in general, consistent with an end-state assuming some targeted end use. Examples of end uses are recreation, brownfields, or greenfields status. The 1995 BEMR estimated this effort would take a period of 75 years and cost between 200 and 350 billion dollars, with a base case of 237 billion dollars (with adjustments for productivity). The 1996 BMR was somewhat lower at 227 billion dollars, though for a number of reasons the two sets of estimates are not directly comparable.

Around this baseline, EM conducted a significant number of scenario exercises intended to test the sensitivity of the program's cost to alternative planning assumptions, including alternative end-states, scheduling, and program philosophies. Setting aside the extreme scenarios

of minimum action (90 billion dollars with virtually no restoration) and maximum greenfield (272 billion dollars with very extensive restoration) alternatives ranging from essentially fencing and monitoring (150 billion dollars) to substantial greenfields clean-up (166 billion dollars) leave the impression that there are virtually no alternative courses of action. Moreover, a 75-year time horizon imposes a modest, if any, sense of urgency. Direct stakeholders tend to view the activity as perpetual, for all practical purposes. Despite pressures from Congress to take urgent steps to achieve demonstrable results and numerous internal initiatives, the program, taken as a whole, became a safe haven where virtually any research, technical, or social agenda could find a home.

In 1996, with the adoption of the Ten-Year Plan and the succeeding 2006 Plan, a radical change occurred. Rather than a 75-year time horizon with an open-ended budget, the 2006 Plan imposed a fixed period of time and a fixed budget of about 6 billion dollars per year. While recognizing that technical considerations would drive some components beyond the self-imposed deadline, which in itself was intended to stretch EM to the limit, the plan imposed fixed, top-down limits. The new mandate became: do the most good possible within boundaries -- much as a buyer in search of a new home recognizes the realities of budgets, bankers, and one's own carrying capacity for principal and interest.

The limits imposed by the 2006 Plan triggered a search for opportunities to reduce costs, a search that in turn triggered a reevaluation of DOE's approach to contractor management. During the Cold War, DOE had evolved a series of public/private relationships variously referred to as government owned/contractor operated, management and operations contracts, or simply,

M&O relationships. Under these relationships, DOE and the private sector acted as partners, with the private sector providing managerial expertise drawn from parent companies and technical expertise assembled outside the restrictive confines of the Civil Service. While not entirely "one" with the government, the M&O was certainly responsive. Operating under level-of-effort contracts, also known as cost-plus contracts, these organizations undertook programs of research, development, and demonstration (RD&D) to supply nuclear weapons in support of the Cold War effort, as well as a range of RD&D activities in support of energy programs and policies.

Under a cost-plus contract, with government ownership of facilities, the government assumes all financial risk and must monitor activities carefully, to the point of participating in key decisions. Firms assume virtually no financial risk, but have every incentive to expend resources at highest possible levels, unconstrained by cost ceilings and unmotivated by profit potentials. The approach was successful, and contributed enormously to the fall of the former Soviet Union. Unfortunately, such an approach is less well suited to the cost control that clean-up requires.

To help control costs, EM has proposed a radical shift to contractor relationships that center around substituting fixed-price contracts for cost-plus ones -- an approach called privatization within EM. Under a fixed-price contract, firms agree to provide a clearly defined level of services or products at a given price or price schedule. Thus, if savings can be squeezed out of activities, the firm earns profits (fixed-price net of costs). If not, it incurs losses. Under

this approach, financial risks are shifted from government to the firm. The important point is that through the 2006 Plan EM has entered into its own fixed-price contract with Congress. It has agreed to perform a relatively well-defined set of activities, over a fixed period of time, at a fixed price. It bears the full risk, essentially political risk, of success or failure. In turn, EM seeks to the maximum extent possible to pass along the risks of performance to the private sector through fixed-price contracts.

The fact that the term privatization can be used to refer to other practices that include sale of government facilities to private owners, deregulation, leasing arrangements, and a variety of other transactions not dealt with here has caused some confusion over whether or not EM's approach to privatization is consistent with capturing cost savings through competition (Weida, 1997). On its privatization home page (http://www.doe.gov/privatization) DOE divides its privatization activities into contract reform, asset transfer, and a divestiture of functions, each of which comes into play for the clean-up. In addition, EM has also used the term privatization to describe several specific initiatives, including the requirement of forward financing of capital facilities by the private sector, to be amortized during waste treatment phases; the pooling of demands for waste treatment across sites into a smaller set of common contracts that multiple sites could access at fixed unit prices; and simply cost control through locking in costs with firm-fixed-price contracts. In fact, similar principles drive private sector behavior in each circumstance and there is little to be gained from terminological arguments over whether DOE's use of the term "privatization" fits in with previous definitions or scopes.

