URANIUM

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The world uranium market suddenly became interesting once again in 2003, as prices rose appreciably for the first time since 1996. Nevertheless, producers continued to experience challenging times: exchange-rate movements offset much of the US dollar-denominated price rises, and historical contracts negotiated at old prices were still running through. World production fell very slightly again, to 35,844 t U from a revised figure of 36,063 t U in 2002. The 12% rebound experienced in 2000 after the nadir of only 31,000 t U in 1999 has yet to be repeated. The production cutbacks in 1997-1999 were motivated by low prices and led to the gradual termination of production in some countries. The rebound in 2000 (and to a lesser extent 2001) was concentrated in the two leading producers, Canada and Australia, and to a lesser extent in the Newly Independent States (NIS) of the former Soviet Union.

This pattern stalled somewhat in 2002 and 2003, as special factors caused production hiccups in both Australia and Canada. In Australia, there have been production problems at the Olympic Dam mine. In Canada, there has been the continuation of the gradual switch from the older mines to the new but also a loss of several months' production at McArthur River during 2003. The major success story during 2002/03 has been Kazakhstan, which is gradually increasing production from in situ leach (ISL) mines and becoming a major world producer.

As in recent years, primary uranium supply filled only about 55% of world reactor requirements during 2003.The balance was made up by secondary supplies, including an expected further reduction in uranium inventory levels throughout the world and by the recycling of both reprocessed spent reactor fuel and other fissile materials. These included a major contribution from former military materials and also from re-enriched depleted uranium stockpiles.

Uranium spot market prices rose sharply during 2003, starting the year at around US$10.00/lb and ending at US$14.50/lb. Most of the increase was concentrated in the second half of the year and, indeed, the upward price trend has carried on in the first months of 2004. The price increase is a little reminiscent of the trend during 1996, when prices peaked in mid-year at around US$16.50/lb. However, all signs are that the increase this time will be rather more permanent and not simply a short-term market reaction to a technical shortage of material, as happened in 1996.

Although the vast majority of uranium is traded under longer-term contracts, the spot market provides a guide to the material traded at the margin and is also an influence on these contract terms themselves. Prices quoted by the

year-end were at last sufficient to cover the marginal operating costs of most mines and could provide a necessary stimulus to production increases.

Although supply disruptions from some mines can partly explain the price increases, the real reason is more fundamental. There remains uncertainty surrounding the timing and magnitude of secondary supplies on the commercial market, which are needed every year to fill the balance between supply and demand. These have been overhanging the market for years, notably the uranium component of the blended down highly enriched uranium (HEU) sold by Russia to the US. This has been marketed prudently following the agreement in early 1999 between the Russians and three Western companies. The balance has been largely made up by a run-down of inventories from sources such as the US Enrichment Corp (USEC), some Japanese utilities running down their inventories and from re-enriched depleted uranium. However, it now appears that the notion that fuel supply will be freely available into the medium term has ended. This position has been long-anticipated by those in the market, but its sudden arrival is always surprising and it will take some time for people to react.

With the abolition of restrictions on most supply from the NIS into the US market (now only remaining for Russian origin uranium), the gap between spot prices quoted for supply from this source and from elsewhere in the world has narrowed to the extent that market-makers no longer quote a separate price. In the European Union (EU), the Euratom Supply Agency (ESA) maintains a policy of aiming to restrict supply from this source to 25% of demand. Producers in the CIS continue to export all their production, while Russia is believed to have substantial inventories of fissile material of various types to fuel domestic and captive customers up to perhaps 2010.

The conclusion everybody is making is that new investments in uranium production facilities are likely be needed in the near future, and that prices must remain at levels sufficient to provide an incentive for producers to do this.

