

Uranium

Robert T. Whillans

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

OVERVIEW

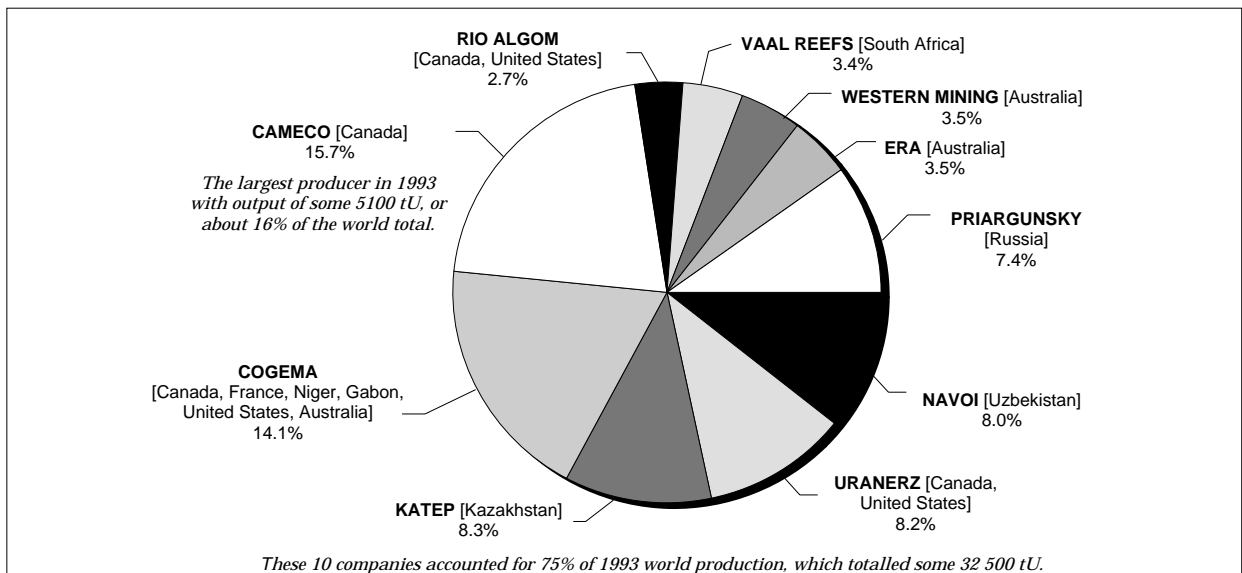
For most of 1994, there was little optimism about the possibility of a short-term recovery in the worldwide uranium market. The potential availability of uranium from the former Soviet Union (FSU), especially through the "matched sales" agreement between the United States and Russia, continued to depress prices, dampen enthusiasm, and defer uranium exploration. This mood persists despite the belief that the gap between production levels and reactor requirements over the longer term would necessitate new uranium production to offset dwindling inventories. With Western inventories now significantly diminished, the price increase seen at

the end of 1994 may signal a return to the market by buyers, a positive sign for 1995.

Overall, 1994 was a good year for Canada in uranium. Pre-production work progressed at three of the six new Saskatchewan uranium mining projects that were advanced through the environmental review process, and preparations continue for environmental reviews of the remaining three uranium mining proposals. In 1994, Canada's uranium producers negotiated major new sales contracts, helping to maintain Canada's position as the world's leading uranium supplier. With four of the world's top ten uranium-producing companies deriving all or a sizeable portion of their uranium from Canadian deposits (Figure 1), Canada's uranium industry has enhanced its competitive position in the global uranium market.

Reversing a trend in declining sales over the past few years, Canada's uranium marketers signed new export contracts in 1994 for the delivery of more than 15 000 tonnes of uranium (tU). This represents almost a quadrupling of the 1993 sales volume, and

Figure 1
World's Top Ten Uranium Mining Companies in 1993



Source: Uranium Institute.

makes 1994 a near-record year. Furthermore, the level of new business recorded in early 1995 suggests that Canada's uranium industry may enjoy a second year of enhanced sales volume. The average price of 1994 deliveries under all export contracts was C\$51/kgU, an increase from the 1993 price of C\$50/kgU that reflects the Canadian/U.S. dollar exchange rate. As has been the case in five of the last six years, less than 1% of all such 1994 deliveries for export were spot sales.

DOMESTIC PRODUCTION AND DEVELOPMENTS

In 1994, estimated primary Canadian uranium production exceeded 9500 tU, up slightly from output of 9155 tU in 1993, due primarily to increased production at Cluff Lake and Rabbit Lake (see below). Primary production now more closely approaches Canada's nominal production capability, which currently exceeds 10 000 tU/y. In terms of output value, uranium ranks sixth among Canada's top ten metal commodities. The preliminary estimate of mine shipments in 1994 under all domestic and export contracts was 11 200 tU valued at C\$585 million; final shipments for 1993 are reported at 8727 tU worth C\$497 million. Canada's uranium industry directly employed almost 1400 workers as of year-end 1994 at the mine sites; this figure does not include on-site contractors working at mine expansion projects or head office personnel. The timely development of several new uranium mining projects in Saskatchewan should help to further increase uranium industry employment levels in Canada over the next few years.

Recent levels of output and employment at Canada's uranium production centres are shown in Table 1, while Table 2 reports annual uranium shipments and values from 1989. The difference between annual production and shipments reflects producer inventory adjustments. With domestic requirements representing only 15-20% of current Canadian output, most of Canada's uranium production is available for export. Table 3 highlights the main operational characteristics of existing uranium production centres in Ontario and Saskatchewan as of 1993, the most recent year for which complete data are available. Canada's producing mines and major uranium deposits are depicted in Figure 2, while Figure 3 illustrates domestic uranium production by project and owner for 1993.

