

URANIUM

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The tough times for world uranium producers continued during 2001, despite some upward price movements in the latter half of the year. The fundamental picture in the market of excess supply continued to predominate. Nevertheless, world production rose by 2% to 35,499 t, following on the 12% rebound in 2000 from the nadir of only 31,000 t in 1999. 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 was concentrated in the two leading producing countries Canada and Australia, but to a lesser extent in the former Soviet Union (FSU). This pattern was reinforced during 2001, with a 17% increase in Canadian production and a 2% rise in Australia. In Canada, the new mines at McArthur River and McLean Lake moved up towards full capacity while in Australia, the new Beverley in situ leach (ISL) mine made its first contribution. Major producers now seem to have succeeded in bringing their inventories under control, while moving production to new and more modern mining facilities

Despite the further limited improvement in world production in 2001, primary supply filled only 55% of world reactor requirements during the year. 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 moved up slowly during 2001, but this was not a full recovery as they still ended the year at levels below the marginal operating costs of many mines. However, at least this marked a reversal of the downward trend which began in the second

half of 1996, after prices had peaked in mid-year at around US\$16.50/lb for Western supply. Prices which started 2001 at around US\$7/lb, rose to above US\$9.50 by the year end, which brought them back to the level of early 2000. 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.

The major influence on the market continued to be the uncertainty surrounding the timing and magnitude of secondary supplies on the commercial market. This includes the uranium component of the blended down highly enriched uranium (HEU) sold by Russia to the US. Despite the agreement in early 1999 between the Russians and three Western companies concerning the prudent marketing of this, the magnitude of this supply source continues to overhang the market. In addition, supply from US Enrichment Corp. (USEC), having been granted high uranium inventories as part of its privatisation, and from re-enriched depleted uranium, kept up the notion that supply should be freely available into the medium term. Uranium producers took advantage of the weak market conditions further to prune their inventories, with the World Nuclear Association's 2001 survey of producers revealing that these had been pruned substantially since 1998.

With the abolition of restrictions on most supply from the Commonwealth of Independent States (CIS) in 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 narrowed to the extent that market makers stopped quoting 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 to fuel domestic and captive customers up to perhaps 2010. However, new investments in uranium production facilities will likely be needed by then if these countries are to remain substantial exporters to the West.

Australia

Total Australian production rose slightly in 2001, following the strong upward trend apparent since 1994 (only temporarily reversed in 1998). Total production of 7,720 t represented over a fifth of world production in 2001. ERA's production at Ranger was slightly lower than in 2001 at 3,564 t, below the rated capacity of 4 230 t/y. ERA's parent company Rio Tinto has decided to retain its ownership, acquired when it bought North in 2000, but it has been announced that plans to develop the Jabiluka orebody, 20 km from the existing Ranger mill, have been put on hold. Uranium output at WMC's Olympic Dam copper/uranium mine also fell slightly in 2001 to 3,693 t. After being well ahead in the first three quarters, a fire at the solvent extraction plant substantially curtailed output in the final quarter. The Beverley ISL mine in Southern Australia, owned by Heathgate Resources (a General Atomics subsidiary), recorded its first year's production in 2001 of 463 t, well below stated capacity of 850 t/y. The Honeymoon ISL project may enter production in late 2002 or early 2003.

Canada

Canada's uranium output rose by a further 17% in 2001 to 12,520 t, and it easily retained its place as the leading world producer, accounting for 35% of the total. The notable dip in production which occurred in 1999 was merely a period of transition as it moved towards the new higher grade mines. Key Lake/McArthur River output rose substantially to 6,900 t, with the mill (now adapted to take the higher-grade McArthur ore) achieving its rated capacity throughout the year. Rabbit Lake production fell by 1,000

t to 1,800 t. Cluff Lake continued in operation throughout 2001 with production of 1,300 t, but will cease production at the end of 2002. McClean Lake produced at a higher level of 2,500 t during 2001, with an improved mill circuit increasing capacity. Development of the Cigar Lake project remains on hold, with the start-up date dependent on an improvement in market conditions.

Europe

French production continued to fall in 2000, down to 124 t. Remaining reserves had become exhausted, so production was terminated during the year. German production was 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. Production in Spain fell sharply to only 30 t, with mining operations terminated at the end of 2000. DIAMO in the Czech Republic is gradually phasing out uranium production, but still produced 330 t in 2000, while Hungarian output from decommissioning work has ended.

