

AN INTEGRATED BUSINESS APPROACH TO DISPOSITIONING DUF₆

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ABSTRACT

As discussed in previous papers in this session, three recent events have significantly influenced DOE's selection of a preferred alternative for dispositioning the Department's legacy of depleted uranium hexafluoride tails:

1. Environmental Perspective: the states of Ohio, Kentucky, and Tennessee are pressuring DOE to devise and implement a plan for ultimate disposition of its DUF₆ inventory.
2. Public Law 105-204: the Administration must submit to Congress a budget and plan to treat and recycle the DUF₆ using facilities to be constructed at Paducah and Portsmouth using funds fenced for this purpose.
3. Public Hearings Associated with the Draft PEIS: the overwhelming sentiment of the public was "Quit Dawdling With This Material...Clean It Up Now!"

In addition, privatization of the United States Enrichment Corporation (USEC) is likely to produce additional focus on the ultimate disposal issue since USEC will probably not have the luxury of storing its tails for a long period of time.

As a consequence, DOE will most likely seek entrepreneurial approaches from private industry for dispositioning this material. From the DOE perspective, the winning proposal will offer and demonstrate the capability to successfully execute an extraordinary privatized dispositioning program addressing:

1. Aggressive pursuit of end-uses
2. Fully integrated services
3. Jobs and job transitioning for displaced workers
4. Lowest cost
5. An ultimate disposal path

This must be done in such a way as to fully support DOE's commitments contained in the plan submitted to Congress in response to PL 105-204.

The business entity proposing this winning approach, of course, must be assured that the program can be executed with acceptable risk and at an attractive return on invested capital and talent.

This paper deals with: (1) funding issues; (2) the elements which will most likely comprise an "extraordinary privatized dispositioning program"; (3) the elements of risk which must be reduced to acceptable levels; and (4) the elements of cost which require special attention to assure adequate return on investment and a successful privatization initiative, which is important to DOE as well as to the private entity.

FUNDING ISSUES

Under provisions of PL 105-204, approximately \$400,000,000 has been authorized to pay for treatment and recycle of DOE's DUF₆ legacy using facilities constructed for these purposes at Portsmouth, Ohio and Paducah, Kentucky. A realistic understanding of the drivers for DOE's and Congress' new initiative for managing legacy DUF₆ is important to industry since the winning proposal must address these needs in the most attractive way. From the business perspective, the drivers for this legislation have little to do with the safety of a long-term "store, oversee, and seek end-use" strategy. DOE responded promptly and responsively to concerns of the Defense Nuclear Facility Safety Board regarding the condition of some of the DUF₆ cylinders and has clearly demonstrated its ability to manage these cylinders safely over the long-term. The principal drivers for the legislation are:

- Employment for displaced workers at the affected sites
- Public perception at and around the sites that ultimate disposition of the legacy needs to get underway now
- Availability of "off-budget" funds to pay for starting DUF₆ conversion and re-use work.

It is important to note that the funds authorized (but not appropriated) for dispositioning DOE's DUF₆ were generated from utility fees for enrichment services and not generated as a direct DOE budget item. Since \$400M will permit a good start to but not completion of the treatment process, DOE may be especially attracted to any program which offers a way to complete or greatly advance the completion of the treatment process for all its DUF₆ at Portsmouth (PORT), Paducah (PAD), and Oak Ridge (OR) using off-budget financing. This includes any and all DUF₆ transferred or to be transferred to DOE by the United States Enrichment Corporation under terms of the 1992 Energy Policy Act or the Privatization Act of 1996. There is a simple and highly appropriate way to do this which integrates the Administration's non-proliferation policy, DOE's intent to comply with both the spirit and letter of PL 104-205, and industry's desire for lowest cost enrichment services at minimum impact on the uranium market. In any event, the winning proposal will address funding downstream of the \$400M in innovative ways.

It goes without saying, of course, that the entity providing the privatized service must be assured of a put or pay contract for conversion/dispositioning services (or equivalent) which permits an

acceptable return on investment. Presumably, this must be done within the first \$400M of work. It is the opinion of the authors that all the provisions of and drivers for PL 104-205 can be satisfied well within this level of funding while processing ~2,000 legacy cylinders/year for a substantial number of years. This depends upon formulating and executing a well-defined program of **Integrated DUF₆ Dispositioning Services**.