Elliot Lake, Ontario

Production levels were maintained at the Stanleigh operation of Rio Algom Limited under its contract with Ontario Hydro, which requires the utility to continue uranium purchases until 1996 as opposed to 2020, as stipulated in the original contract. Production from the Stanleigh mine in 1994 is estimated

at 690 tU, a level of output that reportedly will continue in 1995. (See 1993 operational data in Table 3.)

Decommissioning Elliot Lake Uranium Tailings

In October 1992, the Atomic Energy Control Board (AECB) decided that proposals submitted by Rio Algom Limited and Denison Mines Limited for decommissioning several sites should be referred to the Minister of Environment Canada for public review by a panel, under the federal Environmental Assessment and Review Process (EARP). As the proposed proposals to decommission the Elliot Lake uranium tailings would be the first to undergo environmental scrutiny, the review promised to be a major exercise.

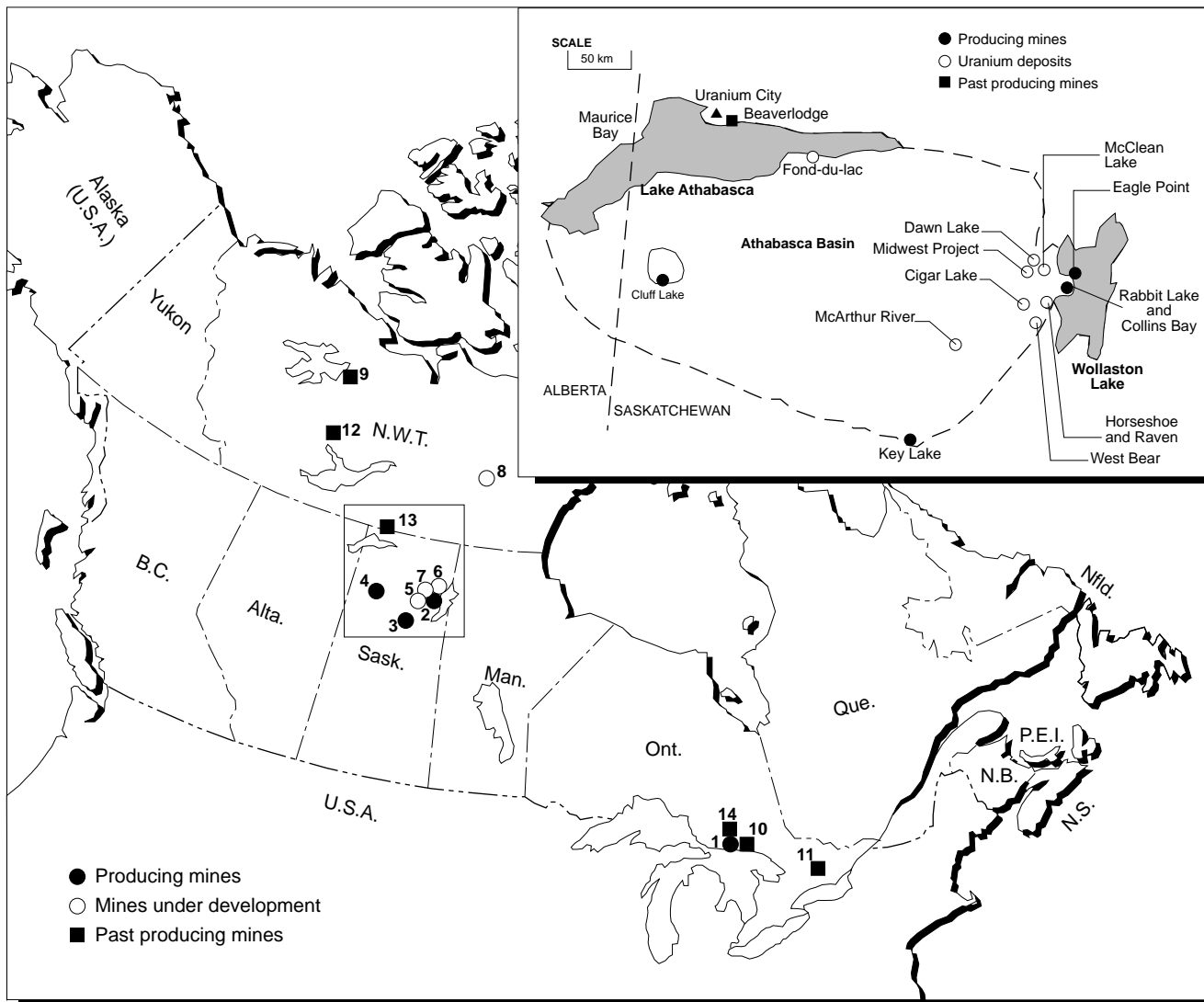
Early in 1993, Terms of Reference (ToR) and operating guidelines for an EARP review were proposed, and a three-member review panel was subsequently established. The ToR would allow a review of Denison's proposal to decommission its Denison and Stanrock tailings facilities and a review of Rio's proposal to decommission its Quirke and Panel tailings facilities. By October 1993, draft guidelines had been issued by the panel for the preparation of Environmental Impact Statements (EIS). These require a description of the existing Elliot Lake tailings management areas, the proposed method for long-term management of the tailings, and the potential environmental and health impacts of these proposals. In December 1993, public scoping sessions for the review began, and comments from interested participants were received on the draft guidelines.

In August 1994, the Minister of Environment Canada approved the panel's proposal to revise its ToR based on comments received during the scoping sessions, and final EIS guidelines were issued. The proponents' EIS were expected early in 1995, with public hearings on these EIS anticipated to begin by June 1995. The federal government will provide more than C\$60 000 in assistance under the Participant Funding Program to help individuals and groups prepare for their participation in the environmental review process.