EM's privatization initiative has leaped quickly from the drawing board to implementation, with several projects having been contracted to private firms using fixed-price management and contracting procedures. The privatization home page describes numerous activities of this kind. Two particularly large, complex, and visible projects, the Hanford Tank Waste Remediation System (TWRS) and the Idaho Pit 9 are now underway, as are a smaller number of efforts that range from outsourcing laundry services to smaller tank waste remediation and utility privatization efforts at Savannah River. An early review of these efforts by the GAO (letter report from Victor Rezendes to Senator John Glenn, Jan. 31,1997) cautioned against declaring early victories for privatization, noting that estimates of savings relative to clean-up by M&O contractors were not clearly established, particularly in light of EM's history of cost overruns on fixed-price contract. DOE responded that the numbers cited were not contract overruns, but cost increases not infrequently caused by revised legislative mandates. DOE further argued the need to measure progress over time and to apply lessons learned to its management practices. Such exchanges provide clear evidence of the need to establish conceptual principles to help create realistic expectations for privatization's role in the clean-up effort and develop management tools to achieve them. It is noteworthy that not all efforts have been fully successful. Pit 9 remains a topic of controversy and is generally viewed as a negative privatization experience.

III. The Integration of ES&H Risks with Financial Risks

The clean-up is essentially a risk reduction activity. Its goal is to reduce terminal risks to some acceptable end-state level, given financial and temporal constraints and other EM

responsibilities. Other EM responsibilities are largely concerned with responsible stewardship activities to manage pre-treatment risks and with responsible worker safety programs to govern actual clean-up.

The effect of the 2006 Plan is to force EM to compare financial risks with ES&H risks when making decisions. Placing a temporal and dollar limit on the activity essentially challenges EM to view risks untreated in 2006 as terminal, that is, left untreated. Therefore EM must now compare the risk-reduction value of transferring a dollar from stewardship to worker safety and from worker safety to terminal risk reduction. Given some metric for risk aggregation, and recognizing the constraints imposed by compliance, risk management at EM becomes a task of trading off the benefits and costs of stewardship, worker safety and terminal risk reduction. If conducted well, the last dollar spent will yield equal risk reduction in all three categories.

This new risk management regime places additional pressures on EM to make privatization succeed. First, EM must answer critics who charge that profit-seeking behavior by firms will lead them to shirk on worker safety and stewardship during clean-up. To answer effectively EM must demonstrate that its management practices will make it less profitable for a private firm to shirk than to behave responsibly. This will require new procedures, because the procedures developed to manage M&O contracts involve EM in the decision process, a practice that if continued will drive up costs under privatization.

Second, dollars saved by privatization translate directly into dollars available for additional terminal risk reduction. This means that DOE must develop management procedures that yield the greatest expected dollar savings. Again, management practices developed under M&O contracts are unlikely to meet this need because they are not geared toward providing incentives, within the context of competitive procurements, that will lead to bids most favorable to EM's ends.

Finally, EM must carefully choose projects to be "privatized" because the value of fixed-price contracts arrived at through privatization effectively defines the nature of EM's own contract with Congress. If EM cannot manage contracts to avoid cost increases it will create imbalances in its own risk management plans and will lose credibility with Congress.

The effect of these changes is to link financial risk management and ES&H risk management in new and unfamiliar ways. We now turn to management policies that could guide privatization to meet the goals we pose.

IV. Managing Financial and ES&H Risks Through Privatization

Three sets of principles, summarized here, govern the required management policies. The first is *compatibility:* in general, the technical uncertainty of any given project must be consistent with the requirements of a fixed-price contract. Second is *sequencing*: knowledge that will emerge from sequential stages of the waste treatment life cycle should be anticipated, because it can be used to define project scopes to reduce costs. Third is *incentives*. EM has two incentive-

related tasks -- writing contracts to incorporate penalties and bonuses to incentivize responsible ES&H behavior, yet be self-enforcing; and developing procurement selection processes to create price competitions that yield favorable bids.