INTEGRATED DUF₆ DISPOSITIONING SERVICES

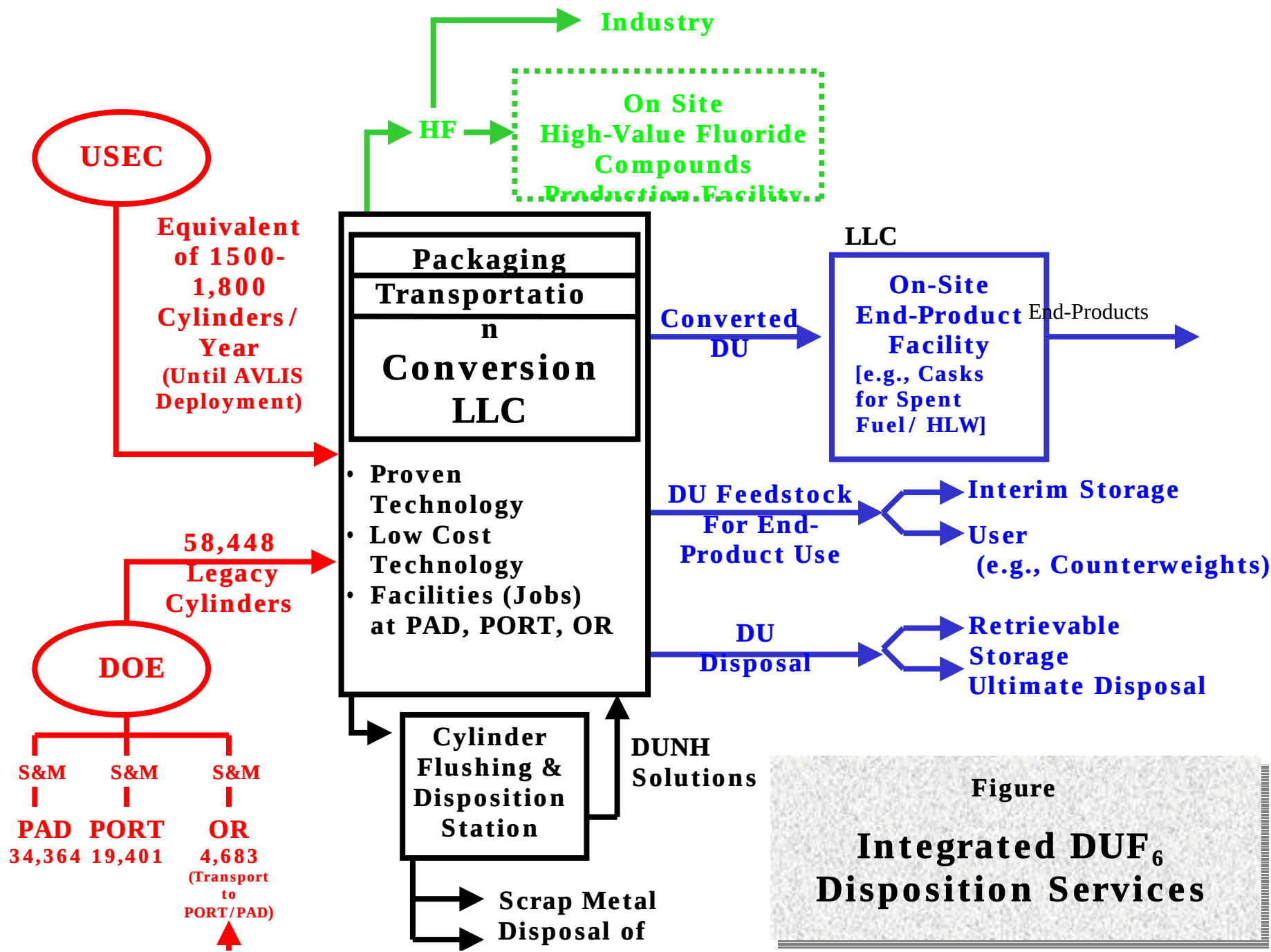
From a business perspective, the job of executing a DUF₆ dispositioning program is viewed, first of all, in the context of the revenue streams and the cost streams associated with actual conversion and dispositioning work. In this instance, two customers need to be considered in projecting the potential demand for conversion and disposition services; viz., DOE and the United States Enrichment Corporation. Clearly, a business strategy which captures work from both of these customers offers substantial advantages to each.