Australia

Total Australian production rose by 10% in 2003 after the temporary setback in 2002, following the strong upward trend apparent since 1994 (also temporarily reversed in 1998). Total production of 7,596 t U represented over a fifth of world production in 2002. ERA's production at Ranger was sharply higher again in 2003 at 4,295 t U, very much in line with the rated capacity. Plans to develop the Jabiluka orebody, 20 km from the existing Ranger mill, remain on hold and depend on agreement being achieved with the local people. Production can continue from the existing Ranger orebody until 2011/12. Uranium output at WMC's Olympic Dam copper/uranium mine rose slightly in 2003 to 2,693 t U. Substantial investments have been made in the mine, amounting to A$500 million, and this is allowing production to return to the 4,000 t/y U level. The Beverley ISL mine in Southern Australia, owned by Heathgate Resources (a General Atomics subsidiary), recorded its third years' production in 2002 of 608 t U, rather below its rated capacity of 850 t/y U. The Honeymoon ISL project may enter production in the near future.

Canada

Canada's uranium output fell again by 10% in 2003 to 10,457 t U, but it easily retained its place as the leading world producer, accounting for 29% of the total. These dips in production are mainly due to the continuation of the period of transition as it moves towards the new higher-grade mines. The cessation of production at the end of 2002 at Cluff Lake explains most of the lower Canadian production in 2003 – however there was residual production from Cluff Lake of 27 t U. A mine flood at McArthur River also had an impact. Output at McArthur fell to 5,831 t U, with the mill (now adapted to take the higher grade McArthur ore) short of feed during the supply- disruption period. Rabbit Lake production rose sharply to compensate, to 2,281 t U after the mill restarted in late 2002. McClean Lake produced at a similar level of 2,318 t U during 2003, with some uncertainties persisting about its operating licence. Development of the Cigar Lake project remains on hold, with the start-up date dependent on an improvement in market conditions.

Europe

French uranium production has now effectively terminated with the exhaustion of economic reserves. German production was also solely associated with the decommissioning and environmental clean-up of mining operations belonging to Wismut, in the former East Germany, which ceased production in the early 1990s after being a major world producer in the 1950s-1980s. Mining operations in Spain also terminated at the end of 2000 and residual production is from clean-up activities. DIAMO in the Czech Republic is now the only substantial European producer, but is itself planning to phase out uranium production gradually. Nevertheless, it still produced 345 t U in 2003, but well down on the previous year.

Africa

Overall production was down by 5% in 2003, with only Niger's output higher than in 2002. Niger's production from Akouta and Arlit was 2% higher at 3,150 t U, again exceeding 3,000 t U. There is some potential for expanding production here if market conditions justify it. South African production, on the other hand, was 8% lower again at 758 t U. All output is now from AngloGold as Palabora has ended uranium production following the closure of the heavy minerals recovery plant. Production at the Rossing mine in Namibia fell substantially in 2003, by 13% to 2,036 t U. The plant was idle in the first quarter owing to installation of new equipment. However, the operation is losing a lot of money owing primarily to the rise of the Namibian dollar against the US dollar, in which uranium prices are denominated. There is now some doubt as to whether production will continue after 2006, when Phase 2 mining has previously been anticipated.

United States

Production fell yet again in 2002 for the seventh year in succession, by 7% to only 857 t U, again below 1,000 t U. Annual US uranium requirements are for over 20,000 t U, so there is a substantial trade deficit. ISL production accounted for all of the total, with Cameco's Power Resources Inc the only producer. Acquisition of the Smith Ranch ISL mine in 2002 led to the rationalisation of the Highland and Smith Ranch projects, with all processing

from the two areas now at Smith Ranch. Production from both there and Crow Butte was slightly up on 2002. The previous production from reclamation projects has gradually ceased. A revival of other ISL production and by-product output in US (and indeed from any conventional mills) is dependent on the continuation of improved market conditions.

Other countries

There was only minor production from Argentina in 2003, and in India and Pakistan output is believed to have remained virtually constant. It is now believed that Chinese production has been rising slowly, after the start up of ISL operations, with production of 750 t U in 2002. Each of these countries can be termed 'captive producers' in that they produce for domestic reactor requirements only. Their reserves tend to be low grade, making widespread commercial exploitation unlikely in foreseeable market environments. Brazil recommenced production in 2000 and has recovered from the setback in 2001 when licensing problems restricted output. Production rose to 310 t U in 2003 and is expected to rise further in future to utilise full mine capacity.