Africa

Overall production was down on 2000, even though figures were higher in two of the three producing countries, Niger and South Africa. Niger's production from Akouta and Arlit was 7% higher at 3,096 t. South Africa was 2% up at 898 t, with an improvement at AngloGold more than offsetting the halving of output at Palabora, owing to closure of the heavy minerals recovery plant. The Rossing mine in Namibia experienced an 18% production reduction from 2000 at 2,239 t, owing to a maintenance shutdown in the second quarter and a labour strike, soon settled, in the third quarter.

US

Production fell again in 2001 for the fourth year in succession to only 1,000 t, the lowest level for several decades. ISL production accounted for over 90% of the total. Cameco's Highland and Crow Butte operations suffered output declines, while Rio Algom's Smith

Ranch facility operated at a similar level to 2000. The only other production came from Cotter's Canon City mill, which produced from stockpiled Schwartzwalder ore and from Rio Algom's Ambrosia Lake mine water recovery operation. US production will soon be totally dependent on the three ISL operations, with a revival of any conventional mills dependent on improved market conditions.

Other Countries

There was no production in Argentina during 2001 while it is believed to have remained constant in each of China, India and Pakistan. Each of these 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 but suffered a setback in 2001 when licensing problems restricted output to 30 t. It is hoped that with these overcome, production may be over 300 t in 2002 and rise further thereafter.

CIS

Overall uranium production has continued to rise slowly after the low point reached in 1997. This followed a long decline, apparent from the early 1990s. The poor economic conditions in these countries have continued adversely to affect uranium mining, as has the very competitive market in the West. Output in both Kazakhstan and Uzbekistan was slightly ahead of 2000. These countries have the best successful links with Western partners, with Kazakhstan having two joint venture ISL mines with Western partners approaching the production stage. In both countries, conventional mines have closed and they are now dependent on ISL technology. Russia is investigating the practicality of applying ISL mining, but currently remains dependent on the one conventional mine at Krasnokamensk.

Outlook

The market outlook is for a further slow rise in world production, led by Canada and Australia and, to a lesser degree, by the CIS.

Nevertheless, despite the run-down of inventories by Western utilities, secondary supply from ex-military materials is likely to prevent a strong boom. The trend for supply to become concentrated in a few large low-cost mines in a limited number of countries is likely to continue, with some of the smaller projects which have been mentioned over the past few years finding it hard to compete on cost grounds. Delays to approval for the major projects may, however, provide an opportunity for these, as would any interruption in the expected supply of blended-down HEU. There remains considerable uncertainty surrounding future CIS 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 is 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, 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 in Australia, where previous successes have been achieved. Sandstone deposits suitable for ISL have been sought in the US, the CIS, Mongolia, India and China.

Demand

At the end of 2000, there were 438 nuclear reactors in operation throughout the world with a combined capacity of 350 GWe. This was two more than at the end of 2000 and represents an increase of 2 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 36 reactors throughout the world either under construction or

temporarily suspended from operation at the end of 2000, with combined capacity of 30 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 2001 - despite only a slow increase in nuclear generating capacity, nuclear production has maintained its share of world electricity at approximately 17% throughout the 1990s. 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 64,000 t and this is expected to grow slowly over the longer term by up to 1% per annum.

WORLD URANIUM PRODUCTION (t)

	1999	2000	2001	00-01%
Argentina	28	0	0	0
Australia	5,979	7,578	7,720	2
Brazil	0	50	30	-40
Canada	8,214	10,682	12,520	17
China*	500	500	500	0
Czech Republic	612	500	330	-34
France	439	319	124	-61
Gabon	294	0	0	0
Germany	32	28	20	-29
Hungary	10	10	0	0
India*	200	200	200	0
Kazakhstan	1,390	1,740	1,750	1
Namibia	2,689	2,714	2,239	-18
Niger	2,918	2,895	3,096	7
Pakistan*	23	23	23	0
Portugal	10	10	4	-60
Romania*	100	50	115	130
Russia*	2,000	2,000	2,000	0
South Africa	981	878	898	2
Spain	255	251	30	-88
Ukraine*	500	500	500	0
US	1,807	1,456	1,000	-31
Uzbekistan	2,130	2,350	2,400	2
Total	31,111	34,734	35,499	2

* WNA estimate