Athabasca Basin, Saskatchewan

The Rabbit Lake production facility is operated by Cameco Corporation in partnership with Uranerz Exploration and Mining Limited. Milling of the Eagle Point test ore yielded excellent recoveries with a significant reduction in reagent consumption, and was continued in 1994 to confirm mined ore grades and optimize mill operating parameters. The Eagle Point/Collins Bay dual-source ore was processed until mid-1994, when full-scale mining at the Eagle Point operation commenced following receipt of an operating licence from the AECB on June 29, 1994. The Rabbit Lake mill is estimated to have produced more than 2800 tU in 1994, a significant increase from the

Figure 2
Uranium Mines in Canada, 1994



Numbers refer to locations on map above.

PRODUCERS

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

MINES UNDER DEVELOPMENT

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

PAST PRODUCERS

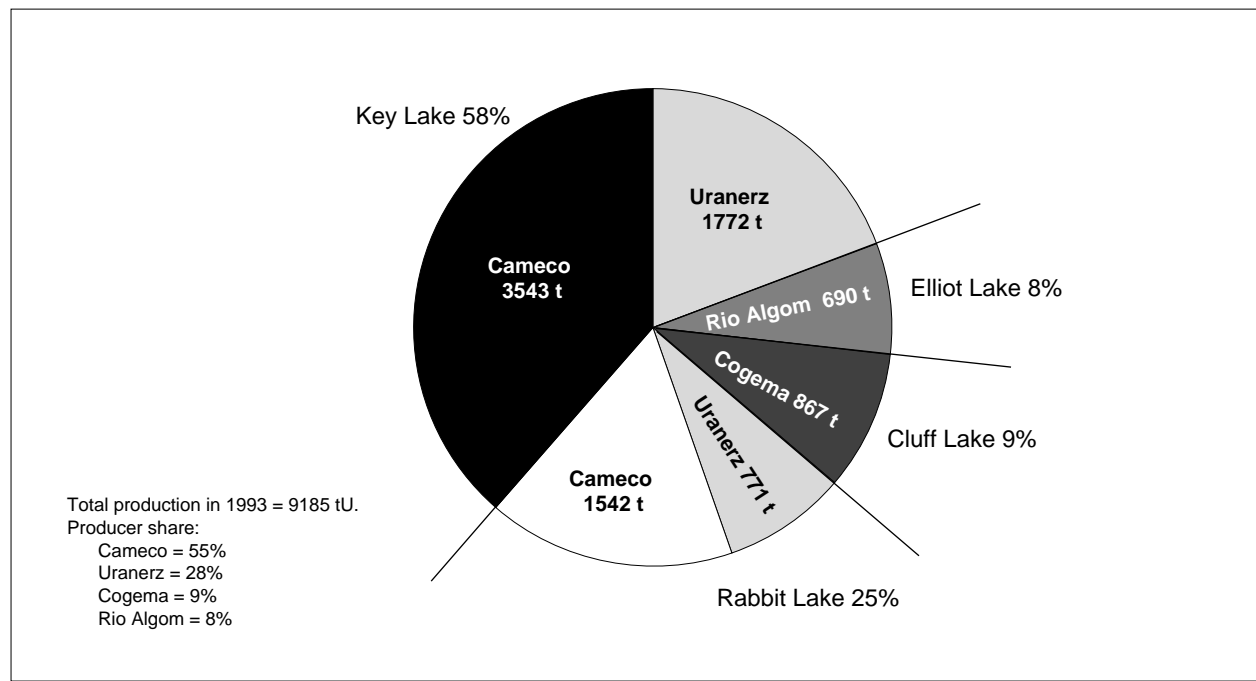
- 9. Port Radium
- 10. Agnew Lake
- 11. Madawaska (Bancroft)
- 12. Rayrock (Marian River)
- 13. Beaverlodge
- 14. Quirke/Panel/Denison (Elliot Lake)

Source: Uranium Division, Electricity Branch, Natural Resources Canada.

1993 level. Operating on alternate weeks in 1994, the mill is licensed to produce 5400 tU/y should nominal capacity be reached later this decade. Ore from the Eagle Point mine and Collins Bay A and D ore zones is sufficient to provide mill feed beyond the year 2000.

The Key Lake production facility is also operated by Cameco in partnership with Uranerz. In 1994, the Key Lake mill is estimated to have produced more than 5000 tU, well below its licensed annual capacity of 5700 tU. Subject to regulatory approval, the mined-out Deilmann pit will be used as a tailings

Figure 3
Canadian Uranium Production and Ownership, 1993



Source: Uranium Division, Electricity Branch, Natural Resources Canada.

disposal facility, perhaps by 1996. By increasing feed volumes and blending in lower-grade ore, the Key Lake mill can produce until 1998 relying on ore from the Deilmann deposit. After Key Lake ore is depleted, ore from the McArthur River project should be sufficient to double the useful life of the Key Lake mill facility, given the necessary environmental and regulatory approvals. The average grade of ore at McArthur River is over 4% uranium, double that of Key Lake.

In the western Athabasca Basin, the Cluff Lake production facility is owned and operated by Cogema Resources Inc. Processing ore from stockpile and underground mining, the mill is estimated to have produced in excess of 1040 tU in 1994. Licensed by the AECB for production of up to 1500 tU/y, the Cluff Lake mill operated on alternate weeks only throughout 1994. However, modifications to make the mill more environmentally efficient and capable of handling increased mine production should permit full-time operation late in 1995.

