Uranium

Robert T. Whillans

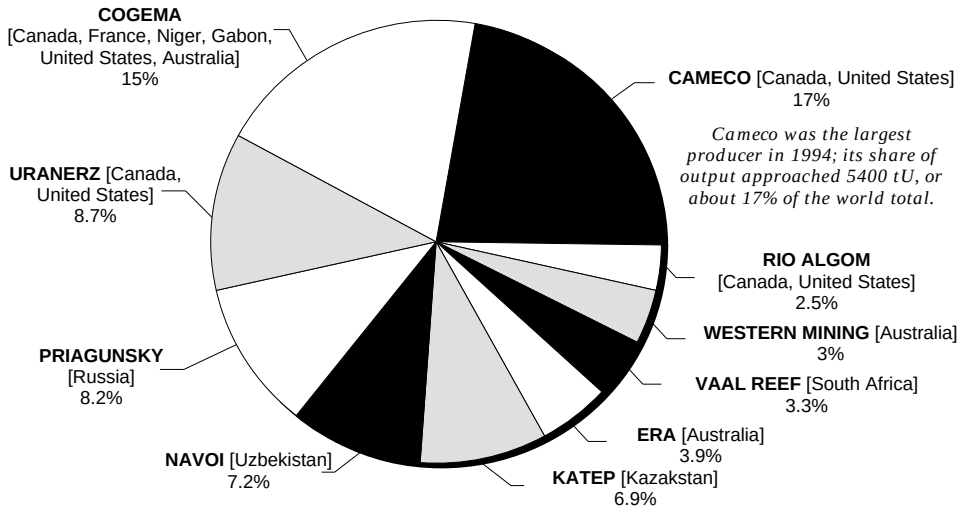
The author is with the Energy Sector, Natural Resources Canada.
Telephone: (613) 996-2599

OVERVIEW

World uranium prices recovered markedly during 1995 as effective limits on the flow of uranium products from the republics of the former Soviet Union (FSU) into the important U.S. market finally began to take shape. The financial collapse of several companies in the NUEXCO[1] organization, one of the world's major nuclear fuel traders, disrupted deliveries and led to defaults in supply commitments. Competition in the supply of uranium from the FSU declined and Minatom, the Russian Federation Ministry of Atomic Power, began to exhibit restraint in its marketing efforts. At the same time, global uranium production was just over half of global consumption, and Western inventories declined further. These developments have fuelled perceptions that uranium supply has declined to dangerously low levels and focused attention on the need for new production centres. Uranium supply from the FSU and from surplus military material in both the FSU and the United States is now necessary in the short term to keep civilian power reactors operating until new production sources receive environmental approval and can be brought on stream.*

* John C. French, Advisor, Uranium Markets (tel.: (613) 995-7474), made a significant contribution to this chapter in those sections dealing with international uranium market developments and uranium prices.

Figure 1
World's Top Ten Uranium Mining Companies in 1994



These 10 companies accounted for 75% of 1994 world production, which totalled some 31 000 tU.

Source: Uranium Institute, 1995.
Note: Ranking reflects equity interest in production facilities, not market share.

Canada's uranium industry enjoyed another good year in 1995 as producers again negotiated major new sales contracts. As the leading uranium supplier, Canada hosts four of the world's top ten uranium-producing companies, which derive all or a sizeable portion of their uranium in Canada (Figure 1). The March 1995 announcement that construction of the C$250 million McClean Lake uranium project will proceed has enhanced Canada's competitive position in the global uranium market. When the McClean mill starts up in 1997, it will be the first new production facility to come on stream since the Key Lake operation began production in 1982. In addition, the environmental impact statements for the Midwest Joint Venture, Cigar Lake and McArthur River projects were completed and submitted to the Joint Federal-Provincial Environmental Assessment Panel on Uranium Mining Development in Northern Saskatchewan (Joint Panel) by the end of the year. The environmental reviews of these uranium mining proposals are expected to begin early in 1996.

Following the near-record sales of 1994, Canada's uranium marketers signed new export contracts in 1995 for the delivery of some 20 500 tonnes of uranium (tU). Sales in 1994/95 alone exceeded the sales of the previous five years combined. The average price of 1995 deliveries under all export contracts was C$47/kgU, a slight decrease from the 1994 price of C$51/kgU. The decline reflects the expiration, at the end of 1994, of several major export contracts signed in the early 1980s when uranium prices were considerably higher than they have been in recent years.

DOMESTIC PRODUCTION AND DEVELOPMENTS

Greater output at Canada's four uranium-producing operations in 1995 increased primary uranium production estimates to almost 10 450 tU (Table 1). In terms of output value, uranium ranks sixth among Canada's top ten metal commodities. As well, employment at Canadian uranium mining operations increased slightly in 1995, as work continues at several new mining projects in Saskatchewan in preparation for production. Table 2 indicates that preliminary estimates of 1995 mine shipments, under all domestic and export contracts, decreased in tonnage and value. Table 3 highlights the main operational characteristics of the existing uranium production centres in Saskatchewan and Ontario in 1994, the most recent year for which complete data are available. Figure 2 locates Canada's producing uranium mines and major deposits, while Figure 3 illustrates domestic uranium production by project and owner for 1994. Table 5 provides an update on the new projects that will form the basis of Canadian production capability well into the future.

Elliot Lake, Ontario

Production levels were maintained at Rio Algom Limited's Stanleigh operation under a contract with Ontario Hydro, which calls for uranium purchases until 1996. In June 1995, Rio Algom announced that, as planned, its Stanleigh operation will close on June 30, 1996, and be decommissioned.

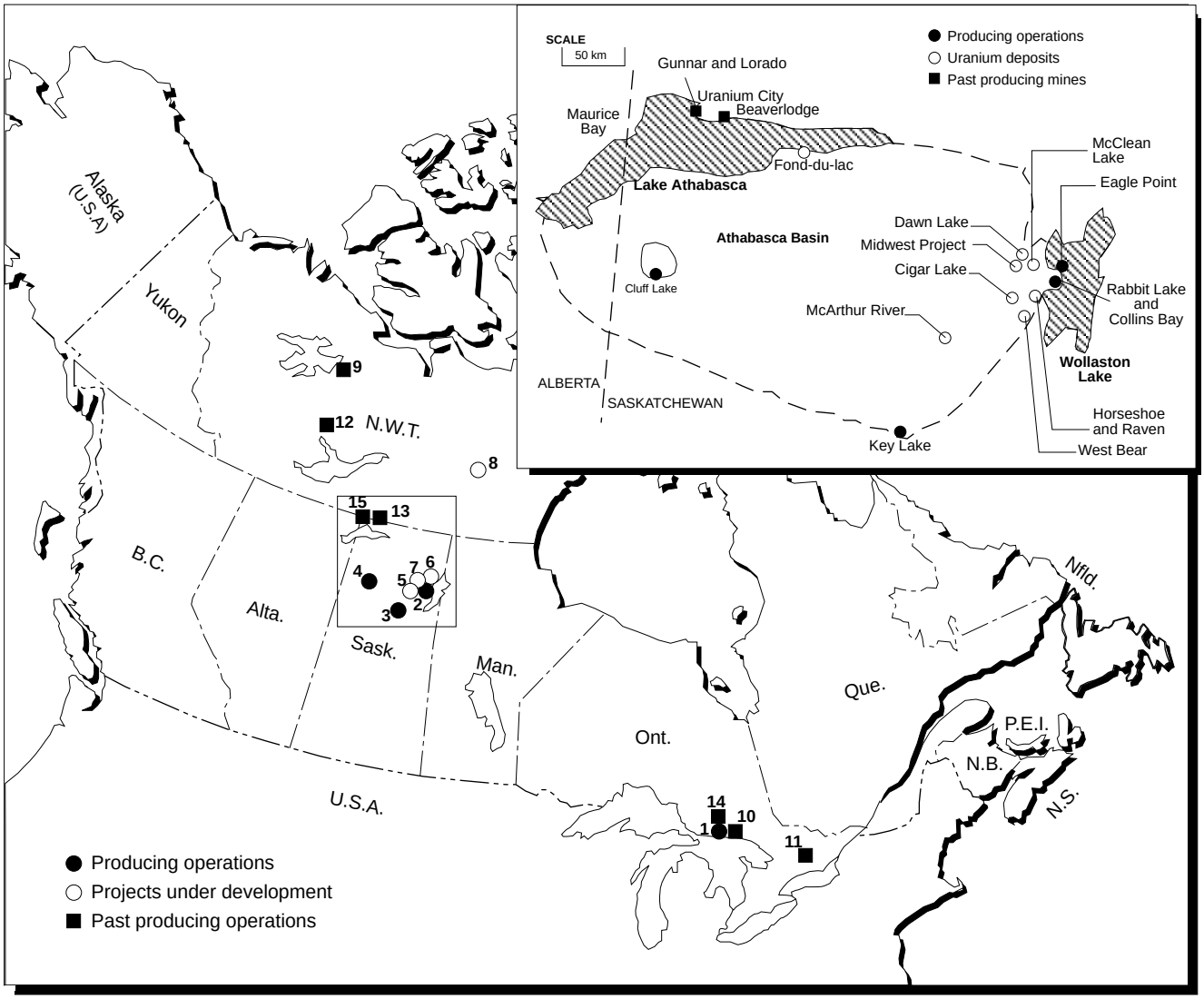
In 1992, proposals submitted by Rio Algom and Denison Mines Limited for decommissioning several tailings sites at Elliot Lake were referred by the Atomic Energy Control Board (AECB) for public review under the federal Environmental Assessment and Review Process (EARP). With Terms of Reference proposed, a three-member Elliot Lake Environmental Assessment Panel was established and guidelines were drafted for the preparation of Environmental Impact Statements (EIS). Public scoping sessions began in 1993, final EIS guidelines were issued in 1994, and the proponents' EIS submissions were received early in 1995. Public hearings commenced on November 14, 1995, and were concluded in late January 1996. If the panel completes its review early in 1996, the federal government is expected to be able to respond to the panel's recommendations by mid-year.

