

DUF₆ Pilot Project

An Intradepartmental Transfer of
Depleted Uranium

Project Completion Report

Source: Bill Murphie, DOE/PPPO, 10/2/08, who said Bonneville Power Administration (BPA)
prepared the slides.

See GAO HQ # 213972.6 for write-up of Murphie meetings

Background

- Columbia Generating Station is an 1,107 MW boiling water reactor owned and operated by Energy Northwest. The Plant is located on the DOE Hanford Site.
- BPA purchases 100% of Columbia Generating Station's power and pays all operating costs per the Project agreements.
- BPA is self financed, funded by the ratepayers and does not receive taxpayer funded appropriations.
- There are 700,000 tons of depleted uranium tails (DUF_6) at Portsmouth and Paducah that have accumulated from 50 years of enrichment operations with varying assays of residual U^{235} isotope.
- The price of uranium (UF_6) rose from \$33/KgU to \$74/KgU over the two-year period of April 2003 – April 2005. By the fall of 2005 it was believed to be economically viable to extract additional U^{235} from some of the higher assay DUF_6 .
- Natural uranium contains ~ 0.7% of the U^{235} isotope, the DUF_6 used for the pilot project contained a minimum assay 0.4% U^{235} .

DUF₆ Pilot Project

- A pilot project for recycling 8,500 metric tons of DOE DUF₆ for end use as fuel in a commercial reactor was proposed to DOE Environmental Management (DOE-EM).
- This pilot project provided a unique opportunity for DOE-EM, Bonneville Power Administration (BPA), and taxpayers/BPA ratepayers to benefit from a commodity that in 2005 had no identified reuse.
- The scope of the pilot was limited so as to not impact the domestic uranium mining market and not significantly affect the conversion plants under construction in Kentucky and Ohio.

DUF₆ Pilot Project (cont.):

- The Pilot was designed to assess the feasibility and benefits of commercial use of DOE's DUF₆, and produce enough equivalent natural uranium for about 8 reactor years of fuel for the Columbia Generating Station.
- The Pilot was to provide DOE with information to support a decision regarding any subsequent action related to reuse of the remaining DUF₆ inventory.
 - Pilot was to use only 1.2 % of the total DOE DUF₆ inventory.

DUF₆ Pilot Project (cont.):

- The Pilot transferred uranium from DOE-EM to Energy Northwest on behalf of BPA. Energy Northwest will use the uranium produced by this Pilot Project to generate electricity solely on behalf of BPA.
- No additional funding was required for DOE.
 - DOE-EM's costs to transfer the material are covered by Energy Northwest /BPA
- Estimated savings to U.S. taxpayers of up to \$40 million were estimated, through cost avoidance for DOE in the DUF₆ disposal program.
- Savings to electric ratepayers in Idaho, Oregon, Washington, and Montana were originally estimated at \$20-\$50 million, by reducing the costs of fuel for the Columbia Generating Station nuclear plant over four fuel cycles/reloads (8 years), and stabilization of fuel costs for that plant.

Pilot Project Implementation

- The DUF_6 Pilot Project became known as the Uranium Tails Pilot Project (UTPP or Project). A unique project developed jointly by the Department of Energy Environmental Management Division (DOE-EM), Energy Northwest (EN) and the Bonneville Power Administration (BPA).

Pilot Project Implementation (cont.):

- Approval
 - UTPP received approval from the Deputy Secretary Clay Sell in May of 2005.
- Processing
 - The first cylinder of the 672 cylinders containing DUF_6 was fed into USEC's process line at the Paducah Gaseous Diffusion plant in June of 2005.
 - The final cylinder of DUF_6 was processed in November 2006.

