Paducah Citizens Advisory Board
"working for the future"

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# Recommendation 11-07: Re-Enrichment of High Assay Tails

Approved August 25, 2011

**Purpose:**

The purpose of this recommendation is to expedite decisions by the Department of Energy (DOE) regarding high assay tails at the Paducah Gaseous Diffusion Plant (PGDP) site.

**Background:**

The DOE currently has an inventory of approximately 41,000 depleted uranium cylinders at the PGDP. Additionally, there are approximately 20,700 depleted uranium cylinders at the Portsmouth Gaseous Diffusion Plant. Of those, approximately 8,800 cylinders at Paducah and 5,800 cylinders at Portsmouth contain sufficient concentration of U-235 to be potentially viable re-feed. They are referred to as "high assay tails".

If treated as waste, these high assay tails are a significant financial liability to the DOE. This financial liability could be turned into an asset and generate approximately $2.2B for the federal government to help compensate for budgetary shortfalls by feeding them into the PGDP cascade. The re-enrichment will result in the generation of approximately 4,300 enriched (product) UF6 cylinders. The total inventory which would ultimately need to be disposed of through the DUF6 conversion facility could be reduced by the same 4,300 cylinders, so cylinders that are currently an environmental cleanup liability to the DOE can become a commercially viable asset to the DOE through enrichment. Since no appropriations are needed to process these cylinders, it would not impose any additional tax burden on American taxpayers.

The Paducah Gaseous Diffusion Plant is the only plant that can effectively strip the high assay tails of their remaining U-235. Overseas transport is not a viable option because the high assay tails are contained within cylinders that are not designed to be shipped. The Paducah Gaseous Diffusion Plant is, admittedly, energy intensive; however, it has the unique capability of matching a particular cylinder's assay with a point on the cascade at which enrichment begins. This is an efficiency which allows the PGDP to avoid costs associated with a cylinder being processed from the beginning to the end of the enrichment cycle.

The high assay tails cylinders could be retained by the DOE for enrichment in the future at a more fuel efficient facility, however, since centrifuge technology typically has a higher stage separation factor, these plants are typically built specifically to feed a 0.711% assay while

stripping to a given tails assay. A centrifuge plant is not designed to process high assay tails and

would require expensive process modifications to dedicate cascades to this operation. The Paducah Gaseous Diffusion Plant is already designed for simultaneous feeding of multiple assays and can process the tails in conjunction with commercial operations in the same cascade. Furthermore, the high assay tails cylinders contain fuel cycle contaminants which would contaminate a new enrichment facility's process lines. This would require additional equipment to be installed in existing process lines to control the contaminants, thereby further reducing any monetary gains for the DOE.

Re-enrichment could commence immediately as the PGDP has excess capacity to process the high assay tails cylinders. Up to 1.6 million separative work units (SWU) per year can be made available to re-enrich the high assay tails, allowing the Paducah Gaseous Diffusion Plant to remain economically viable beyond 2012. The PGDP employs a workforce of trained and highly skilled people who are ready to commence re-enriching these tails cylinders.

Re-enriching these high assay tails at Paducah has the potential to keep the PGDP operational for several more years, thereby ensuring our Nation has sufficient enrichment capabilities to meet current demand. According to their website, URENCO USA anticipates, "That at full capacity the facility can produce sufficient enriched uranium for nuclear fuel to provide approximately 10% of America's electricity needs."[1] Currently, 19% of America's electricity is generated by nuclear power plants. This leaves a significant nuclear fuel shortfall to meet nuclear power plant needs. Furthermore, the technology is foreign owned and controlled. For the sake of national security, it would seem wise for America to be able to generate its own enriched uranium using its own technology.

By keeping the PGDP operational, the start of the massive post-operational cleanup of the PGDP would be deferred to the future. This action would prevent the DOE from having to move to D&D all three GDPs at the same time. Costs for surveillance and maintenance, along with security, are estimated to be $93M annually. The Environmental Protection Act authorized annual deposits to the D&D Fund by the Government and domestic nuclear utilities. Contributions in excess of current fiscal year funding requirements are invested in U.S. Treasury securities to earn interest. Approximately half of the receipts have been used to pay for cleanup work with the remaining half invested to earn interest. The outlay for the D&D funding profile includes the use of interest earnings based on a phased schedule for D&D of the three gaseous diffusion facilities. Utilization of funds earlier than planned would result in lost interest earnings and possibly a deficit in the fund. There are no funds currently appropriated for the transition and for D&D of the PGDP. The DOE could continue to utilize current appropriations as planned if it defers the start of D&D of the PGDP through extended operations by re-enriching the high assay tails. Revenue generated by re-enriching the high assay tails at Paducah could allow the DOE Environmental Management (EM) to focus cleanup dollars to meet FY-2019 enforceable milestones at Paducah, which are in jeopardy because of levelized funding. Additionally, this effort would preserve the DOE's available natural uranium inventory for future use.