In 1993, Cogema's Dominique-Janine Extension (DJX) was approved by both levels of government following public hearings before the Joint Federal/Provincial Panel on Uranium Mining Developments in Northern Saskatchewan (note project modification below). Cogema planned to enlarge its DJ pit southward toward Cluff Lake in 1994 to prolong open-pit mining and supplement output from underground operations. The AECB issued the necessary licence

approvals to proceed in late June 1994, and construction activities began in earnest in July, at which time stripping of the overburden also commenced. The stripped material is being used to backfill the Dominique-Janine and Claude open pits. By the end of October, the first 200 m of the new underground access ramp had been completed. Although initial ore production from DJX is projected for the spring of 1995, the remaining surface construction is not expected to be completed until mid-year.

Saskatchewan Environmental Assessment and Review Panels

In 1991, six proposals for new uranium mining projects in Saskatchewan were referred for public review by an independent panel, pursuant to the federal government's EARP Guidelines Order. A Joint Saskatchewan/Canada Panel was formed; it has reviewed the Cluff Lake Dominique-Janine Extension (DJX), the Midwest Joint Venture (MJV), and the McClean Lake projects, but must still review the Cigar Lake and McArthur River projects. A federal-only Panel was also formed and has reviewed the Eagle Point/Collins Bay A and D Expansion at Rabbit Lake, where approval had been granted by Saskatchewan authorities in 1988.

The Joint Panel also reviewed an Underground Exploration Program (UEP) for the McArthur River project in 1992, which was proposed to obtain data needed to prepare an EIS for the overall project. The

Panel reported in early 1993, recommending that the UEP be allowed to proceed subject to certain conditions. Both governments agreed.

In late 1993, the Joint Panel recommended that the DJX proceed, subject to conditions; that the MJV not proceed as designed; and that the McClean Lake project be subject to a five-year delay. Subsequently, both governments agreed that DJX should proceed, subject to the AECB licensing process, that the MJV presented potential risks and should not proceed as presented, and that the McClean Lake project should proceed subject to the AECB's normal licensing process. It was concluded that the AECB's licensing process will allow all of the technical issues raised by the Joint Panel to be considered within the context of a licence application, and will provide sufficient time for the proponents to address them before the McClean Lake project comes into operation.

Also in late 1993, the federal-only Panel recommended that full-production underground mining of the Eagle Point orebody be approved, subject to certain conditions, but that approval be withheld for open-pit mining of the Collins Bay A and D orebodies until additional technical information on waste rock management and decommissioning is provided by the proponents. In March 1994, the federal government agreed that underground mining at Eagle Point should proceed, subject to the AECB's licensing process, and that open-pit mining at Collins Bay A and D may also proceed, subject to the AECB licensing process. The AECB process will address the conditions recommended by the Panel during the evaluation of the licence applications, and will require the provision of adequate information on waste-rock management and decommissioning, as recommended by the Panel.

In early 1994, Cogema announced that it had decided to modify its plans for developing the DJX project at Cluff Lake, and submitted revisions to the government regulatory authorities. The revised three-phase mining plan would not require the damming and partial draining of the north end of Cluff Lake, but would require Cogema to access deeper portions of the DJX orebody by underground means after an initial phase of open-pit mining. As noted above, the federal and provincial governments had responded to the recommendations of the Joint Canada/Saskatchewan Panel on December 23, 1993, and had agreed that DJX should proceed as submitted. Cogema's proposed modifications were viewed by the AECB as presenting environmental impacts that were less than those predicted for the initial project and, as such, could therefore be adequately controlled. Nonetheless, on May 9, 1994, the AECB invited public comment on the details of proposed modifications to the mining method at DJX to ensure that there was no significant public concern regarding Cogema's application. After the June 10, 1994, deadline for receiving comments on the proposal, the AECB concluded that the project could proceed as re-submitted.

On July 29, 1994, the AECB referred the proposal for a redesigned Midwest Joint Venture to the Minister of Environment Canada for public review. It was proposed that the project be reviewed by the existing Joint Panel, and that the review could be combined with that of the Cigar Lake project. Proposed ToR were prepared in close consultation with Saskatchewan's Department of Environment and Resource Management (SERM) and the Federal Environmental Assessment Review Office (FEARO). On November 9, 1994, the revised MJV uranium mining proposal was referred by the federal and provincial environment ministers for review by the Joint Panel. At the same time, ToR for assessing the project were released, and notification was given that C\$75 000 in participant funding was being made available to assist the public in the environmental hearings. It was expected that the EIS for the MJV and the Cigar Lake project would be submitted early in 1995 so that the public review process could begin as soon as possible.

On December 16, 1994, the AECB announced that the construction licence for the McClean Lake project had been amended to permit changes to the milling process.

Additional Production Possibilities

Beyond the existing production centres discussed, there are several uranium projects, including those noted above, that could be brought on stream over the next several years. The start-up dates of these projects depend upon receiving the necessary approvals, developments in the international uranium market, and economic decisions made by the project owners. The summary outlined in Table 5 provides an update on uranium development projects that will form the basis of uranium production capability in Canada well into the future.

OTHER DEVELOPMENTS

Cameco Privatization

In a share offering that closed September 15, 1994, the Government of Canada and the Government of Saskatchewan both sold two million Cameco shares at a price of C\$25.50 each, continuing the privatization process that began after the 1988 merger of two Crown corporations (Saskatchewan Mining Development Corporation and Eldorado Nuclear Limited) into Cameco Corporation. This sale reduced provincial government ownership in Cameco to 34.9% and dropped federal government ownership to 5.7%. An additional 5.1% reduction in provincial ownership occurred by October 1, 1994, when special warrants issued in late 1991 by the Saskatchewan government were fully exercised. As of mid-October, the public held 64.5% of the more than 52 million outstanding shares of Cameco.