UTPP Targets:

- The UTPP's production target was set at 1,820,000 – 1,957,000 KgU, enough feed stock for 8 years of operation of Columbia Generating Station. Energy Northwest ultimately received 1,939,817 KgU of natural UF₆ credited to their account at United States Enrichment Corporation (USEC) at the completion of the UTPP.
- The initial UTPP target budget estimate was set at \$85-\$88 million but included an escalator for an anticipated power rate increase by the Tennessee Valley Authority (TVA) to the company providing enrichment services (USEC) in the spring of 2006. The cost of this TVA power rate increase was estimated to be in the range of \$5 -\$15 million before the commencement of the project, the actual increase was approximately \$6.6 million for a revised budget estimate of \$94.6 million.

UTTP Targets (cont.):

- The Total UTTP costs are currently estimated at \$94.6 million (waiting final invoicing). A break down of individual costs were as follows:
 - \$1.48 million will be paid to DOE-EM for incurred transportation and handling costs.
 - \$7.02 million will be paid to the U.S Treasury for the DUF₆ that was processed. *what is the payment for the waste? up to 60%*
 - \$86.1 million was paid to USEC for the 509,269 SWU used to process the DUF₆ into natural UF₆. *\$169.07 per SWU*

UTTP Targets (cont.):

- Initially in the late summer of 2004 the UTTP was estimated to provide a \$20 million reduction in future fuel costs for CGS. By May 2005 when the Deputy Secretary approved the UTTP this number was revised to \$50 million based on the escalation of uranium in the market place. During the two year duration of the UTTP the market price of uranium continued to escalate and almost tripled in value by the end of the project. Net savings in future fuel costs (based on November 2006 uranium spot market prices) for Energy Northwest, BPA and the rate payers of Pacific Northwest is over \$220 million.

UTTP Successes Included:

- The UTTP as a project meet all of its goals.
- All 672 cylinders were transferred from DOE-EM to USEC's Paducah Enrichment Plant safely without accidents or mishaps.
- All of the 672 cylinders have been processed and none were rejected prior to the start of processing. Several cylinders did require engineering evaluation of their physical condition prior to processing.
- Only one cylinder could not be completely processed (emptied). This was believed to be due to an unidentified physical problem with the cylinder. The cylinder was disposed of in the same manner as the other emptied cylinders.
- There were no contamination issues identified during the processing of 1.9 million kilograms of natural uranium.

UTTP Successes (cont.):

- The UTTP has had no detrimental effect on the domestic uranium market as evidenced by the continued rise in the market price of uranium over the period of the project.
- The UTTP was successfully implemented per the provisions of the agreements, without the need for intervention of senior management of any of the parties.
- The UTTP was completed in the fourth quarter of 2006, almost two months ahead of schedule and within its targeted budget.
- Savings to the U.S. taxpayers are estimated to be as much as \$40 million, through cost avoidance for DOE in the DUF₆ disposal program.
- Over eight million dollars in funds to be transferred to DOE-EM and the U.S. Treasury as payment for the source material (DUF₆).

Summary

- BPA and Energy Northwest wish to extend our thanks to all of the DOE staff who participated in the Pilot Project. We appreciated the staff's teamwork and due diligence in making this Pilot Project a huge success.
- The UTPP demonstrated that government agencies and private parties can cooperate in a joint venture that brings value to each of the parties involved. Joint ventures similar to the UTPP could form the basis for future projects that provide additional benefit to the individual agencies and to the tax payers in general in dealing with the department's uranium legacy.

Summary (cont.):

- The May 10, 2005 Deputy Secretary's determination directed that a Letter of Agreement (LOA) (05GS-75150) memorialize the UTPP. EM and BPA signed this LOA May 31, 2005 and item 10 of the LOA includes language that "BPA and EM intend to pursue the use of additional uranium inventories at the conclusion of the Pilot project..."
- We believe it would be beneficial to Department's goals and to the rate payers of the Pacific Northwest to conduct additional discussions with DOE-EM in an effort to pursue the possibility of a similar project or to explore new pilot projects using other surplus uranium materials slated for disposal.