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# Usec takes the lead

*Following successful lead cascade tests, Usec aims to finalise the overall design for its AC100 centrifuge machine early in 2008.*

The lead cascade of Usec's American Centrifuge project began generating uranium enriched to a level usable by commercial nuclear plants in October 2007. The company now expects to meet the next key milestone in the project – to secure financing for 1 million SWU capacity of the plant – in January 2008.

“Our American Centrifuge team in Piketon has operated the machines in a variety of cascade configurations and we have obtained reams of valuable

data about performance and safe operations,” Philip Sewell, Usec senior vice president, American Centrifuge and Russian HEU, said. He added that data gathered from these activities was consistent with Usec's predictions of cascade and machine performance. “All the models predicted within a very good range of accuracy the results that we obtained,” Sewell told *NEI*.

While the tests have resulted in enrichment levels in the region of 2-5%, Sewell said that the centrifuges could obtain higher levels of enrichment. The plant is licensed to enrich to a maximum of 10%.

Usec said the results mean that it has met the milestone agreed with the US Department of Energy (DoE) of having the lead cascade operational. The June 2002 Usec/DoE agreement envisaged this milestone to take place exactly one year earlier – in October 2006 – but in mid 2006, following various delays in manufacturing and testing, Usec adjusted the schedule to mid 2007.

DoE officials have observed the cascade operation and have been provided with information about the test results. In a letter to the DoE, Usec vice president Vic Lopiano said: “In addition to generating product assays in a commercial range, lead cascade operation has provided important information regarding machine-to-machine interactions and the integrated efficiency of the cascade. An operating lead cascade has also been an invaluable training platform for our operators and technicians as we prepare for deployment of the commercial plant.”

The integrated testing programme is continuing at the American Centrifuge Demonstration Facility, which is located within the building where Usec is constructing its commercial plant in Piketon, Ohio. The site is adjacent to Usec's shutdown Portsmouth gaseous diffusion plant.

## AC100 DESIGN

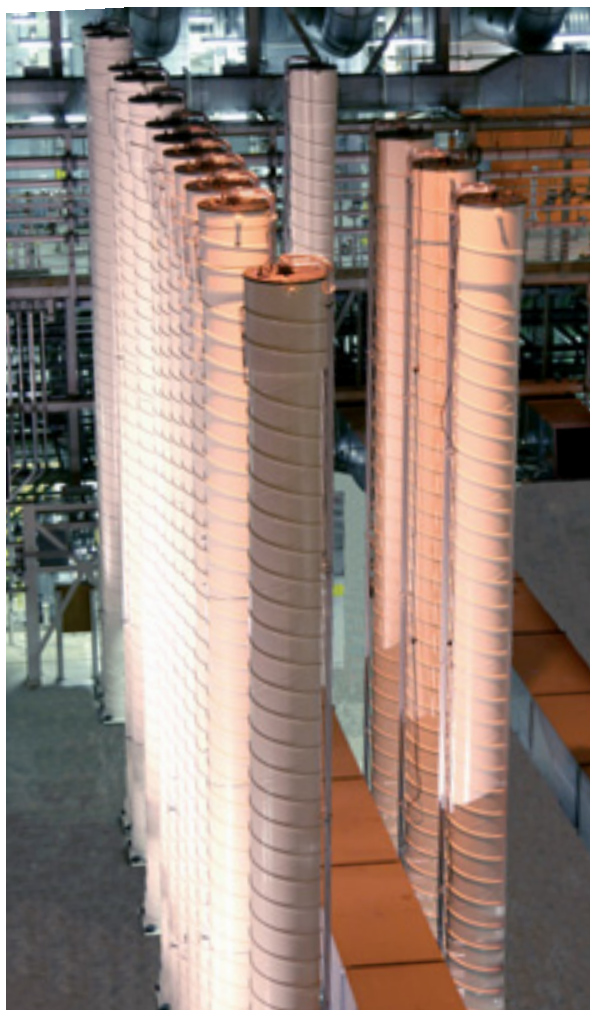
The lead cascade prototype machines will also provide data that the American Centrifuge team will use in the final

development of the AC100 machines to be installed and operated in the commercial plant. “Early next year we will be freezing the design for the AC100 machine,” Sewell said.

Usec expects the lead cascade test programme to help identify improvements in design, assembly and operations that will be integrated into the AC100 machine. Individual machine testing carried out at Oak Ridge, Tennessee demonstrated prototype machine performance of 350 SWU per machine per year and Sewell is confident that the AC100 will operate at that performance level. Achieving commercial grade assay in the first round of tests was the main goal, he said. “We will be now moving toward ensuring a lead cascade can hit that target that we have set, and that we have met on an individual basis. We are pretty confident we can do that but to date we haven't realised that type of SWU-per-machine performance. But I would quickly add that we haven't because we haven't designed it to do that yet.” He pointed out: “We have not seen any significant inefficiencies or loss of performance from individual to a grouping or cascade of machines.”