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 will be offered 3 million shares for C\$30.75 per share, with the closing date on or about February 9, 1995. When fully subscribed, this final federal offering will result in Cameco being owned approximately 70% by the public and 30% by the Government of Saskatchewan.

Financial Assurances for Decommissioning of Uranium Mine Sites

In November 1994, the AECB amended its Uranium and Thorium Mining Regulations to require uranium producers to provide financial assurances at the beginning of operations that sufficient funds will be available for the eventual decommissioning of their sites. This change will ensure that taxpayers do not bear future decommissioning costs associated with the clean-up of uranium mine sites.

EXPLORATION

In 1994, the Uranium Resource Appraisal Group (URAG) of Natural Resources Canada (NRCAN) completed its twentieth annual assessment of Canada's uranium supply capabilities and an associated survey of uranium exploration activity. The results were reported¹ in the third quarter of the year.

As has been the case for almost a decade, uranium exploration activity in 1993/94 was concentrated in areas favourable for the occurrence of deposits associated with Proterozoic unconformities, most notably in the Athabasca Basin of northern Saskatchewan. Exploration expenditures of C\$40 million in 1993 were down from 1992 (C\$46 million), in part reflecting continued low spot prices and limited market opportunities. About three quarters of this most recent annual expenditure reported by URAG is attributable to the advanced underground exploration and deposit appraisal activities at Cigar Lake, McArthur River and Eagle Point, all in northeastern Saskatchewan. Uranium exploration and surface development drilling during the 1993/94 field season reached 62 000 m according to the URAG survey, a sharp decrease from the 79 000 m reported for 1992/93. In comparison, the Saskatchewan government has estimated that grassroots uranium exploration in the province reached C\$11 million in 1994, up from the C\$7 million (actual) reported for 1993.

In 1993, the number of companies participating in active exploration projects stood at 20, about the same as in 1992. Overall, some 38 exploration projects remain in good standing. Seven major active operators² spent virtually the entire C\$40 million committed in 1993; in alphabetical order they were: Cameco Corporation, Cigar Lake Mining Corporation, Cogema Resources Inc., Minatco Ltd. (now owned by Cogema), PNC Exploration (Canada) Co.

Ltd., Uranerz Exploration and Mining Limited, and Urangesellschaft Canada Limited (majority owned by Cogema).

Table 4 summarizes uranium exploration activity in Canada from 1976 to 1993; it shows that from 1982 to 1989, the number of "million-dollar" projects remained relatively constant, but that since 1990 there has been a decline to pre-1980 levels.

RESOURCES

A critical component of NRCAN's annual assessment of domestic uranium supply capabilities is the compilation of estimates 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.

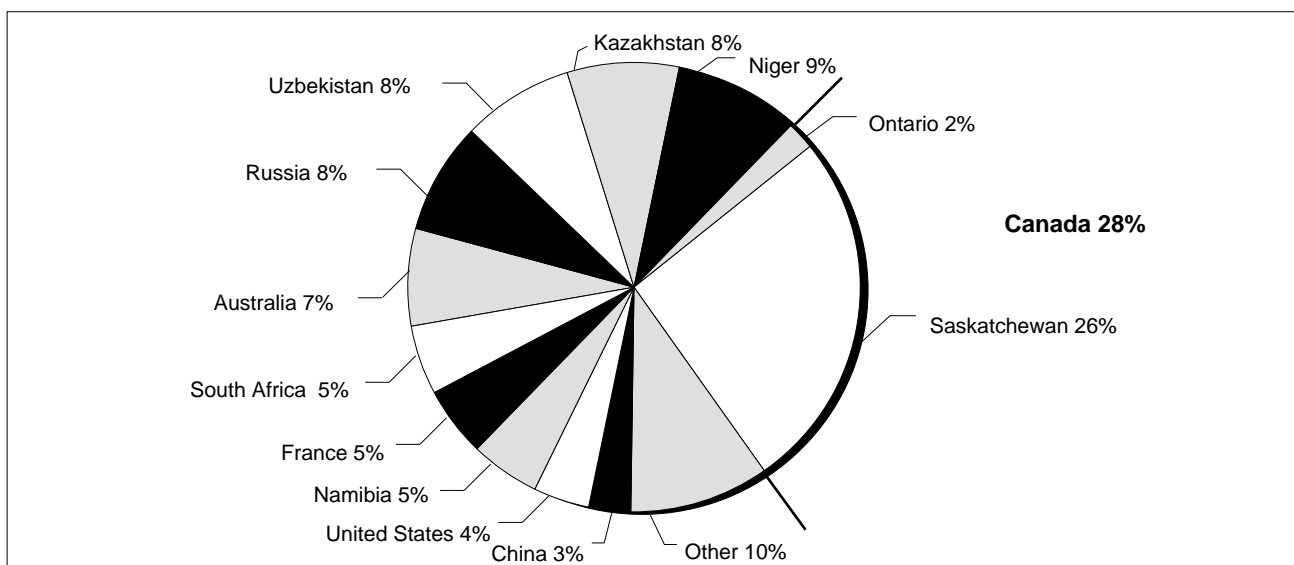
With the deterioration of the uranium market and low uranium prices, the latest URAG assessment of Canada's known uranium resources was again restricted to those resources recoverable from mineable ore at prices of C\$150/kgU or less. Table 6 provides a breakdown of the estimates of Canada's known uranium resources as of January 1, 1994, compared with those of the previous year, which was the first year in which estimates were not made for resources recoverable from mineable ore at prices between C\$150 and C\$300/kgU.