Athabasca Basin, Saskatchewan

Saskatchewan's longest-lived uranium production facility, at Rabbit Lake, is operated by Cameco Corporation in partnership with Uranerz Exploration and Mining Limited. While the original Rabbit Lake pit was mined out in 1984 and the Collins Bay "B" zone was subsequently depleted in 1991, milling operations continued based on stockpiled Eagle Point pre-production and test-mine ores. Full-scale production at the Eagle Point mine commenced following receipt of an operating licence from the AECB on June 29, 1994. The next development is to isolate the Collins Bay "A" and "D" orebodies, which are located under the waters of Collins Bay. Having previously received authorization to construct steel-cell cofferdams in Collins Bay, Cameco started work on the "D" zone dike in late 1994, completed construction in March 1995, and began stripping the overburden by year-end. The Rabbit Lake facility operating licence was amended by the AECB on September 15, 1995, permitting Cameco to develop and mine, by open-pit methods, these two Collins Bay orebodies. Construction of the "A" zone dike began in August 1995, and should be completed in March 1996 to allow mining in the winter of 1996/97. The Rabbit Lake mill is licensed by the AECB to produce 5400 tU/y should market conditions warrant bringing output beyond current levels later this decade. Ore from Collins Bay "A" and "D" is sufficient to provide feed to the Rabbit Lake mill for about two years; together with ore from Eagle Point, the mill can operate beyond the year 2000.

Figure 2

Uranium Mining in Canada, 1995



Numbers refer to locations on map above.

PRODUCING OPERATIONS

1. Stanleigh – Elliot Lake
2. Rabbit Lake (incl. Eagle Point and Collins Bay)
3. Key Lake
4. Cluff Lake

PROJECTS UNDER DEVELOPMENT

5. McArthur River
6. Midwest/McClean
7. Cigar Lake
8. Kiggavik

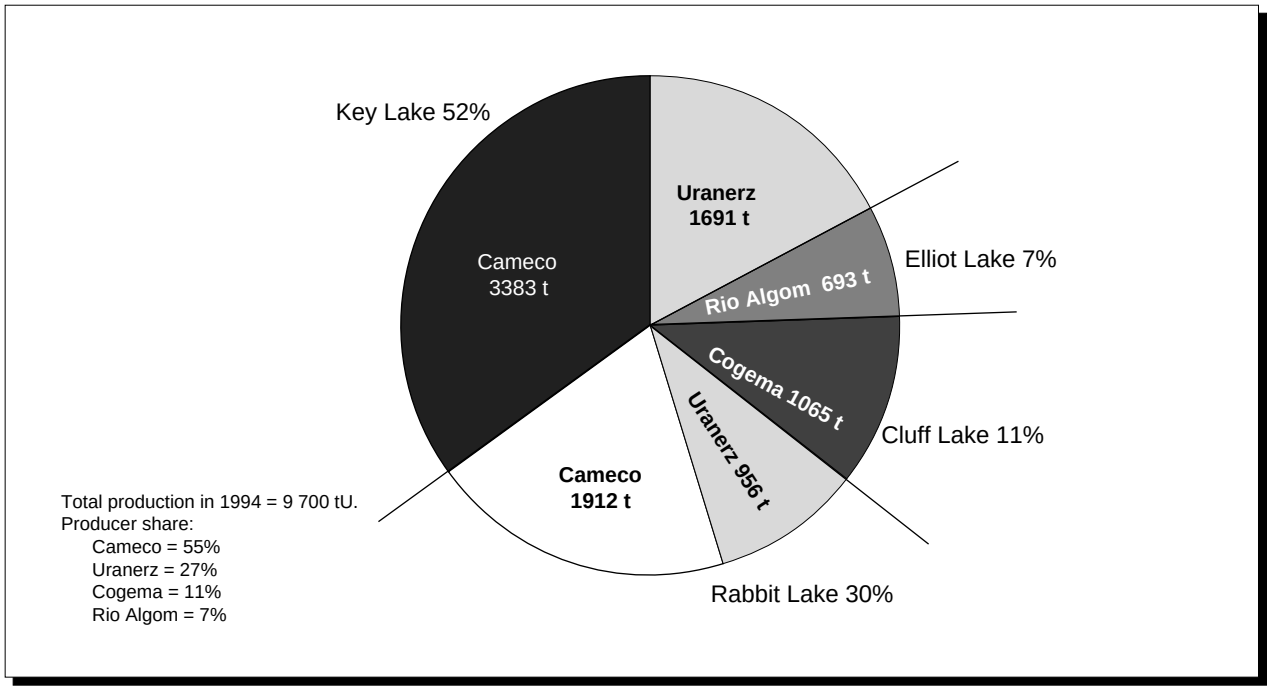
PAST PRODUCING DEVELOPMENT

9. Port Radium
10. Agnew Lake
11. Madawaska et al (Bancroft)
12. Rayrock (Marian River)
13. Beaverlodge et al
14. Quirke/Panel/Denison et al (Elliot Lake)
15. Gunnar and Lorado et al

Source: Uranium and Nuclear Energy Branch, Natural Resources Canada.

Saskatchewan's Key Lake production facility, also operated by Cameco in partnership with Uranerz, is currently the world's highest-grade uranium mine. Having mined out the Gaertner deposit in 1987, and expecting to deplete the larger Deilmann deposit during 1996, the partners will cease mining operations at Key Lake. However, depending on the throughput rate, Key Lake could produce uranium until 2000 by processing the remaining stockpiled Deilmann ore. Given the necessary environmental and regulatory approvals, the McArthur River project is expected to provide feed for the Key Lake mill, some 80 km to the south, thereby doubling its useful life. Currently, the mill is licensed by the AECB to produce 5700 tU/y.

Figure 3
Canadian Uranium Production and Ownership, 1994



Source: Uranium and Nuclear Energy Branch, Natural Resources Canada.

However, in a major announcement revising ore reserve estimates at McArthur River in November 1995, Cameco noted that operations at Key Lake would be based on an annual milling rate of 6900 tU when McArthur River ore is processed. Geological resources at McArthur River have been revised upwards to 160 000 tU at an average grade of 13% U; this total contains mineable reserves of 73 000 tU at an average grade of 16% U.

In mid-May 1995, Saskatchewan's Environment and Resource Management Department and the AECB both announced approval for Cameco's proposal to use the mined-out Deilmann open pit at Key Lake as a tailings management facility. Initially accepting tailings from the remaining Deilmann ore, the site is also expected to accept tailings from the McArthur River ore. Regulatory approval also permits the construction of a new system to deliver tailings to the depleted Deilmann pit. It is expected that Cameco will use the "pervious surround" disposal method at Deilmann, the same technique successfully employed at the Rabbit Lake pit to minimize environmental impacts.

At the Cluff Lake production facility, located in the western Athabasca Basin and owned by Cogema Resources Inc., several deposits have been developed over the life of this operation. During 1995, full-scale open-pit production was reached at the Dominique-Janine Extension, the most recent development. Output from this pit and the Dominique-Peter and Dominique-Janine underground mines will extend operations beyond the year 2000. The Cluff Lake mill, licensed by the AECB to produce up to 1500 tU/y should market opportunities warrant, began continuous operations on October 3, 1995, after having operated for years on an alternating one-week-on/one-week-off basis.