Figure 1 portrays the principal elements of an “Integrated DUF₆ Dispositioning Program” from the standpoint of the tangible elements of the service. It does not capture, for example, the business entity’s need and responsibility to help deal sensitively and effectively with congressional delegations, state and local officials, affected community leaders and citizens, and union officials ; nor does it deal with many other tangible and intangible elements which must be successfully integrated at proposal, contracting, and execution stages if the business and customer objectives are to be realized in a reasonably predictable way. These “other tangible and intangible” elements include such things as:

- working with DOE and appropriate members of Congress and their staff to assure that authorized monies are actually appropriated for DUF₆ dispositioning services and that the programs proceeds expeditiously.
- working with DOE, USEC, state officials, union leaders, community leaders, and others to help assure that good jobs are available to displaced workers in the affected communities.
- incentivizing end-use product and commercialization research, including, promulgation of related free-release standards and management of related liabilities.
- working with DOE and the cognizant Community Reuse Organizations to establish mutually acceptable leases and related terms and conditions (especially, decommissioning responsibilities).
- accommodating DOE’s “Right of Access” and defining the extent to which DOE will regulate operations in addition to the statutory licensing agencies.
- licensing privatized nuclear material processing facilities on a DOE site in three states (two of which, are agreement states) with predictable first-time and on-going costs

The winning business proposal will consistently and aggressively advance the first fundamental premise of the procurement effort, viz., that:

1. DUF ₆ Is An Asset



This means that additional customers (i.e., potential revenue streams) need to be considered, either as purchasers of converted DUF_6 for use as feedstock for end-use product manufacture or as purchasers of end-use products themselves which the business entity may elect to produce in conjunction with conversion services. All of this, of course, reduces DOE's dispositioning costs either by way of royalty payment to DOE (in the case where the business entity takes title to the DUF_6) or by outright sale of the converted DUF_6 by the business entity on behalf of DOE. In addition, it helps to maximize jobs.

It is not inconsistent, however, to demand that an ultimate disposal path for the converted DUF_6 be demonstrated as well. This would be absolutely essential in the event that the business entity took title to the DUF_6 . However, it makes sense for DOE to demand this also, since the volume is so large, the end-use product market is so difficult to predict and state and local interests are best served by doing so.

A fully integrated service proposal will address on-going tail cylinder surveillance and maintenance, packaging and transportation of tail cylinders as necessary, cleaning and ultimate disposition of empty cylinders (potential revenue stream), and achieving maximum revenues from sale or utilization of by-products of the conversion process (such as HF).

The winning proposal will integrate all such factors in such a way as to satisfy two additional fundamental premises of the procurement process, viz., that:

2. Related Jobs in the Affected Communities Will be Maximized

3. Net Unit Cost of Conversion Will Be Minimized

ELEMENTS OF RISK

The number one business risk has already been addressed in the section dealing with funding issues: even the most entrepreneurial business entity will require adequate assurance that conversion service demand (Kgs DUF_6 /yr for x years) will permit an acceptable return on invested capital. This assumes, of course, that DOE seeks a truly "privatized" conversion/dispositioning service.

Technology risk associated with DUF_6 conversion is not large since processes for converting DUF_6 to:

DUF_4
 DU_3O_8
 DUO_2
DU Metal

have been deployed at production scale at a variety of sites over a substantial number of years. The business entity, however, will certainly pursue and incentivize the demonstration of improved conversion processes for the simple reason that the volume is so large and the time of production is so long. This initiative, of course, also helps to hedge against the risk of providing conversion services under a fixed-price contract, which almost certainly will be required of the winning proposal. In addition, aggressive pursuit and deployment of improved conversion processes will make end-use product initiatives more attractive to both investor and user.

Clearly, by-product and end-use product initiatives will never be pursued as aggressively as possible nor products commercialized as extensively as possible until free-release standards are promulgated. This must be done in parallel with efforts to insulate processors, end-use product manufacturers, and end-use product users from the risk of liabilities to third parties for alleged injuries from exposure to such products. The current U.S. legal system and the ease of raising fears associated with "nuclear stuff" is a real deterrent to pursuit of legitimate benign applications for converted DUF_6 . The simplest way to incentivize this pursuit is to extend Price-Anderson indemnification to DU processors, product manufacturers, and product users.

Predicting ultimate disposal costs over the long-term is always a concern, since regulations for burial of this material is subject to the vagaries of time and community attitudes as well as legitimate concerns which may be raised when in-situ performance (leach rate, migration, agglomeration, etc.) does not conform to assumptions promulgated many years previous. The successful proposal will demonstrate the capability to manage these issues balancing good business practice, responsive customer service, and responsible environmental practices.