It is important to note that as of January 1, 1994, total recoverable known uranium resources were estimated at 475 000 tU, and that in each year since January 1, 1990, there have been steady increases in the total estimates reported due to continued exploration successes in northern Saskatchewan and the Northwest Territories. These increases have occurred despite production exceeding 35 000 tU in this period, and despite the continued downward adjustment of resources at Elliot Lake, 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 1993, uranium producers avoided selling on the spot market, geared output to their existing contract commitments, and balanced production levels as their projects with replacement reserves proceeded through the environmental review process. In 1994, some of those projects were successfully advanced and some producers were able to increase uranium production in response to new marketing opportunities. However, output continues to remain below

Figure 4
World Uranium Production, 1993
 33 000 tonnes



Source: Uranium Division, Electricity Branch, Natural Resources Canada.

nominal production capability, which currently is in excess of 10 000 tU. Significantly higher uranium prices will be required to bring Canada's uranium production up to full capability.

Projecting Canada's short-term uranium availability has become somewhat problematic in the 1990s. 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 make it difficult to project future production capability levels with much certainty.

Presenting an historical perspective, Table 7 places Canada in a broader context with respect to actual uranium production from 1988 to 1993 inclusive, while Figure 4 illustrates Canada's share of world output in 1993 in comparison with the other major world producers.

THE URANIUM MARKET

Overview

World uranium production remained well below reactor requirements in 1994 as accumulated inventory, especially from Russia, continued to reach the market. The potential availability of more than 500 t of highly enriched uranium (HEU) – equivalent to more than 150 000 tU – from dismantled FSU nuclear weapons added to the concerns of traditional uranium suppliers.

In 1994, Canada enhanced its position as the world's leading uranium supplier as its uranium marketers signed new export contracts for the delivery of more than 15 000 tU. This level of new business, nearly quadruple that of 1993, offsets those years of leaner sales volumes experienced since 1989. Destined to be exported to consumers among the range of countries shown in Table 8, the 1994 sales do not reflect contract amendments and the exercising of quantity-flexibility options under existing contracts.

By country of buyer, Table 8 also indicates 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, 1995, forward commitments under all export contracts exceeded 42 000 tU. The development of several new Saskatchewan orebodies, related to projects that have cleared the public environmental review process, should form the basis of continued production well into the next century.

Notwithstanding the uncertainty about the future level of exports from the FSU, which continues to cloud the outlook in the near-term market, Canada's uranium producers are very competitive and well placed to meet future demands.

Marketing Activity of the Former Soviet Union (FSU)

Since 1988, the Western uranium industry has been adversely impacted by active Soviet marketing in the West. This has exacerbated an already depressed

uranium market, leading to historic low prices in real terms, many mine closures and cutbacks in production levels, and an increasing concentration of ownership in the international uranium production industry. The disintegration of the Soviet Union at the end of 1991 has led to a fragmentation of the uranium industry in the FSU, compounding the problem through increased competition among individual uranium production *kombinats* in their quest for hard currency.

With domestic requirements being met from large civilian inventories, the FSU's entire current uranium output, as well as significant inventory, became available for export. The rapid increase in exports to the United States resulted in a U.S. anti-dumping investigation being initiated in 1991. This in turn led to the signing of quantitative restraint agreements, containing price-tied import quotas, with the six FSU uranium-producing republics in October 1992. The European Union also responded to the increased imports from the FSU by imposing quotas on individual utilities, administered on a flexible case-by-case basis.

However, the market price in the United States did not rise sufficiently to allow imports from Russia, and Russia took advantage of a clause in its agreement allowing for renegotiation. In December 1993, the United States and the Russian Federation agreed to amend the suspension agreements between the two countries. Effective in 1994 and 1995, the amendment would allow a specified quantity of Russian uranium to be imported into the United States provided it is matched on an equal basis with newly produced U.S. uranium supplied by a U.S. producer. Under the terms of the amendment, the price received by the U.S. producer must be at least equal to the final price paid by the U.S. utility consumer; this would effectively allow "dumped" Russian uranium to subsidize higher-cost U.S. producers, in competition with Canadian and other international producers. The allowed quantities would be very large in relation to the available market, and would very likely lead to further price suppression. The threat that similar amendments for matched sales would be negotiated with other FSU Republics, and that an agreement might also be concluded between the United States and Russia permitting the blending down of HEU from Soviet nuclear weapons for commercial use, significantly heightened market uncertainty.

On January 7, 1994, Canada presented a Diplomatic Note to the United States pointing out that the U.S.-Russia amendment would endanger the viability of Canada's uranium production industry and would be inconsistent with the obligations of the United States under the North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT). Canada was not alone in requesting that U.S. authorities address the matter; several

other uranium-producing countries and companies also made formal representations to the U.S. government. Despite the protest, the U.S.-Russia amendment was signed on March 11, 1994. The situation was further exacerbated by the finalization, on January 14, 1994, of a second agreement between the United States and Russia that allowed HEU to be blended down and marketed for commercial use.

Canada challenged the amendment, and consultations commenced under the NAFTA dispute settlement mechanism. Supporting the foreign policy and non-proliferation objectives of the United States with respect to the amended suspension agreement and the HEU agreement, Canada maintained that U.S. objectives could be accomplished in a manner that would be less disruptive to the uranium market. A first round of talks was held in Washington on April 14, a second round was held June 23, and the third and final round was held October 20, 1994. By early 1995, an agreement to resolve the dispute to the mutual satisfaction of all parties had been tentatively reached. Significantly, the United States was expected to confirm that the uranium derived from the retirement of Soviet nuclear weapons would be subject to the quotas and restrictions of the suspension agreement. The disposition of this material for use as commercial nuclear fuel will take place over a period of many years, minimizing the impact on the world uranium market.

In terms of market impact by the end of 1994, one matched spot sale of some 100 tU had been announced under the U.S.-Russia amended suspension agreement, with indications that several more potential matched sales were under review. The first delivery of low enriched uranium (LEU) converted from HEU under the U.S.-Russia agreement was delayed until 1995 due to technical problems.