On March 16, 1995, Cogema announced the finalization of financing arrangements to formally proceed with its C$250 million McClean Lake project (see below). Site construction began in April 1995, the water treatment plant is scheduled to start up in January 1996, and first production from the McClean mill is expected in the second half of 1997. The McClean Lake project will be the first new mining/milling operation in Canada since Key Lake began production in 1982.

Additional Production Possibilities

Beyond the existing production centres, and the recent extensions or expansions to them, there are still a number of new uranium mining projects that remain to be brought on stream over the next several years, given timely environmental and regulatory approvals. The summary outlined in Table 5 provides an update on recent and pending uranium developments, as of December 1995, that will form the basis of uranium production capability in Canada well into the future, and indicates the status of the environmental review process for each of these new production centres.

Saskatchewan Environmental Assessment and Review Panels

Background

In 1991, six uranium projects were referred to the Minister of the Environment pursuant to the federal Environmental Assessment and Review Process (EARP) Guidelines Order. A joint federal-provincial panel reported on three projects in October 1993, namely the Dominique-Janine Extension (DJX) at Cluff Lake, the McClean Lake project, and the Midwest Joint Venture project. The federal and provincial governments responded to the recommendations of the Joint Panel in December 1993. Essentially, both governments stated that the Cluff Lake and McClean Lake projects should proceed, subject to the phased AECB licensing process, but that the Midwest project should not be approved as then designed. A second panel, representing only the federal government, reported on the Eagle Point/Collins Bay Expansion at Rabbit Lake in December 1993. The federal government responded to the recommendations of this federal-only panel in March 1994, also stating that this project should proceed subject to the AECB licensing process.

Update

Significant progress was made at the Saskatchewan uranium mining projects that have successfully cleared the public environmental assessment and review process, i.e., the Cluff Lake DJX, the Rabbit Lake Expansion, and the McClean Lake project. Uranium production has begun at Eagle Point and DJX, and construction is well under way at McClean; stripping of the JEB pit area began there in October in anticipation of first mill production in 1997. As well, Environmental Impact Statements (EIS) were finalized during 1995 for the three remaining projects, namely, Midwest, Cigar Lake and McArthur River, permitting the public environmental reviews to proceed (Table 5). On December 12, 1995, governments announced that C$75 000 in funding would be made available to assist the public in participating in the Joint Panel reviews of these remaining three projects.

With regard to these remaining projects, the Midwest project has been redesigned by Cogema, the new operator, after taking into account all of the concerns cited by the Joint Panel during the project's initial review; Cogema submitted its revised EIS on August 31, 1995. With the Cigar Lake project held on a care-and-maintenance basis, Cigar Lake Mining Corporation completed its EIS for submission on October 4, 1995. At the McArthur River project, Cameco, the majority owner and operator, completed underground exploration during 1995 aimed at obtaining the information necessary to complete an EIS and project feasibility studies. Although technical difficulties delayed completion of this work, Cameco submitted its EIS to the Joint Panel on December 11, 1995. Grading ten times the world average, the McArthur River ore is to be processed at Key Lake and would extend operations there beyond the year 2015. The Joint Panel is expected to begin its review of these three projects in early 1996 after EIS documents are examined and any deficiencies outlined by the Joint Panel are addressed by the proponents.

Major Development

In early September 1995, an agreement in principle was announced whereby the capacity of the McClean Lake mill would be expanded from 6 million lb to 24 million lb of U_3O_8 per year (9230 tU/y) to permit the processing of ore from the Cigar Lake project. This decision assumes that Cigar Lake will receive regulatory approval and that the owners will decide to proceed to production. The milling facility would be a joint venture owned by the Cigar Lake and McClean Lake partners. It would benefit from economies of scale and such innovations as paste tailings and subaqueous tailings deposition. The very high grade of the Cigar Lake ore means that the McClean mill would have the largest output capability of any uranium-processing facility ever constructed in the world.

Cameco Privatization

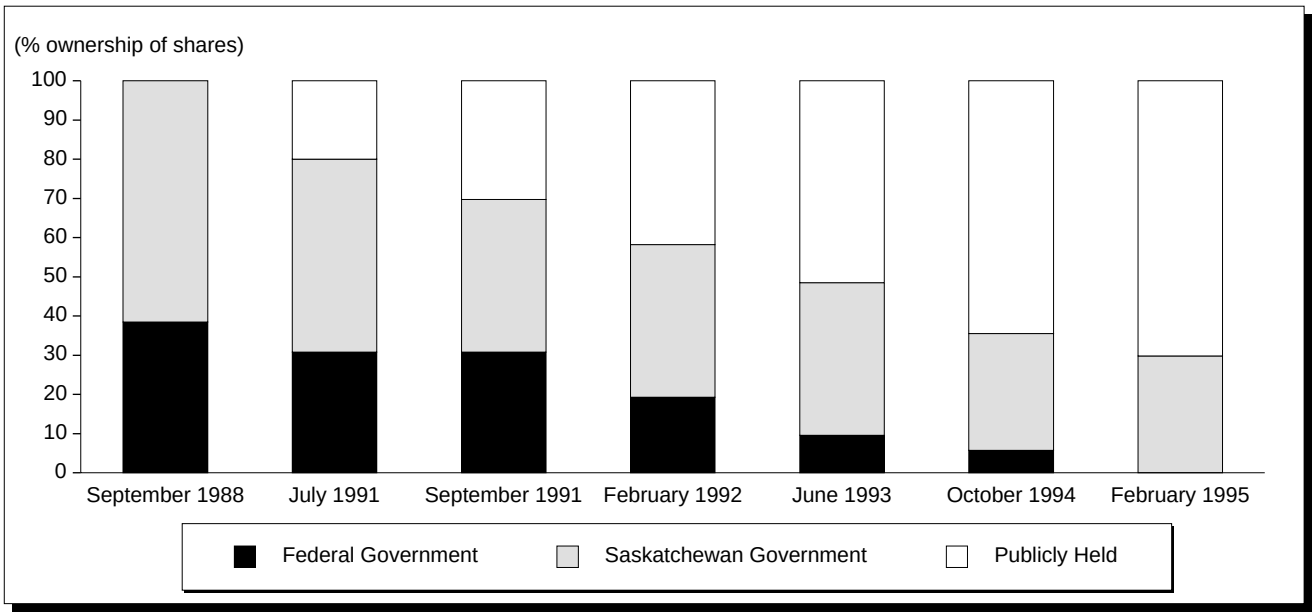
On January 18, 1995, Cameco announced that the Government of Canada would sell its remaining common shares of Cameco, subject to regulatory approval. The public was offered 3 million shares for C$30.75 each, with a closing date on or about February 9, 1995. This final federal offering has resulted in Cameco's ownership being held roughly 70% by the public and 30% by the Government of Saskatchewan. Figure 4 highlights Cameco's privatization milestones to date.

EXPLORATION

In 1995, Natural Resources Canada (NRCan) completed its twenty-first annual assessment of Canada's uranium supply capabilities and an associated survey of uranium exploration activity. The results were reported[2] in the fourth quarter of the year.

Uranium exploration activity remains concentrated in areas favourable for the occurrence of deposits associated with Proterozoic unconformities, most notably in the Athabasca Basin of Saskatchewan and the Thelon Basin in the Northwest Territories. Exploration expenditures in 1994/95 of some C$36 million approached the C$40 million spent in 1993/94. In recent years, most of these expenditures reported by NRCan have been attributable to the advanced underground exploration and deposit appraisal activities associated with the Cigar Lake, McArthur River and Eagle Point deposits, all in northeastern Saskatchewan. As grass-roots exploration

Figure 4
Milestones in the Privatization of Cameco Corporation



Source: Cameco Corporation.

expenditures are unlikely to offset spending declines at the developed properties, overall uranium exploration expenditures will likely decrease. The Saskatchewan government estimated that grassroots uranium exploration in the province reached C$11 million in 1995, the same as was reported for 1994.

During the 1994/95 field season, uranium exploration and surface development drilling reached 67 000 m, a modest increase from the 62 000 m reported for 1993/94.

The number of companies actively exploring for uranium in Canada has stabilized at about 20. Of the more than 50 exploration projects that remained in good standing during the 1994/95 field season, some 27 were actively explored. The top five active operators[3] were responsible for spending virtually the entire C$36 million committed in the 1994/95 field season. In alphabetical order they were: Cameco Corporation, Cigar Lake Mining Corporation, Cogema Resources Inc., PNC Exploration (Canada) Co. Ltd., and Uranerz Exploration and Mining Limited. (Note: Expenditures by Cogema include those of its subsidiary companies, Minatco Limited and Urangesellschaft Canada Limited.)