#1: the Compatibility Principle. The essence of the compatibility principle is straightforward: *some, perhaps many, waste clean-up projects are* ***not*** *feasible candidates for privatization.* The legal doctrine of "Constructive Change" poses limitations on projects that can be privatized. This limitation derives from the extent and nature of *uncertainty* associated with the waste clean-up task. For a fixed-price contract to be compatible with relevant contract law -- and therefore enforceable -- uncertainty must be reduced (*via*, e.g., waste characterization) to a level that allows for the construction of a contract with minimal provisions for change. For projects that, at any point in time, are not compatible with an enforceable contract, privatization of the project will not reduce costs relative to an M&O contractor. Waste characterization and other activities that reduce uncertainty should be continued until the project becomes compatible, or an alternative contracting approach should be employed.

The Compatibility Principle also has important implications for the manner in which the Department manages contracts. Specifically, it must eschew management practices that evolved during the time in which primary reliance was on cost-plus contracts -- practices that involved a great deal of micro-managing a contractor's *processes*. If fixed-price contracts are to be compatible, the Department must anticipate rules, standards, and activities that it wishes to

require, make them a part of the contract, and then limit its own management activities to those required to enforce the contract.

#2: the Sequencing Principle. Clean-up of many DOE sites involves what may be thought of as a life cycle involving a number of distinct, related activities. An example of a common life cycle is: waste characterization, waste treatment, packaging and transportation, and storage. Components of the life cycle take place as a sequence: characterization must be completed before treatment; treatment must be completed before transport, and so on.

The Sequencing Principle suggests that the use of a sequenced procurement process should be undertaken as a normal part of life cycle analysis prior to a privatization decision. The rationale for this principle derives from the effects of uncertainty that are resolved only after the completion of the characterization activity. Bids for the treatment prior to characterization are based on subjectively-determined *expected values* -- estimated costs for treating alternative configurations of waste materials weighted by uncertainty that is resolved only after the completion of the characterization activity. They will, at minimum, include a premium for risk that is not included in bids that could be obtained following characterization. Similar opportunities exist for technology demonstration. In general, sequencing suggests that the definition of projects developed through the BEMR process may not be appropriate for the 2006 Planning process and that opportunities to redefine project boundaries to reduce costs should be considered. It should be further noted that sequencing is an analytical, not an administrative,

process. Opportunities for cost reduction should be sought throughout the life cycle, for example, by encouraging robust technologies that obviate detailed characterization.

#3: the Incentives Principle. The Incentives Principle relates to the procurement *process* that is used by the Department for obtaining fixed-price bids. Given comparably qualified bidders, EM has the goal of (i) awarding contracts to the lowest-cost contractor, and (ii) obtaining the lowest possible bid. However, the Department can never know the true minimum cost of any contractor, because contractors have strong incentives to withhold this information from EM. EM can use published data to estimate what will necessarily be *average* industry cost. By definition, this cost is the "worst of the best and the best of the worst," i.e., well above the costs of the least-cost, most efficient, contractor.

The critically important question then becomes: does *any* bid solicitation (RFP) process succeed in ensuring EM that it will achieve its goals? More specifically, do the procurement processes commonly used by the Department (negotiated contracts and/or what is commonly called a "first-price auction") serve this purpose? The answer based on the Incentives Principle is a negative response to both of these questions. The achievement of EM's goals requires that the Department give serious consideration to the use of different procurement processes. The processes that we recommend are those in which it is demonstrably true that contractors have incentives to offer bids that reflect their minimum costs -- *the contractor's best interests are served* by the submission of bids that equal their true minimum costs. Two examples of such

"incentive compatible" procurement processes are the English Auction and the Bid Improvement Auction. EM's use of either of these processes will allow it to achieve its goals.

V. Summary and Conclusions

Privatization and risk management are inextricably wed under EM's new 2006 Planning process. The following suggestions should be considered as EM develops policies for risk management:

- Not all projects can -- or should -- be privatized. There are severe legal constraints placed by the courts on the enforcement of fixed-price contracts in the face of significant uncertainty. When these are ignored, the courts may, through constructive change, convert fixed-price contracts to cost-plus ones, negating advantages gained by privatization and likely adding costs. If a project scheduled for privatization overruns its budget, terminal risk reduction targets will not be met. Interim risk management may also be jeopardized, because the management resources required for cost-plus management will have been redeployed. In all, privatization requires compatibility with fixed-price contracting.