This is a unique opportunity for the DOE EM to extract an asset from a financial liability.

Millions of dollars in environmental cleanup costs can be eliminated. Simultaneously, significant revenue can be generated for use in the DOE's D&D activities, allowing the DOE to maintain momentum in its cleanup mission at Paducah. This is a win for the DOE, the Nation, and American taxpayers.

**Recommendation Discussion and Justification:**

1. Re-enriching the high assay tails will generate significant revenue, which can help fund the DOE EM's cleanup mission at Paducah during a time of revenue shortfalls and deep budget cuts.

2. Enrichment of the high assay tails has the potential to generate 4,300 cylinders of commercially viable product, thereby reducing the volume of waste, which the DOE EM must eventually remediate. This reduction of waste enhances environmental benefits and eliminates government expenditures associated with the cleanup costs of these now-profitable cylinders.

3. No appropriations are needed to process the high assay tails, therefore it will not impose additional burden upon American taxpayers.

4. The Paducah Gaseous Diffusion Plant is the only plant that can effectively strip the high assay tails of their remaining U-235 since it alone is capable of match point operations. Dedication of centrifuge cascades to tails stripping will require expensive modifications while the Paducah Plant is already designed for feeding high assay tails simultaneously with ongoing commercial operations and no modifications are needed.

5. Because the high assay tails contain fuel cycle contaminants, enriching them in a new facility would necessitate installing additional equipment to control the contaminants, thus reducing monetary gains. It is likely that the value of the U-235 contained within the high assay tails cylinders would never be recovered.

6. Re-enrichment of the high assay tails cylinders at Paducah could commence immediately.

7. The current workforce is trained, highly skilled, and in place to re-enrich the high assay tails.

8. It will extend the useful life of the PGDP until a viable alternative with which to enrich uranium is dependable; thereby ensuring our Nation has sufficient enrichment capabilities to meet demand. While a new centrifuge enrichment facility has recently come on line, there is approximately a 9% gap in the capability of the new facility and current national demand for enriched uranium.

9. America's national security could be jeopardized by becoming totally dependent upon a facility that is foreign owned and controlled to provide all of our enriched uranium.

10. Costs associated with surveillance and maintenance of the facility until the DOE EM is ready to initiate D&D activities would be avoided. Incremental costs associated with additional security as well as surveillance and maintenance activities would be approximately $93M annually.

11. There are no funds appropriated for the transition and D&D of the Paducah Gaseous Diffusion Plant. Continuing operations would postpone the start of PGDP D&D to the future, allowing the DOE to utilize current appropriations as planned.

12. Re-enriching the high assay tails would preserve the DOE's available natural uranium inventory, which contains no fuel cycle contaminants, for future use.

**Recommendation:**

**The Paducah Citizens Advisory Board respectfully requests the DOE consider the following:**

**1. The DOE should make an immediate decision to re-enrich the high assay tails at the Paducah Gaseous Diffusion Plant beginning in FY-2012 in order to capitalize on available excess capacity and cost efficiencies while the plant is still operational.**

**2. Funds, proceeds, revenues, or other monetary returns generated from the re-enrichment of high assay tails at the Paducah site should be allocated to the Paducah EM cleanup projects on top of current funding targets. This will allow the DOE to meet FY-2019 enforceable milestones and the DOE's commitments to the community regarding site cleanup, which are currently in jeopardy due to the current levelized funding targets.**

**3. If the DOE is delaying the decision to re-enrich the high assay tails for any particular reason, such as in order to retrofit a facility that utilizes a different technology or allow the DOE to self-perform the work, the Paducah Citizens Advisory Board requests supporting documentation for the DOE's decision be made publicly available.**

**References**

[1] *http://www.urenco.com/Content/33/LES.aspx*