Table 4 summarizes uranium exploration activity in Canada from 1976 to 1994.

RESOURCES

NRCan's annual assessment of domestic uranium supply capability provides a compilation of Canada's "known" uranium resources based on the results of an evaluation of company data. Uranium supply from Canada in the next decade will come from known resources, estimates of which are divided into three major categories, *measured*, *indicated* and *inferred*, that reflect different levels of confidence in the reported quantities. Most of these resources are associated with deposits identified in Figure 2.

Recent NRCan assessments of Canada's known uranium resources have been restricted to those resources recoverable from mineable ore at prices of C$150/kgU or less. Table 6 provides a breakdown of the estimates as of January 1, 1995, compared with those of the previous year. The 1995 results represent the third year that estimates have not been made for resources recoverable from mineable ore at prices between C$150 and C$300/kgU, i.e., the price range where resources are not of current economic interest.

It is important to note that as of January 1, 1995, total recoverable known uranium resources were estimated at 454 000 tU, a slight decline from the 475 000 tU reported as of January 1, 1994. Except for this latest result, there has been a steady increase in the total estimates reported each year since

January 1, 1990, due to continued exploration successes in northern Saskatchewan and the Northwest Territories. Until 1995, this increase in uranium resource totals occurred despite production of 45 000 tU over the five-year period, and the continued downward adjustment of resources in Ontario as a result of the closure of Rio Algom's Quirke and Panel mines in mid-1990 and the Denison mine in early 1992.

SUPPLY CAPABILITY

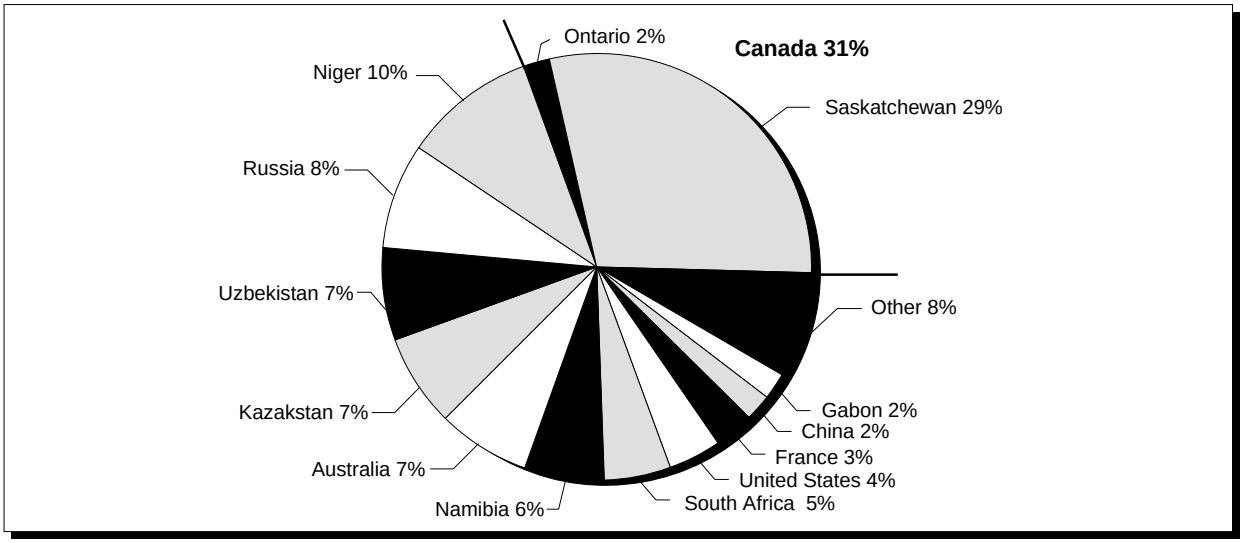
In Canada, some uranium producers have had to limit production until projects with replacement reserves have cleared the environmental review process. In 1994, the Eagle Point, Dominique-Janine Extension, and McClean Lake projects were advanced and, during 1995, most operations were able to increase uranium production in response to new market opportunities. Timely environmental approvals and significantly higher uranium prices will be required to allow Canada's uranium production capability to continue expanding to its full potential which, for a number of years early in the next century, could exceed 20 000 tU. However, developments in the international uranium market, the rate that projects progress through the environmental review process, and uncertainty regarding the costs associated with certain of the planned new projects preclude projecting future production capability levels with much certainty. Table 7 ranks Canada among the world's major producers, showing actual uranium production from 1988 to 1994 inclusive. Figure 5 illustrates Canada's share of world output in 1994 in comparison with these other major producers.

INTERNATIONAL DEVELOPMENTS

In 1993, Cameco Corporation and Uranerz Exploration and Mining Limited signed an agreement with the Kazakh National Joint Stock Company of Atomic Power Engineering and Industry (KATEP), the state organization controlling uranium resources and production in Kazakstan. Under the terms of the 10-year agreement, Cameco and Uranerz were granted the exclusive right to market KATEP's uncommitted uranium production. Cameco and Uranerz committed to share their expertise in the uranium industry with KATEP and to invest some US$3 million in Kazakstan's uranium facilities to improve efficiencies, upgrade safety and protect the environment. In August 1995, the three partners announced a joint-venture proposal to develop the Inkai and Mynkuduk uranium deposits located in southern Kazakstan, which will be mined by *in-situ* leach[4] (ISL) methods; each will hold a one-third interest. Uranerz will act as the project operator, given its specific expertise gained from the Crow Butte ISL property in Nebraska and other U.S. projects.

The development of Australia's significant low-cost uranium resources continues to be deterred by a long-standing Australian Labour Party (ALP) policy to restrict uranium mining to three named mines. For more than a decade, with the *status quo* position preserved through successive ALP conventions and national elections, only one new uranium mine, the Olympic Dam operation, has been permitted to come on stream. In September 1994, the ALP reconsidered abandoning the "Three Mines Policy" at its National Conference; however, it referred the question of

Figure 5
World Uranium Production, 1994
31 000 tonnes



Source: Uranium and Nuclear Energy Branch, Natural Resources Canada.

future policy to a committee of the party's national executive, which will report to the next National Conference in 1997. This should preclude the ALP from introducing discussion of this issue during upcoming national elections, expected before May 1996. Until a change is made, the existing policy remains in force.

THE URANIUM MARKET

Overview

Globally, uranium production in 1995 was just over 50% of reactor requirements, with the balance of requirements being met largely from inventories. Canada enhanced its position as the world's leading uranium supplier with the announced go-ahead of the McClean project. As well, Canadian uranium marketers signed new export contracts for the delivery of some 20 500 tU, a level of business even greater than in 1994. This 1995 sales total does not reflect contract amendments and the exercising of quantity-flexibility options under existing contracts.

Table 8 indicates, by country of buyer, the nominal cumulative amount of uranium under Canadian export contracts reviewed and accepted since 1974, illustrating Canada's diverse export base. As of January 1, 1996, forward commitments under all export contracts exceeded 50 000 tU. The development in Saskatchewan of those new uranium projects that have cleared the public environmental review process should form the basis of continued production well into the next century. Notwithstanding the continued uncertainty about the future level of exports from the FSU, Canada's uranium producers are very competitive and well placed to meet future demands.

Recent Domestic Uranium Purchases

In 1991, Ontario Hydro cancelled one and renegotiated a second domestic long-term supply contract, reducing its outstanding commitments by a factor of ten. In 1992, the utility requested bids for long-term uranium supply from producers in Canada, Australia, Namibia and the United States. Four producers were selected in 1993 to supply 35% of the utility's requirements from 1996 through 2002, three from Canada and one from abroad, marking the first time uranium had been purchased from a foreign supplier. Cameco, Uranerz, Cogema and the joint venture marketing uranium from South Australia's Olympic Dam operation will each supply about 150 tU/y over the contract period.

In September 1993, Ontario Hydro issued a second bid request, from the same sources noted above, to supply 20% of its requirements from 1997 to 2000. In June 1994, the utility chose Energy Resources of Australia, which operates the Ranger mine in the Northern Territory, and Cameco to supply about 100 tU/y each, and Uranerz to supply about 75 tU/y, over the contract period.