The main difference between the AC100 and the prototype concerns the cost – Usec is working with its suppliers to reduce the number of parts per machine. “The distinction is not performance; the distinction's going to be cost and how it's manufactured,” Sewell told *NEI*, adding: “We feel confident, based upon all of our analysis and what the manufacturers are telling us, that that more simplified manufacturing design provides no deterioration in performance and reliability.”

In order to help achieve its target cost estimate, Usec is seeking to reduce the capital cost per machine through simplifying the design. Usec said it is also contracting for the manufacture of the centrifuge machines in stages so that contracts for machines manufactured in later stages can benefit from the reduced costs expected in the future. “We believe



American Centrifuge machines operating in a cascade configuration at the American Centrifuge Demonstration Facility in Piketon, Ohio

that success in these value engineering efforts by our project team and our strategic suppliers may help to offset higher materials costs seen in some of the initial American Centrifuge project procurements," the company said.

After finalising the AC100 design, individual machines would be tested at Oak Ridge, and then a cascade consisting of several dozen AC100 machines would be built later in 2008. Subject to satisfactory performance, Usec plans to "ramp up manufacturing of those AC100 machines and install them in a commercial plant mode in 2009 with the objective of having actual commercial operations late in 2009," according to Sewell. "Our plan at this time is to hit the 1 million SWU capacity mark late in 2010." Usec estimates the plant to reach its planned 3.8 million SWU capacity in mid 2012.

### FINANCING THE FUTURE

In early 2007, Usec completed a comprehensive review of the cost of deploying the American Centrifuge Plant and established a target cost estimate of \$2.3 billion. This target cost estimate included amounts spent on the project through early 2007 and estimates for cost escalation, but did not include financing costs or a reserve for general contingencies. The target cost estimate assumes that Usec will be successful in reducing the capital cost per machine over time based on value engineering the design of centrifuge machines for high-volume manufacturing.

Usec said it expects to complete a comprehensive review and update of its target cost estimate for deployment of the American Centrifuge Plant in the first quarter of 2008. The cost estimate resulting from that review will include a reserve for general contingencies that will take into account potential variations in the project plans and uncertainty regarding associated costs that cannot specifically be identified at the time the estimate is prepared.

The company said it believed that the cost of deploying the American Centrifuge Plant is likely to be higher than provided for in its target cost estimate, as a result of high costs associated with the centrifuge machines being manufactured by its suppliers during the initial stage of deployment and higher costs in construction materials for completion of the plant.

Spending on the project as of 30 September 2007 of approximately \$541 million, combined with contractual arrangements Usec has made and anticipates making in the near future



American Centrifuge Plant buildings in Piketon

for components of the American Centrifuge Plant, exceeds the corresponding amounts included in its target cost estimate by approximately \$150 million, or roughly 15%.

During the third quarter of 2007, Usec entered into a number of contracts related to procurement of key components and materials for the American Centrifuge Plant and expected to enter into additional contracts by year end. Contracts are now in place for carbon fibre needed to manufacture the centrifuge rotor and for the outer steel casings for the centrifuge machines.

Usec expects total spending on the American Centrifuge project in 2007 will be approximately \$300 million, split between \$135 million in expense and \$150 million in capital expenditures, with the remainder representing prepayments for specialty materials and new manufacturing facilities for building the commercial plant AC100 centrifuges. Now that the project has moved from the demonstration phase to a commercial plant phase, a significant portion of expenditures will be capitalised from now on. The company anticipates an increased rate of spending on the American Centrifuge Plant, with 2008 spending projected to be roughly \$600 million.

Financing the project will consist of a two phase approach: "equity first, debt later," Sewell said. "We're going to use equity first that we raise in our business and we're going to seek debt for the remaining part of the project in the second half of 2008."

In September, Usec raised net proceeds of approximately \$775 million

through the concurrent issuance of 23 million shares of common stock and \$575 million in aggregate principal amount of convertible notes. According to Usec, these proceeds, along with an existing \$400 million bank credit facility and anticipated cashflow from operations, will allow the company to meet the milestone of having a financing commitment secured for 1 million SWU capacity in January 2008. "We have more than sufficient funding commitment to meet that milestone and will be going over that subject with DoE in January," Sewell said.

"But that's not the total amount that we'll need for the whole project," Sewell continued, "so the second phase of our finance will involve debt, and we'll be looking to raise debt in the second half of 2008."

One possible area in which Usec could raise debt involves loan guarantees from the DoE under a provision in the Energy Policy Act of 2005. "That loan guarantee programme by the DoE is intended to stimulate the introduction of advanced nuclear technologies and energy efficient technologies. This centrifuge plant we feel is an advanced nuclear technology; we believe it's the most advanced centrifuge technology in the world. And the second major advantage is that it reduces the need for power. It uses 5% of the electricity that the existing production plant does," Sewell said, noting that the DoE will be soliciting nuclear projects in 2008, "and we would expect to submit a loan guarantee application and then work with DoE on trying to finalise the terms."