- There is a corollary danger in carelessly or strategically declaring incompatible projects to have been successfully "privatized." Even if EM

recognizes that privatized projects are likely to overrun their planned costs and budgets accordingly, failure to meet its declared goals drives up DOE's own financial risks, as perceived by Congress and will erode Congress's faith in its "fixed-price contract" with DOE. Like a private business, DOE must inspire confidence in its "banker" if it is to avoid further Congressional constraints and oversight.

- EM can take a number of steps to increase the compatibility of a project with fixed-price contracting, many of which require dividing the project into phases or segments that are aimed are reducing technical uncertainty. Yet EM should not apply this advice in a cookbook manner. It must also explore (1) gains from robust technologies that reduce the value of specifying waste inputs and (2) the implications of larger numbers of smaller projects for losses in economies of scale.

- A corollary is that EM must carefully consider the manner in which projects are defined. DOE's management legacy left it a clean-up agenda defined by scientific factors rather than by the pursuit of cost reduction. Because technical risks translate directly to financial risks and in turn to greater terminal risks, there is strong justification for reconsidering project definitions to produce opportunities for cost reduction .

- Taken together, concerns for compatibility and sequencing will lead EM to devote greater effort to initial planning.

- Once a decision to privatize an activity is made, a two-part procurement strategy must be undertaken. First, an RFP describing a contracting process must be developed that will provide incentives for firms to behave responsibly on matters related to ES&H. This must include a means for EM to ensure ES&H risk management indirectly, rather than directly. Second, a process must be developed for selecting a low-priced bidder.

- Following EM's traditional approach of participating directly in firms' decisions about ES&H will undermine its privatization goals. If DOE participates in these decisions it will create opportunities for change orders under which contract costs increase. It also will tend to impose rigid requirements rather than encourage flexible procedures tailored to specific project needs.

- The Department's commonly used process for soliciting bids -- involving either negotiation or what is called a "first-price auction" -- will not succeed in achieving EM's goals of ensuring that contracts are let to least-cost, qualified contractors at the lowest possible price. Procurement

processes that provide bidders with incentives to bid low because of bidding competition with rivals should be considered instead.

- Whereas under cost-plus contracting DOE had complete access to its contractor's information base, under privatization, contractors will have incentives to protect business-sensitive information. DOE should take advantage of market incentives to offset this information imbalance.

- Developing self-enforcing, incentivized RFP terms and developing more effective selection processes will require EM to increase the resources it devotes to planning. This should be more than offset by reductions in efforts needed to manage privatized contracts.

- EM must recognize that in developing management practices appropriate to privatization it sends signals to firms that will lead them to form expectations about future EM behavior. For example, if EM creates price competitions around incompatible contracts, firms will believe that underbidding actual costs is a desirable strategy, because losses due to technical uncertainties will be compensated by the courts. Hence, all firms will underbid, many will experience losses, and the courts will determine DOE's ultimate costs. In general, EM should treat all procurements as part of a larger business strategy and consider that individual choices will set precedents for activities throughout the complex.

These findings are relevant to management practices for privatized or fixed-price contracts, but they are only part of the challenge facing EM in risk management. EM's greatest challenge may come in evaluating tradeoffs between interim risk management and terminal risk reduction and having done so, escaping the confines of compliance that militate against cost-saving and risk-reducing changes. In the past, without the constraints imposed by the 2006 Plan, EM avoided this by pushing terminal risk reduction forward into the future. If it can no longer do this, it must develop protocols to guide decisions concerning the benefits and costs of risk management relative to terminal risk reduction for privatization management practices.

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REFERENCES

Bjornstad, D. J.; Cummings, R. C.; Dummer, C. L.; Jones, D. W.; Russell, M.; Valdez G. Risk Reduction and the Privatization Option: First Principles. Knoxville, TN: The Joint Institute for Energy and Evironment; 1997.

USGAO (U.S. General Accounting Office). Nuclear Waste: DOE's Estimates of Potential Savings From Privatizing Cleanup Projects. GAO/RCED-97-49R; 1997.

USDOE (U.S. Department of Energy), Office of Environmental Management. The 1996 Baseline Environmental Management Report. DOE-EM-0290; June 1996.

USDOE, Office of Environmental Management. Accelerating Cleanup: Focus on 2006. Draft, June 1997.

Weida, W. J. An Economic Critique of DOE's Attempt to Privatize Cleanup of the Nuclear Weapons Complex. Global Resource Action Center. May 9, 1997.

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