In June 1995, Ontario Hydro issued a third bid request to supply 50 tU and/or 100 tU annually for the years 1997 to 1999. In addition to sourcing the uranium from Canada, Australia, the United States, Namibia or South Africa, the request would also give consideration to proposals from joint ventures or a mixture of supply arrangements involving Western and FSU suppliers, that is, 50% from the above-named countries and 50% from FSU suppliers. In all longer-term bid requests, the successful bidders must assure that their production operations are in compliance with all regulations, including environmental protection, and that the proposals submitted offer both a market-related price with a ceiling and a base price with escalation.

In November 1995, in its first request for significant quantities in the spot market, Ontario Hydro asked for proposals on amounts varying between 38 and 230 tU; it specified that some 154 tU were to be delivered in January 1996, with additional quantities delivered in mid-year. In this latest request, there were no limitations placed on the origin of the uranium, which may be purchased from one or more suppliers, but the origin must be specified.

As of January 1, 1996, forward commitments under all domestic uranium purchase contracts were in the order of 7500 tU.

Marketing Developments Affecting FSU Uranium

On February 23, 1995, through an exchange of letters, the United States provided Canada with certain assurances and clarifications with respect to the implementation of its uranium anti-dumping suspension agreement with Russia and the Highly Enriched Uranium (HEU) contract with Russia. In return, Canada suspended its consultations on uranium under the North American Free Trade Agreement (NAFTA), while reserving the right to reactivate them should circumstances warrant.

With respect to the agreement suspending the anti-dumping investigation on uranium from the Russian Federation, the United States indicated, *inter alia*, its intention to hold imports of Russian uranium to the annual import volumes allowed under the amended agreement, its intention to enforce the anti-circumvention provisions of the agreement, and that it was not pursuing the concept of matched sales in negotiating amendments to its suspension agreements with Kazakstan or Uzbekistan. With respect to the HEU contract for the purchase of enriched uranium derived from HEU removed from nuclear weapons, the United States confirmed that the natural uranium component imported under that contract is subject to the restrictions of Section IV.M of the suspension agreement. Moreover, the United States noted

that utility-owned uranium products delivered pursuant to enrichment contracts affected by the purchase of HEU and HEU products can be disposed of by using it for overfeeding in the enrichment plants, selling it outside of the United States, or returning it to Russia.

The United States Enrichment Corporation (USEC) is the executive agent of the U.S. government for the HEU agreement with Russia. In February 1995, the USEC began discussing its plans for privatization with the U.S. Administration. Among its proposals was one excluding the USEC from anti-dumping restrictions on the sale of enrichment feed delivered to it by utilities in conjunction with the purchase of enriched uranium derived from Russian HEU. At the same time, the Administration began moving forward with a proposal to dispose of surplus U.S. military HEU by giving it to the USEC free of charge and allowing the USEC to sell it in the market. These plans would effectively have undermined the assurances given to Canada by the United States.

As these plans progressed into draft legislation, they became quite contentious among the various interests concerned with the U.S. uranium market. Eventually, on August 3, 1995, Canada requested further consultations with U.S. officials. During discussions in Washington on August 30, Canadian officials expressed their concerns and presented a market analysis which demonstrated that the immediate and unregulated sale on the U.S. market of Russian uranium from HEU would disrupt the uranium market to the extent that it would threaten U.S. objectives. Following a series of meetings, draft Senate legislation was published September 18 that provided for the regulated release of such uranium onto the market in a manner that Canadian officials and producers judged would allow it to be absorbed into the market with minimum disruption. This legislation was ultimately reconciled with the House version and was awaiting passage at year-end.

Early in 1995, U.S. Administration plans for disposing of surplus U.S. HEU began to take shape. These plans were addressed by U.S. interests, alongside the concerns about the market impact of introducing uranium derived from Russian HEU, and the draft legislation for the privatization of the USEC incorporated a mechanism for ensuring the gradual introduction of this material into the U.S. market over a number of years. Due to lower enrichment levels, the U.S. HEU has a much lower uranium equivalence than the corresponding Russian material. Since the quantity of HEU is much smaller as well, the impact on the market will be insignificant in comparison with the Russian material. However, additional U.S. HEU may be declared surplus in the future.

Throughout the year, the U.S. Department of Commerce (DOC) took steps to limit the import of FSU uranium that was enriched in Europe. Under the doctrine of "substantial transformation," enrichment confers the origin of the country where this processing operation is done, thereby allowing FSU-origin uranium to enter the United States outside the quotas (i.e., bypassing the quotas) on imports from the various FSU Republics provided for in the respective suspension agreements. On March 27, the anti-dumping suspension agreement with Kazakstan was amended. The amendment cut off imports of "bypass" uranium from Kazakstan and did not include matching provisions. A similar amendment of the agreement with Uzbekistan was signed on October 13. The United States has clearly stated that it intends to do the same with the Russian suspension agreement. At issue at year-end was the grandfathering of "bypass" uranium under U.S. utility contracts entered into before the date of the Kazak amendment. Canadian officials were actively monitoring the progress of U.S. proposals to allow some of the grandfathered uranium from Kazakstan and Uzbekistan into the United States under new matching provisions.

Actual imports of Russian Low Enriched Uranium (LEU) derived from HEU finally commenced in June 1995. The DOC-observed price in the U.S. market was above US$12.00/lb U_3O_8 on both April 1 and October 1. This was above the new threshold in the amended Kazak agreement, allowing in the minimum level of Kazak imports in each of the succeeding six-month periods. The same US$12.00/lb U_3O_8 threshold was incorporated in the Uzbek amendment with the same result.

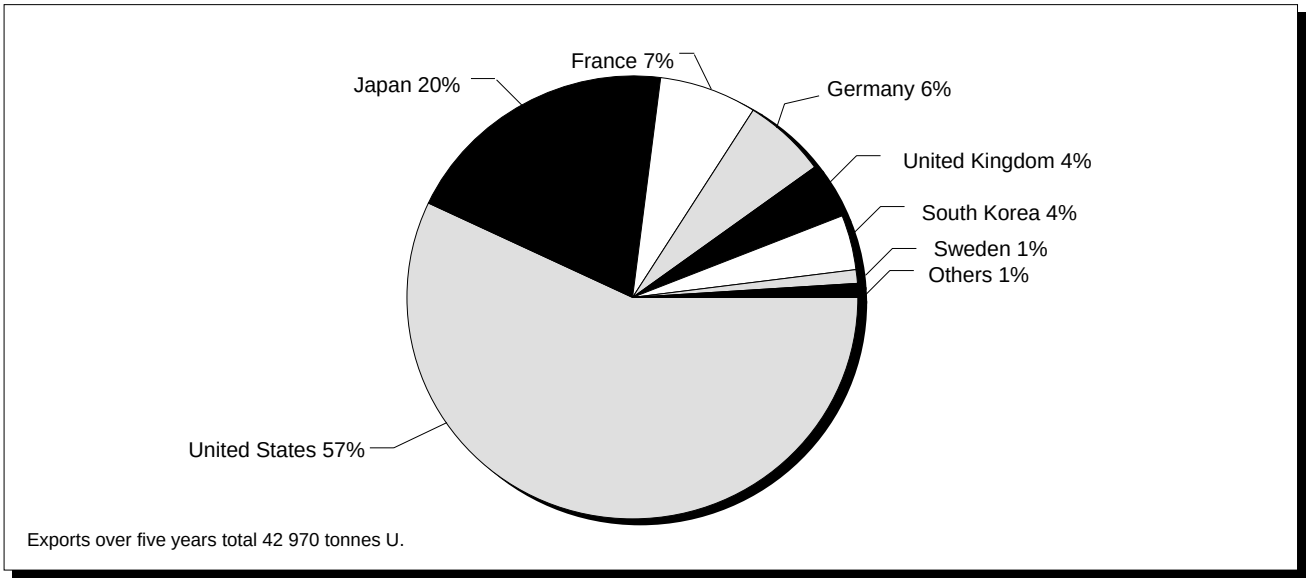
Uranium Prices

Two distinct uranium spot market prices developed during the fall of 1992 when import restrictions were placed on uranium from the FSU in the United States and the European Union. During 1995, the reported spot price in the "restricted" market rose from US$9.60/lb U_3O_8 (year-end 1994) to US$12.20/lb U_3O_8 at the end of 1995. Most of the increase occurred in the first quarter of the year. The price in the "unrestricted" market rose even more sharply from US$7.20/lb U_3O_8 at the end of 1994 to US$10.00/lb U_3O_8 at the end of 1995. In this case, most of the increase occurred during the third quarter. The gap between these two prices narrowed appreciably during 1995.

