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The Myth of Excess SWU Capacity

One of the more pervasive myths about enrichment capacity is that there is an excess of it. This largely results from a misunderstanding of the nature of SWU demand and the dynamic interrelationship between the enrichment and uranium markets. Below we will examine the nature of SWU demand, its dynamic nature, and the ramifications that the excess SWU capacity question has on the future of the market and industry.

We can identify three sources of enrichment demand. One is the normal demand by utilities to make fuel. The second is the production of blendstock for HEU. The third is the enrichment of tails to create equivalent feed, either directly or through underfeeding. Blendstock and tails stripping are similar because they both involve enriching tails, but are different due the final product as well as the motivations for enrichment. Thus, the SWU demand in the first instance is for enrichments of 4.5-5w/o, the second is to 1.5w/o, and the third is to 0.711w/o. The last two of these account for perhaps 8-10 million SWU worldwide.

The demand for SWU to create HEU blendstock and to enrich tails increases to the extent that tails assays used to feed the process decline. That is, the lower the tails assays, the more SWU it takes to produce an equivalent amount of blendstock or uranium output. A decrease from 0.30w/o to 0.29w/o in the assay of the feedstock requires almost a 5% increase in the amount of enrichment to produce the same amount of feed (with enrichment occurring at a final 0.15w/o tails assay). Also, USEC is now enriching high-assay tails that DOE has transferred to Energy Northwest (see story page 3), further increasing this type of demand for SWU.

There are strong indications that there is little or no surplus SWU capacity. Enrichment prices have been under upward pressure, and are likely to continue to be under upward pressure for some time. Moreover, in the recent WNFM meeting in Prague, Tenex's Alexander Pavlov stated that the perception that Russia had excess SWU capacity was wrong, and capacity was closely balanced with needs. Further, there are

The question of excess SWU capacity also may have some relevance to the Russian Suspension Agreement and the Sunset Review that is being conducted with respect to restrictions on the import of Russian uranium to the United States. There is essentially no uranium to export from Russia in any case, but as long as the HEU deal continues, there is likely little SWU to export either. The Suspension Agreement review has been linked by some to the current SWU trade case between USEC and the European enrichers.

In the SWU trade case, the Department of Justice has argued that a finding of SWU being a service and not a product would endanger the current HEU deal since it might allow Russia to contend that its commercial SWU should not be restricted. This, in turn, the argument goes, might lead Russia to favor selling commercial SWU over making blendstock for HEU and precipitate an early end to the HEU deal.

What would happen if the HEU deal ended? First, there could be a small reduction in SWU supply of perhaps one million SWU

To account for this additional SWU demand in a SWU supply/demand comparison, one must either add it to the demand side of the equation or subtract it from the supply side. In this respect, it is inappropriate to add the SWU content in EUP from HEU to total Russian SWU capacity, since a comparable amount of primary Russian capacity is devoted to making blendstock for HEU. Some industry analyses add HEU SWU (and SWU used to upgrade tails) to Russian nameplate capacity, when, in reality, it subtracts from the effective capacity or at best double counts. The SWU fairy is not going to magically supply the additional demand associated with blendstock production and tails enrichment.

Not only is total enrichment demand notably higher than what would be suggested by ordinary utility purchases, but the extra demand is increasing. The "normal" demand for enrichment increases to the extent that the demand for enriched product increases and to the extent that utilities opt for lower tails assays. Clearly, both of these things have been happening, which results in a compound growth in enrichment demand. Reactors are operating at higher capacities, some of which have been uprated, and utilities have opted for lower tails assays as the price of feed has jumped.

indications that enrichers are limiting the *downward* tails assay flexibility in new contracts, clearly an indication of a capacity constraint.

The lack of surplus SWU capacity has a number of implications for the market and industry going forward. First, this lack indicates that a moratorium on the construction of new SWU capacity, or even a temporary shutdown of existing plants, as suggested in some nonproliferation circles, makes no sense at all. The moratorium idea was based on the premise that there was sufficient excess capacity to eliminate motives for anyone building a new plant and to supply Iran and other potential new entrants to the SWU business from existing sources instead.

Related to this is the contention in various regulator proceedings involving LES and USEC that there is no need for new SWU capacity. There is clearly a need for substantial additional production.

Another implication is that the prospects for an accelerated HEU program are dim. With little or no capacity to produce additional blendstock, it now appears that it is the ability to create blendstock that would represent the likely physical limitation of any acceleration of the existing program.

The blendstock constraint is also relevant to the amount of HEU that is blended per year, since this is the difference between the SWU contained in blended-down HEU and the SWU required to make blendstock. But the larger effect is from the loss of about 6,000 tonnes per year of uranium from HEU. Such a loss would lead to a dramatic increase in uranium prices, which, in turn, would cause utilities to further reduce tails assay and increase demand for SWU. It is likely that neither the uranium nor SWU markets would "clear" under such circumstances.

Of course, the HEU deal also is of crucial importance from a nonproliferation standpoint, and thus more than the nuclear fuel market would suffer if it ended. Perhaps the best solution from the standpoint of future nuclear fuel supply (both enrichment and feed) as well as furthering nonproliferation goals is to make any Russian commercial SWU sales to the U.S. contingent on a continuation of HEU SWU sales in the current deal. Additional SWU is needed to support the future growth of nuclear power, including that on the part of countries which may be convinced to forgo building their own enrichment facilities if economic supplies are forthcoming from dependable sources. These supplies have to come from somewhere, and Russia is as good a source as any.

The relationship between enrichment and uranium is extremely complex and dynamic. But, this does not mean that it should be ignored when making

down in Russia after the current HEU deal ends. By the time the existing HEU deal ends in 2013, growing world demand for SWU, especially from China and India, seems likely to absorb the Russian capacity currently dedicated to making HEU blendstock. Once the current deal ends, it can be argued that Russia would rather make commercial sales (especially in connection with reactor sales) than use its SWU capacity to make blendstock for more HEU.

procurement and production decisions, and especially when making policy decisions, which in the end may be incredibly wrongheaded.