Other FSU Suspension Agreement Amendments

In October 1994, the U.S. Department of Commerce (DOC) and the Government of Uzbekistan initialled an amendment to the Uzbekistan suspension agreement governing uranium imports to the United States. With an effective life of 10 years, the amendment provides for an annual sales quota of about 170 tU for the first two years and for varying amounts, depending on U.S. output levels, for the next eight years. The new quotas were not expected to have a significant effect on the uranium market. It was anticipated that subsequent discussions between the United States and the Government of Kazakhstan concerning an amendment of the Kazakh suspension agreement would likely produce similar results. By year-end, the United States had negotiated amendments to agreements with both Kazakhstan and Uzbekistan.

Uranium Prices

Throughout 1993 and 1994, two distinct uranium spot market segments persisted due to the commercial restrictions placed on uranium from the FSU in the markets of the United States and the European Union. As reported by NUEXCO,³ the "restricted market" price applicable in the United States, and to non-FSU uranium delivered outside the United States, jumped to US\$10.50/lb U₃O₈ immediately following the signing of the anti-dumping suspension agreements between the United States and the various republics of the FSU in October 1992. It settled into a trading range of US\$9.70-\$10.20/lb U₃O₈ throughout 1993, and declined from US\$9.50/lb to US\$9.05/lb U₃O₈ between January and October 1994. It then surged 6% in the last two months of 1994 to end the year at US\$9.60/lb U₃O₈, well above the annual average price of US\$9.31/lb U₃O₈.

In contrast, the "unrestricted market" price, reported by NUEXCO and applicable to all deliveries of uranium from the FSU outside of the United States, fell from US\$8.00/lb in October 1992 to US\$6.90/lb U₃O₈ by August 1993. It drifted between US\$6.90 and \$7.10/lb U₃O₈ until October 1994, when it too jumped from US\$7.00 to \$7.20/lb U₃O₈ by year-end.

In comparison with the recent trend in the spot market price, the average price of all Canadian export deliveries fell from C\$59/kgU (US\$19/lb U₃O₈) in 1992 to C\$50/kgU (US\$15/lb U₃O₈) in 1993. This trend continued in 1994 with the export delivery price reaching C\$51/kgU (US\$14/lb U₃O₈); the price rise in terms of Canadian dollars was merely a func-

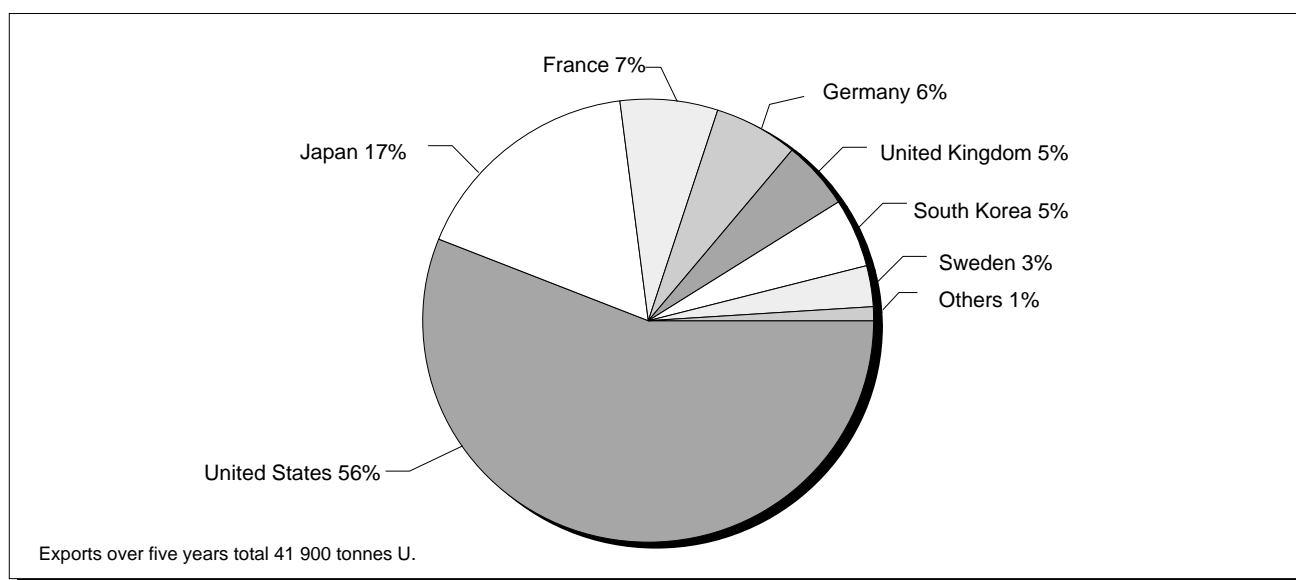
tion of the exchange rate. The decline in Canada's uranium export price from the late 1980s reflects the ongoing completion of older, higher-priced export contracts, mainly with Ontario producers. Increasingly, new Canadian uranium export contracts are being negotiated with much more favourable pricing arrangements for producers. This will tend to offset future declines in the Canadian export price brought about by the completion of the above-mentioned older contracts.

As has been the case in five of the last six years, less than 1% of Canada's deliveries for export in 1994 were made as spot sales, compared with a high of 35% in 1987 and the previous level of 1% in 1981. For comparison, the average price of Canadian deliveries for export from 1974 to 1994 is reported in Table 9. Table 10 shows actual exports of Canadian-origin natural uranium from 1988 to 1993 for Canada's principal export customers; actual exports in 1994 are expected to match those of 1993. The destination of Canadian exports of uranium in concentrates on a cumulative basis (1989-93 inclusive) is illustrated in Figure 5, which highlights the importance of the United States as a customer.