In comparison with the trend in spot market prices, the average price of Canadian export deliveries decreased from C$51/kgU (US$14/lb U_3O_8) in 1994 to C$47/kgU (US$13/lb U_3O_8) in 1995, reflecting the expiration, at the end of 1994, of several major export contracts signed in the early 1980s when uranium prices were considerably higher than they have been in recent years.

In contrast to the recent norm, some 2% of Canada's deliveries for export in 1995 were made as spot sales, compared with an average below 1% through the early 1990s and a high of 35% in 1987. For comparison with spot prices, the average price of Canadian

Figure 6
Canadian Uranium Exports, by Country of Final Destination, 1990-94



Source: Atomic Energy Control Board (AECB), Canada.

deliveries for export from 1974 to 1995 is reported in Table 9. Table 10 shows actual exports of Canadian-origin natural uranium from 1989 to 1994 for Canada's principal export customers; actual exports in 1995 are expected to match those of 1994. The destination of Canadian exports of uranium in concentrates on a cumulative basis (1990-94 inclusive) is illustrated in Figure 6, which highlights the importance of the United States as a customer.

Other Developments Affecting Prices

During 1995, the financial collapse of several companies in the NUEXCO organization, one of the world's major international uranium trader/broker firms, appears to have had some measureable impact on the uranium spot market. While market analysts initially had difficulty reaching a consensus on the eventual quantitative impacts of this default, it is clear that uranium spot prices are quite sensitive to perceptions, and that the default has most certainly led to higher uranium prices. Some analysts see the "restricted price" reaching US$20/lb U_3O_8 (1995$) within the next five years.

REFINING AND CONVERSION

Cameco operates Canada's only uranium refining and conversion facilities, located at Blind River and Port Hope, Ontario, respectively. At Blind River, uranium concentrates are refined to uranium trioxide (UO_3), an intermediate product, and then trucked to Port Hope. There the UO_3 is converted to either uranium hexafluoride (UF_6), for use in foreign light-water reactors following enrichment outside of Canada, or uranium dioxide (UO_2), for use in CANDU reactors.

The Blind River refinery, the world's largest, has a nameplate annual throughput capacity of 18 000 tU as UO_3 and processes uranium concentrates from several countries. This world-class refinery gives Cameco the flexibility to respond quickly to increases in demand. The improving market conditions saw refinery output increase 16% to 6833 tU as UO_3 in 1993, and by another 38% to 9445 tU as UO_3 in 1994. During 1993, the Blind River refinery received regulatory approval to construct a new C$10 million facility that uses an innovative process to convert by-product solvent-extraction solutions into a dry powder form. Construction of the new facility, which converts liquid raffinates to solid form, thereby reducing volumes by 75%, was completed in June 1995. These solids will be stored on site prior to shipment to a facility for final recovery of the remaining uranium.

The Port Hope facilities, with a capacity of some 10 500 tU as UF_6 and 2500 tU as UO_2, have about one quarter of the Western World's UF_6 annual conversion capacity and provide the only commercial supply of fuel-grade UO_2 for CANDU reactors. About 80% of the UO_3 from Blind River is converted to UF_6, while the remaining 20% is converted to UO_2. Overall throughput increased 43% in 1993 to 7853 tU as sales volumes of uranium conversion services grew significantly, due partly to the draw-down of most of the excess UF_6 inventories, and partly to the permanent shut-down of the Sequoyah Fuels Corporation UF_6 plant in the United States in late 1992. In 1994,

overall production at Port Hope increased an additional 20% to a level of 9490 tU.

On December 21, 1995, Cameco announced that it had concluded its first Eastern European uranium conversion agreement with CEZ, a.s., the predominant electric power company in the Czech Republic. CEZ generates about 30% of the country's electricity with nuclear power. Cameco will refine and convert uranium concentrates to uranium hexafluoride for CEZ beginning in 1998.

NUCLEAR POWER DEVELOPMENTS

During much of 1995, the combined generating capacity of Canada's 22 in-service CANDU reactors averaged in excess of 15 400 megawatts electric (MWe) (Table 11). Overall, about 19% of Canada's electric power was nuclear-generated. While Unit 2 at the Bruce "A" Nuclear Generating Station (NGS) was put out of service on October 8, 1995, and will be mothballed, the reactor continues to remain in Ontario Hydro's generation plans as an option to meet demand beyond the year 2000. All four of Ontario Hydro's reactors at the Darlington NGS performed well. On December 8, 1995, the AECB announced that it had approved the restart of Unit 2 at the Pickering "A" NGS. It was expected that this unit, which had been shut down after a small loss-of-coolant accident in December 1994, would be returned to the grid by February 1, 1996. After an eight-month scheduled outage for maintenance work, the Point Lepreau reactor was synchronized back into the electric power grid on December 24, 1995, to resume operating at full power.

To the end of June 1995, 7 CANDUs were among the top 25 reactors worldwide on the basis of lifetime performance, including Point Lepreau (90.1%), Pickering 6 (88.0%), Pickering 7 (87.6%), Darlington 3 (84.9%), Pickering 8 (84.4%), Darlington 4 (83.7%) and Wolsong 1 in the Republic of South Korea (83.2%). Construction is on track for the three CANDU 6 units at the Wolsong site, with ambitious timetables being met; in-service dates for Units 2, 3 and 4 are June of 1997, 1998 and 1999, respectively. First fuel has been loaded at the initial CANDU unit in Romania, scheduled to go critical in February 1996.

Like many utilities in North America, Ontario Hydro is faced with issues of deregulation, competition and privatization. The Province of Ontario's new Progressive Conservative government established an Advisory Committee on Competition in Ontario's Electricity System to evaluate options for phasing in competition in Ontario's electric power sector. The range of issues under consideration include privatization of parts of Ontario Hydro and restructuring of the 300 local utilities that are responsible for supplying power to consumers in the province.

OUTLOOK

In 1995, Canada's total primary uranium production approached an estimated 10 450 tU, its highest level since the late 1980s. As in 1994, Canada's uranium industry again negotiated major new contracts during the year, and continued with development work at those Saskatchewan uranium mining proposals that have cleared the environmental assessment process.

The increase in uranium spot market prices during 1995 has further encouraged Canada's uranium industry and should help reassure domestic producers advancing new mining proposals through the environmental review process and the start-up phase of operations. These world-class uranium projects in Saskatchewan will form the basis of continued Canadian production well into the next century.

In Canada, there is significant potential for the discovery of additional uranium resources. Policies are in place to encourage investment in the industry and to maintain Canada's role as a reliable and competitive supplier to its trading partners. A significant baseload of long-term supply contracts with customers in the United States, Western Europe and the Far East positions Canada's uranium producers very well to compete with the world's major uranium suppliers. Given adequate market incentives, Canada's uranium industry has the capability to maintain its position as the world's leading supplier of uranium for many years to come.

REFERENCES

1 NUEXCO, an international uranium brokerage firm, was originally called the Nuclear Exchange Corporation. Although several companies in the NUEXCO organization, which were associated with uranium trading, declared bankruptcy in early 1995, certain of these have been reorganized and continue to provide brokerage services.

2 *"Canada's Uranium Industry - The World Leader Consolidates its Position,"* NRCan Mailing, October 18, 1995.

3 In certain cases, the identified operator has reported the total expenditures of a joint-venture effort. Therefore, contributions by other parties not responding to the NRCan survey are accounted for in the C$36 million total.

4 In-situ leaching involves extracting uranium from ore in place in the deposit; acidic or basic solutions dissolve uranium when circulated through holes drilled into the orebody from surface.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 1, 1996.

TABLE 1. URANIUM PRODUCTION AND ASSOCIATED WORK FORCE IN CANADA, 1993 AND 1994

Province and Producer	Total Work Force[1] (Dec. 31) 1993	1994	Annual Output[2] (tU) 1993	1994
ATHABASCA BASIN, SASKATCHEWAN				
Cluff Mining (Cogema Resources Inc., 100%)	114	188	867	1 065
Key Lake JV (Cameco, 67%; Uranerz, 33%)	397	399	5 315	5 074
Rabbit Lake JV (Cameco, 67%; Uranerz, 33%)	245	234	2 313	2 868
Subtotal	756	821	8 495	9 007
ELLIOT LAKE, ONTARIO				
Rio Algom Limited				
Stanleigh	558	550	660	640
Total	1 320	1 371	9 155	9 647

Sources: Company annual reports; Atomic Energy Control Board open files.
[1] Figures (rounded) are for company-payroll employees only; on-site contractors (mining, construction, services, etc.) are not included. [2] Primary output only. In 1994, an additional 53 tU was recovered by the remaining Elliot Lake producer from Cameco's refinery/conversion facility by-products, compared with about 30 tU in 1993. While these amounts are NOT included in the Canadian totals of primary uranium production noted above, they are included in the shipments and value of shipments figures provided in Table 2.

