Institute for Science and International Security

ISIS REPORT

August 6, 2010

Technical Note: Iran Recycles the Tails in the Production of 19.75 Percent Uranium

ISIS has learned that Iran is now using the second cascade at the Pilot Fuel Enrichment Plant (PFEP) at Natanz to recycle the tails from the first cascade that produces 19.75 percent enriched uranium from 3.5 percent low enriched uranium (LEU). The purpose is not to increase the output of 19.75 percent material but to maximize the use of the 3.5 percent low enriched uranium (LEU). ISIS previously reported that Iran had stated its intention to recycle tails at the PFEP during the production of 19.75 percent uranium. The two percent enriched tails from the first cascade is fed into the feed point of the second cascade and emerges as about 10 percent enriched uranium. This material is then fed into an upper stage of the first cascade, while the 3.5 percent uranium is fed in at the main feed point of this cascade. With two feed points, the total amount of 19.75 percent product is not increased, but the enrichment effort embodied in the 2 percent material is more fully utilized. The assay of the tails in the second cascade is 0.7 percent enriched uranium, or natural uranium. This material can then be reused in cascades at the main Fuel Enrichment Plant (FEP) at Natanz that make 3.5 percent uranium.

Recycling in the second cascade allows Iran to cut down on wasting separative work units (swu) in the enrichment process and ultimately requires less 3.5 percent LEU to produce a given quantity of 19.75 percent material. Iran is not short on a supply of 3.5 percent material to make research reactor fuel and will not be anytime soon. Thus, it hardly has to worry about using its tails efficiently.

If Iran enriches to weapon-grade uranium, however, it is expected to use the same type of procedure to reduce the amount of separative work left in the tails as it stepwise increases the enrichment level of the uranium, reducing the amount of feed material it needs at each step. Iran likely received the same plans that the Khan network gave Libya detailing how to organize and run cascades to produce weapon-grade uranium from natural uranium in four steps, including recycling the tails produced in the top three steps (the first step goes from natural uranium to 3.5 percent LEU and produces about 0.4 percent tails). Thus, Iran's current actions, while superficially justified on civil grounds, mainly make sense in the context of learning how to make significant quantities of highly enriched uranium efficiently.

236 Massachusetts Avenue, NE, Suite 500 Washington, DC 20002
TEL 202.547.3633 • FAX 202.547.3634
E-MAIL isis@isis-online.org • www.isis-online.org