NIS

Overall uranium production has continued to rise after the low point reached in 1997. This followed a long decline, apparent from the early 1990s. Poor economic conditions in these countries have continued adversely to affect uranium mining but the rise in the Western market price is an incentive to expand production. Output in both Kazakhstan and Russia rose sharply in 2003, both stemming from successful ISL operations (in the case of Russia, this was only the second year of production from ISL). Kazakhstan and Uzbekistan have the best links with Western partners with the former having two joint venture ISL mines with Western companies just starting up in the production stage. Most recently, Canadian-based Cameco Corp, the world's largest uranium producer, announced that it will develop the Inkai deposit in Kazakhstan using ISL technology, in joint venture with the National Atomic Co of Kazakhstan. In both Kazakhstan and Uzbekistan, conventional mines have closed and production is now entirely dependent on ISL.

Outlook

The market outlook is for a slow rise in world production, led by Canada and Australia and, to a lesser degree, by Kazakhstan and Russia within the NIS. The trend for supply to become concentrated in a few large low-cost mines in a limited number of countries is likely to continue. Some of the smaller projects, which have been mentioned over the past few years, may now find it easier to compete now uranium prices have risen. Delays to approval for the major projects may provide a further opportunity for these, as would any interruption in the expected supply of blended-down HEU. There remains some uncertainty surrounding future NIS production levels. In terms of reserve availability, they are in a good position to expand output and production may become increasingly necessary in order to feed domestic reactors (rather than solely for export). The problem remains one of securing sufficient funds for the significant capital investments required

Exploration

Programmes have remained at very modest levels. As surveys of uranium reserves identify well-established deposits totaling over 3 Mt U, equivalent to almost 100 years' production at the recent level, the incentive has remained poor. The focus has been directed at identifying deposits amenable to low-cost production, either through their high grade or through their suitability for ISL technology. The search for high grades has continued in Canada (Saskatchewan and the Northern Territories) and in Australia, where previous successes have been achieved. Sandstone deposits suitable for ISL have been sought in the US, the NIS, Mongolia, India and China.

Demand

At the end of 2003, there were 439 nuclear reactors in operation throughout the world with a combined capacity of 360 GWe. An increasingly important factor is rises in generating capacity of existing reactors via upgrades, as opposed to new reactor start-ups. There were also 35 reactors throughout the world either under construction or temporarily suspended from operation at the end of 2003, with combined capacity of 28 GWe. These can be expected to come into operation over the next ten years, to be partly offset by closures of some older (and usually smaller) reactors.

Although nuclear generating capacity is an important indicator of demand for uranium, the operating characteristics of reactors are also crucial and are sometimes ignored by commentators. The almost universal recent experience has been for higher reactor load factors to be achieved, which pushes up uranium demand. This was particularly so in 2003 – despite only a slow increase in nuclear generating capacity, nuclear production has maintained its share of world electricity at approximately 17% throughout the 1990s into the new century. There are also other important factors to consider, including fuel burn ups and enrichment levels, plus the length of reactor operating cycles. The annual current world reactor requirement is for around 66,000 t U and this is expected to grow slowly over the longer term by around 1% per annum.

Table following page:

World uranium production (t U)				
				% Change
	2001	2002	2003	2002/03
Argentina	0	0	20	0
Australia	7,756	6,854	7,596	10
Brazil	58	270	310	15
Canada	12,520	11,604	10,457	-10
China*	655	730	750	3
Czech Republic	456	465	345	-26
France	195	20	0	0
Germany	27	212	150	-29
India*	230	230	230	0
Kazakhstan	2,050	2,800	3,300	18
Namibia	2,239	2,333	2,036	-13
Niger	2,920	3,075	3,150	2
Pakistan*	46	38	45	18
Portugal	3	2	0	0
Romania*	85	90	90	0
Russia*	2,500	2,900	3,150	9
South Africa	873	824	758	-8
Spain	30	37	30	-19
Ukraine*	750	800	800	0
US	1,011	919	857	-7
Uzbekistan	1,962	1,860	1,770	-5
Total	**36,366**	**36,063**	**35,844**	**-1**

* WNA estimate