TABLE 2. VALUE[1] OF URANIUM SHIPMENTS[2] BY PROVINCE, 1990-95

	Unit	1990	1991	1992	1993	1994	1995[p]
Ontario producer shipments	tU	4 597	1 288	1 027	ND	ND	ND
Value of shipments	C$ millions	627	271	173	ND	ND	ND
Saskatchewan producer shipments	tU	5 123	6 911	8 125	ND	ND	ND
Value of shipments	C$ millions	261	333	400	ND	ND	ND
Total producer shipments	tU	9 720	8 199	9 152	8 727	11 253	10 370
Total value of shipments	C$ millions	888	604	573	497	625	540

Source: Natural Resources Canada.
ND: No disclosure provincially, as only one producer in Ontario.
[p] Preliminary.
[1] Value of shipments includes the value of uranium recovered from the refinery/conversion facility by-products noted in Table 1, which are not included in primary production. [2] Shipments in tonnes of uranium (tU), contained in concentrate, from ore-processing plants.

TABLE 3. OPERATIONAL CHARACTERISTICS OF EXISTING CANADIAN URANIUM PRODUCTION CENTRES, 1994

Operating Entity/ Operator and Location	Ore-Processing Plant[1]			
	Capacity	Recovery	Annual Throughput	
	Nameplate	Overall	Total Ore	Ore Grade
	(t/d)	(%)	(t)	(%)
Cluff Mining (Cogema Resources Inc.) Cluff Lake, Saskatchewan	>900	98	146 000	0.72
Rabbit Lake JV (Cameco Corporation) Rabbit Lake, Saskatchewan	>2 500	98	195 000	1.53
Key Lake JV (Cameco Corporation) Key Lake, Saskatchewan	>800	97	263 000	1.97
Stanleigh Mine (Rio Algom Limited) Elliot Lake, Ontario	>4 500	95	770 000	0.082

Sources: Corporate annual reports; Atomic Energy Control Board open files.
1 Figures are rounded.

TABLE 4. URANIUM EXPLORATION ACTIVITY IN CANADA, 1976-94

Year	Expenditures[1]	Drilling[2]	Million-Dollar Projects[3]
	(C$ millions)	(km)	(number)
1976	44	155	4
1978	90	334	7
1980	128	503	24
1982	71	247	13
1984	35	197	12
1986	33	162	11
1987	37	164	12
1988	59	201	11
1989	58	158	11
1990	45	66	6
1991	44	67	4
1992	46	79	4
1993	40	62	5
1994	36	67	8

Source: Natural Resources Canada.
1 Direct exploration and drilling expenditures in current dollars; from late 1980s, includes advanced underground exploration and deposit appraisal expenditures. **2** Exploration and surface development drilling; excludes development drilling on producing properties. **3** Number of projects where direct exploration and drilling expenditures exceeded C$1 million in current dollars.

TABLE 5. SUMMARY, CANADIAN URANIUM MINING PROJECTS, AS OF DECEMBER 1995

Project, Province/Operator	Owners Share (%)	Deposit Type/ Discoverer and Discovery Date	Resources (Company Estimates)	Ore Grade and Notes on Deposits	Mining Method/ Milling Rate and Capacity	Project Particulars and Status	Location of Project/ Notes of Interest
NEW PROJECTS PLANNED FOR PRODUCTION							
Cigar Lake, Sask./ Cigar Lake Mining Corporation	Cameco (48.75), Cogema (36.375), Idemitsu (12.875), KEPCO (2 non-vote)	Unconformity-related/ Cogema 1981	Overall property 136 000 tU, *mineable*	Overall property grade of 21% U; grades vary from 5% to 70% U; orebody at depth of 450 m	"Non-entry" underground; "jet-boring" mining method; milling at McClean Lake contributing from 2300 to 6900 tU/y	C$555 million project; test mining completed in 1992; EIS submitted in October 1995; public hearings to be in 1996	670 km N of Saskatoon; 500-m-deep shaft sunk; brine freezing of ground is required to mine the ore; project to start up by 1999
McClean Lake, Sask./Minatco Limited (Cogema)	Cogema (70), Denison (22.5), OURD (7.5)	Unconformity-related/ original McClean by CanOxy/Inco 1979-80; JEB & Sue *et al* - 1982 to 1990 by Minatco	Overall property 17 300 tU, *mineable*	2.7% U average overall; open-pit depths from 20 to 145 m; McClean underground ore to 4% U at depth of 170 m	75% by open pit at JEB, Sue A, B & C; underground at McClean; mill capacity may be expanded to 9200 tU/y (see Cigar Lake)	C$200 million project (alone); public hearings in 1993; approved subject to AECB licensing process; construction under way	350 km N of La Ronge; JEB open-pit mining is to start in 1996 with milling in 1997; mine life of the co-enterprise >2010
Midwest Project, Sask./Cogema Resources Inc.	Cogema (56), Denison (19.5), Uranerz (20), OURD (4.5)	Unconformity-related/ Esso Minerals 1977 (interests of Bow Valley, Numac Oil & Gas, *et al* bought out by partners)	Overall property 13 200 tU, *mineable*	Overall property grade of 4% U; grades vary from 2% to 30% U; orebody at depth of 200 m	"Non-entry" underground; "jet-boring" mining method; milling at McClean Lake; contributing 2300 tU/y	$80 million co-venture with McClean; in 1993, Panel rejected Denison's proposal; EIS submitted August 1995	710 km N of Saskatoon; 185-m-deep shaft sunk and ore test mined; new operator, Cogema, revises EIS
McArthur River, Sask./Cameco Corporation	Cameco (55.844), Uranerz (27.922), Cogema (16.234)	Unconformity-related/ Cameco 1988	Overall property 73 000 tU (at least), *mineable*	Overall property grade of 4% U but varies from 2% to 70% U; orebody at depth of 550 m; silicified alteration zone missing Ni and As	"Non-entry" underground mining method with milling at Key Lake; licensed mill capacity 6150 tU/y but may expand to 6900 tU/y	C$400 million project; UEP allowed to proceed in 1993 by Panel; EIS submitted in December 1995; hearings scheduled for 1996	70 km NE of Key Lake; start-up by 1999; will extend operations at Key Lake mill beyond 2015
Kiggavik, N.W.T./ Urangesellschaft Canada Limited (Cogema)	Urangesellschaft (79), CEGB Expl'n (20), Daewoo Corp. (1)	Unconformity-related/ Urangesellschaft 1977	Overall property 15 000 tU, *mineable*; (more incl. Andrew Lake *et al*)	0.41% U average overall; depth Centre pit 100 m, Main pit 200 m	Open-pit mining methods; 1200 t/d mill feed; output rate of 1200 tU/y originally expected	EIS submitted but project deemed deficient by Panel; Cogema expected to review project and submit new EIS	75 km W of Baker Lake; start-up not likely before 2000; >11-year mine life with tributary ore
RECENTLY APPROVED EXTENSIONS OR EXPANSIONS TO EXISTING OPERATIONS							
Dominique-Janine Extension (DJX) at Cluff Lake, Sask./ (Cogema Resources Inc.)	Cogema Resources Inc. (100)	Unconformity-related/ "D" pit by Mokta 1969 (depleted 1981); Claude *et al* by Amok 1970-76 (Claude depleted 1989); D-J & Dominique-Peter 1980-86	Overall property 16 000 tU *mineable*, D-J Extension 5250 tU, *mineable*	Mill-feed grade for 1994 was 0.72% U; DJX to mine >680 000 t of ore grading 0.73% U to yield in excess of 5000 tU	Open pit first at DJX and then underground; mill capacity (licensed) of 1540 tU/y; milling at half capacity for years, but full operations by 1996	C$10 million Cluff Lake extension; hearings in 1993; approval to proceed subject to AECB licensing; mining well under way in 1995	720 km N of Saskatoon; revised three-phase mine plan offers mining flexibility; mine life beyond 2000 with DJX
Eagle Point & Collins Bay at Rabbit Lake, Sask./Cameco Corporation	Cameco (66.67), Uranerz (33.33)	Unconformity-related/Gulf Minerals 1968; Rabbit Lake (depleted 1984); 1971-79 for Collins Bay ("B" pit depleted 1991); 1980 for Eagle Point	Eagle Point *et al*, 20 000 tU *mineable,* overall property 37 100 tU (incl. stockpiles)	Mill-feed grade for 1994 was 1.53% U; mineable grade 1.16% U for Eagle Point and 3.45% U for Collins "A&D"; Eagle Pit depth 120-335 m	"Non-entry" underground methods at Eagle Point, open pit for others; milling rate below 5400 tU/y licensed capacity but increased in 1995	Eagle Point test mining 1992; Panel reviewed and federal government approved in 1993; Eagle Point in production, Collins A&D proceeding	805 km N of Saskatoon; mining Eagle Point ore since late June 1994; expansion will extend mine life beyond 2000

Notes: OURD (Canada) Co., Ltd. is a subsidiary of the Overseas Uranium Resources Development Corporation (OURD) of Japan. Minatco Limited and Urangesellschaft Canada Limited, operated by Cogema Resources Inc., are subsidiaries of COGEMA of France. Idemitsu Uranium Exploration Canada Ltd. is a wholly owned subsidiary of Idemitsu Kosan Co., Ltd. of Japan. Korea Electric Power Corporation (KEPCO) is the Republic of Korea's only nuclear-electric utility. CEGB Exploration (Canada) Ltd. is wholly owned by Nuclear Electric PLC of Britain, formerly called the Central Electricity Generating Board (CEGB).