ELEMENTS OF COST

There are three main categories of cost associated with a privatized DUF_6 dispositioning service:

Capital Costs

Cost to design, construct, license and startup the facilities required to process the DUF_6 and to disposition the converted DUF_6 in conformance with customer requirements, including the cost of facilities and equipment to package and transport tail cylinders to the process plants and the converted material to storage and/or disposal sites.

Direct Operating Costs

Cost of labor, utilities and materials to process the DUF_6 and to package and transport the converted material for interim storage, long-term storage, use, and/or disposal; related subcontracted tasks; spare parts; surveillance and maintenance.

Indirect and General and Administrative Costs

All other costs including management staff; end-use product and conversion process R&D, grants, etc.; debt service; licensing support; customer service; sales and marketing; decommissioning and decontamination costs (D&D); insurance; lease costs; etc.

Even for a fixed-price conversion services contract, there are few items that pose any significant margin degradation risk assuming that:

- a put or pay contract is successfully negotiated (or an equivalent cancellation provision)
- proven conversion technology is deployed
- arrangements for building and/or land lease along with rates for any site-supplied utilities and other services (emergency medical, fire protection, security, etc.) are firm and long-term (based on mutually agreed escalation indices).

However, there are a number of cost elements which must be carefully developed and managed over the long term in order to maintain good customer relations (minimize claims) and avoid profit degradation:

Licensing and Regulatory Oversight Costs

Predicting first time and on-going costs to license a nuclear facility of any kind is always a concern. The task is exacerbated for the DUF₆ disposition initiative by the fact that a number of jurisdictions and agencies are involved and that the facilities will probably be located on a DOE site and some degree of oversight will be demanded by DOE even though the licensing authority lies with the state or the Nuclear Regulatory Commission. However, the difficulty of the task is mitigated substantially by using proven processes, thoroughly inculcating operating "lessons-learned" and the lack of criticality concerns associated with this material.

Handling "Non-Conforming" Cylinders

Over 20,000 DOE cylinders are considered non-conforming* for a variety of reasons:

- overfilled
- overpressurized
- local wall thinning due to corrosion
- breached and patched
- potential valve defects
- degree of conformance not well known

*Cannot serve as the shipping container, cannot be emptied by routine autoclaving, procedures, etc.

Such cylinders will require various degrees of special handling since they are not guaranteed autoclavable using standard procedures. To contract at fixed price for servicing these cylinders, the actual handling procedures and related operating,

equipment and contingency costs must be carefully developed so as to adequately cover business risk but not unduly burden the price for services. It is not clear to the author that attempting to firm price this service is in the best interests of either DOE or the private entity.

Decommissioning And Decontamination (D&D) Costs

Projecting D&D costs for nuclear facilities is always a concern since the time frame is so long and applicable regulations are subject to the vagaries of time and prevailing attitudes about "nuclear stuff". Such concerns are mitigated by the fact that the facilities will be sited and designed for ease of D&D, that the D&D experience base for such facilities is substantial and growing, and that financing the required accrual is not so intimidating as in the past. The D&D cost tab is not insignificant, however, since service rates must bear the cost of the substantial accrual required and the costs to dispose of contaminated materials and equipment is always subject to non-negligible risk.

Disposal Costs

This item refers to ultimate disposition of unused converted DUF_6 (if any!), disposal of LLW from on-going operations, and disposal of contaminated equipment and residue from D&D operations. Such costs are difficult to project over the long term. The risk is best mitigated by: (1) working in close partnership with disposal/storage site operators and the customer (2) leveraging existing relationships and (3) astute contracting.

SUMMARY

A *privatized* approach to DUF_6 dispositioning which offers *fully-integrated services* affords many advantages to all stakeholders, viz., DOE; citizens and officials in the affected communities; regulatory authorities in all affected jurisdictions; the nation's tax-payers and potential end-use product researchers, manufacturers, and users. It is also an attractive business opportunity for those commercial entities which can demonstrate excellence in the conduct of uranium operations spanning design, construction, licensing, operation, and decommissioning of facilities for processing uranium-bearing materials. "Excellence" means ability to perform the work safely, in full compliance with environmental and other regulations, and at a predictable, competitive cost and schedule.

However, significant challenges remain if we are to realize the first premise of the procurement activity, viz., that DUF_6 is an asset and is to be converted principally, if not entirely, for use in beneficial products. Constructing the regulatory and statutory, as well as the technical and entrepreneurial, bases for putting converted DUF_6 to work in society still poses a daunting task.

All stakeholders, including all commercial entities involved in processing services, by-product use, and production and use of products containing converted DUF_6 will have to work closely together, starting as soon as possible, to realize the principal objectives of this procurement.