TABLE 6. ESTIMATES OF CANADA'S URANIUM RESOURCES RECOVERABLE FROM MINEABLE ORE,[1] JANUARY 1, 1994, AND JANUARY 1, 1995

Price Ranges Within Which Mineable Ore is Assessed[2]	Measured		Indicated		Inferred	
	1/1/94	1/1/95	1/1/94	1/1/95	1/1/94	1/1/95
	(000 tU)					
Up to C$100/kgU	64	68	214	202	35	30
C$100 to $150/kgU	<1	<1	119	111	43	43
Total	64	68	333	313	78	73

Source: Natural Resources Canada.
[1] Actual or expected losses in mining recovery and ore processing have been accounted for; these factors were individually applied to resources tributary to existing or prospective production centres. In underground operations, mineable ore is generally 75% to 85% of the ore-in-place; higher mining recoveries are achievable in open-pit operations. Ore-processing recoveries in Canada normally range from 90% to 99%; Canada's weighted average mill recovery for existing conventional uranium operations was 97% over the 1993/94 period. [2] The Canadian dollar figures reflect the price of a quantity of uranium concentrate containing 1 kg of elemental uranium. The prices were used in determining the cut-off grade at each deposit assessed, taking into account the mining method used and the processing losses expected. The price of C$100/kgU was used by Natural Resources Canada to illustrate those resources that were of economic interest to Canada during this period.
Note: $1/lb U_3O_8 = $2.6/kgU.

TABLE 7. PRODUCTION OF URANIUM IN CONCENTRATES BY SELECTED MAJOR PRODUCING COUNTRIES, 1988-94

	1988	1989	1990	1991	1992	1993	1994
	(tonnes U)						
Canada[1]	12 470	11 350	8 780	8 200	9 340	9 190	9 700
Russia	. .	. .	. .	. .	(in Other)	2 700	2 350
Kazakstan	. .	. .	. .	. .	(in Other)	2 700	2 240
Uzbekistan	. .	. .	. .	. .	(in Other)	2 700	2 120
China	. .	. .	. .	. .	(in Other)	950	480
United States	5 190	5 320	3 420	3 060	1 860	1 290	1 290
South Africa	3 850	2 950	2 530	1 710	1 670	1 710	1 670
Namibia	3 600	3 100	3 210	2 450	1 680	1 670	1 900
Australia	3 530	3 660	3 530	3 780	2 330	2 270	2 210
Niger	2 970	2 990	2 830	2 960	2 970	2 910	2 980
France	3 390	3 240	2 830	2 480	2 150	1 710	1 050
Gabon	930	850	710	690	540	550	650
Other[2]	910	940	3 800	2 250	12 600	2 770	2 370
Total[3]	36 840	34 400	31 640	27 580	35 140	33 120	31 010

Sources: *Uranium: Resources, Production and Demand*, a biennial report published jointly by the Nuclear Energy Agency of the OECD and the International Atomic Energy Agency; miscellaneous corporate, national and international reports.
. . Not available.
[1] Canadian figures include uranium recovered from refinery/conversion facility by-products, and differ from primary production figures shown elsewhere. [2] Includes Argentina, Belgium, Brazil, Germany (West), India, Israel, Japan, Portugal, Spain and Yugoslavia; from 1990, includes Pakistan, Germany (East) and Hungary; in 1992, *other* includes Bulgaria, China, the Czech Republic, Kazakstan, Mongolia, Romania, Russia, Ukraine and Uzbekistan. [3] Totals are of the listed figures only; *world* totals represented from 1992 onward.
Note: Country figures are rounded to the nearest 10 tU.

TABLE 8. CANADIAN URANIUM UNDER EXPORT CONTRACTS[1]

Country of Buyer[2]	Tonnes U
Argentina[3]	69
Belgium	3 193
Finland	3 153
France	25 817
Germany	16 197
Italy	1 115
Japan	24 020
South Korea	8 042
Spain	4 068
Sweden	9 628
Switzerland	154
United Kingdom	8 955
United States	85 916
Total	190 127

Source: Natural Resources Canada.
[1] The nominal quantity of uranium in all contracts reviewed and accepted under Canadian uranium export policy since September 5, 1974. Country totals are adjusted to reflect new and amended contracts, and the exercising of quantity-flexibility options, as of December 31, 1995. [2] In most cases, indicates country of end-user. [3] Initially as manufactured fuel bundles for Argentina's CANDU reactor.

TABLE 9. CANADIAN URANIUM EXPORT PRICE,[1] 1974-95

Year	Average Export Prices		Spot Sale Portion of Deliveries
	Current Dollars	Constant 1995 Dollars	
	(C$kg/U)[2]		(%)
1974	39	111	n.r.
1975	52	135	n.r.
1976	104	249	n.r.
1977	110	248	n.r.
1978	125	266	n.r.
1979	130	251	n.r.
1980	135	236	n.r.
1981	110	173	1
1982	113	164	1.5
1983	98	135	10
1984	90	121	26
1985	91	119	20
1986	89	113	21
1987	79	96	35
1988	79	92	13
1989	74	82	<1
1990	71	76	<1
1991	61	64	<2
1992	59	61	<1
1993	50	51	<1
1994	51	52	<1
1995	47	47	2

Source: Natural Resources Canada.
n.r. Not reported.
[1] NRCan derives the Export Price figure annually. It is based on the average price under all export contracts made by Canadian producers for deliveries in the given year. [2] $/kgU x 0.38465 = $/lb U_3O_8.
Notes: Prices are rounded. Constant dollar values are derived using the Implicit Price Index for Gross Domestic Product.

TABLE 10. EXPORTS OF URANIUM OF CANADIAN ORIGIN, 1989-94

Country of Final Destination	1989	1990	1991	1992	1993	1994
	(tonnes of contained uranium[1])					
Argentina	–	–	19	20	29	–
Belgium	190	–	–	–	–	115
Finland	71	83	–	–	–	–
France	696	799	822	111	461	766
Germany	615	220	459	534	665	465
Indonesia	1	–	–	–	–	–
Italy	46	–	–	–	–	–
Japan	1 729	2 005	399	2 328	523	3 443
Netherlands	–	–	–	–	–	–
South Korea	635	339	215	104	715	455
Spain	97	–	–	–	–	274
Sweden	497	285	91	170	–	–
United Kingdom	871	882	498	19	–	50
United States	3 950	4 035	5 307	4 032	6 291	4 938
Total	9 398	8 648	7 810	7 318	8 684	10 507

Source: Atomic Energy Control Board.
– Nil.
[1] Some of this uranium was first exported to an intermediate country for conversion and/or enrichment prior to transfer to the country of final destination.

TABLE 11. NUCLEAR POWER PLANTS IN CANADA AS OF DECEMBER 1995

Reactors	Owner	Net Capacity	In-Service Dates
		(MWe)	
Pickering 1 to 4	Ontario Hydro	2 060	1971-73
Bruce 1 to 4[a]	Ontario Hydro	2 307	1977-79
Point Lepreau	NB Power[1]	635	1983
Gentilly 2	Hydro-Québec	638	1983
Pickering 5 to 8	Ontario Hydro	2 064	1983-86
Bruce 5 to 8	Ontario Hydro	3 440	1984-87
Darlington 1 to 4	Ontario Hydro	3 524	1990-93
Total net capacity (MWe)		14 668	

Source: Natural Resources Canada.
[a] Bruce A Unit 2 out of service on October 8, 1995, and being mothballed.
[1] The New Brunswick Power Corporation.