Other Developments

Effective January 1, 1994, Cameco acquired Geomex Minerals Inc., a U.S. uranium mining company whose major asset is a 30.8% interest in the Crow Butte in-situ leach uranium mine in Nebraska. Cameco announced its C\$14 million purchase on February 17, 1994, noting that it was acquiring direct access to a competitive U.S. source of production and an

Figure 5
Canadian Uranium Exports, by Country of Final Destination, 1989-93



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

enhanced presence within its largest market. Cameco's share of Crow Butte's annual low-cost production is about 75 tU, with potential for a substantial increase; its two other major partners in the Crow Butte project are Uranerz U.S.A. (55%) and KEPCO Resources America Ltd. (10%).

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, with a nominal annual throughput capacity of some 10 000 tU as UO_3 , processes uranium concentrates from several countries. While the depressed conversion market and Cameco's decision to limit production saw refinery output in 1992 decline to 5914 tU as UO_3 from the 1991 level of 9198 tU as UO_3 , annual production increased 16% to 6833 tU as UO_3 in 1993. As an intermediate product, UO_3 production must generally match the uranium conversion services requirements at the Port Hope facilities. Output from Blind River increased significantly in 1994 to a level estimated to be in excess of 9000 tU as UO_3 .

During 1993, the Blind River refinery completed the development of an innovative process to convert by-product solvent-extraction solutions into a dry powder form. Regulatory approval of this C\$10 million project was received in 1993 and, with construction of the new facility expected in March 1995, full start-up is anticipated in May 1995. In the past, by-product solutions were transported to mines at Elliot Lake for reprocessing and extraction of the remaining uranium. However, with the planned closure of the Stanleigh operation by 1997, an environmentally safe and efficient method was required to store and eventually dispose of this material. The new process will accomplish this objective.

The Port Hope facilities, with a capacity of some 10 500 tU as UF_6 and 2500 tU as UO_2 , resumed simultaneous operation in 1992, but at reduced levels. While combined 1992 production fell to 5481 tU from 8983 tU in 1991, overall throughput increased 43% in 1993 to 7853 tU as sales volumes of uranium conversion services grew significantly. The improvement in the conversion market in 1993 was 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. Overall production at Port Hope also increased significantly in 1994 to a level estimated to be in excess of 9000 tU.

NUCLEAR POWER DEVELOPMENTS

As in previous years, developments in Canada in 1994 had an important impact on the domestic nuclear program. By October 1994, the combined generating capacity of Canada's 22 in-service CANDU reactors approximated 15 437 megawatts electric (MWe) (Table 11), at which time more than 19% of Canada's electric power was nuclear-generated; in Ontario, nuclear-generated electricity reached 61%, and in New Brunswick it was 32%.

On April 10, 1994, Unit 7 at the Pickering Nuclear Generating Station, east of Toronto, Ontario, set a new world record by attaining 713 days of continuous on-line power generation. The previous record was held by Oldbury Unit 1, a 230-MW MAGNOX reactor in Great Britain. The Pickering reactor had a phenomenal 894 days of continuous operation until it was shut down for scheduled maintenance on October 7, 1994. At the neighbouring Pickering Unit 2, a small loss of coolant accident (LOCA) occurred on December 10, 1994, which was assigned a rating of 2 on the International Nuclear Event Scale (INES). An air-line failure caused a pressure relief valve of the primary heat transport system to open, resulting in subsequent valve openings and a break in the line of a bleed condenser relief valve. The resulting coolant losses activated the emergency coolant injection system. Within a few hours, valves had been closed manually and the reactor was placed in a depressurized shut-down cooling mode.

The economic recession impacted heavily on electricity demand and on Ontario Hydro's financial situation. On February 14, 1994, Ontario Hydro's Board of Directors announced that surplus generating capacity would be reduced by about 2700 MWe during 1994/95. Four fossil-fired units (at the Lambton and Lennox stations) and one nuclear unit (at the Bruce Nuclear Generating Station) will be mothballed; Bruce Unit 2 is to be shut down in June 1995.

In terms of lifetime performance to late 1994, seven CANDUs are among the top 25 of some 369 reactors rated over 150 MW worldwide. For several years the Point Lepreau reactor in New Brunswick has ranked among the top three reactors in the world; its lifetime capacity factor as of September 1994 was 91.2%. The Wolsong CANDU in the Republic of Korea had a remarkable operating record in 1993 with a capacity factor of more than 100%, and to late 1994 it had a lifetime capacity factor of 83.5%. The other top-performing CANDUs are Pickering 7, Pickering 8, Darlington 4, Pickering 6, and Bruce 5, all in Ontario, with lifetime capacity factors as of the end of September 1994 ranging from 88.5% to 82.6%, respectively.

Internationally, construction of three CANDU 6 units is on track at the Wolsong site, where an aggressive timetable is being followed. In-service dates for Wolsong 2, 3 and 4 are June 1997, 1998 and 1999, respectively. First criticality at the initial CANDU

unit in Romania was planned for February 15, 1995, with the scheduled reactor in-service date set for June 26, 1995.

On November 7, 1994, Canada successfully concluded negotiations on a Nuclear Cooperation Agreement (NCA) with China, jointly signed by Canada's Prime Minister Jean Chrétien and Chinese Premier Li Peng. The NCA meets all of Canada's nuclear non-proliferation policy requirements and has enabled Atomic Energy of Canada Limited (AECL) to initiate discussions on the sale of CANDU reactors to China. The construction of two CANDU 6 units at the Qinshan site was the focus of a Memorandum of Understanding signed by AECL and the Chinese National Nuclear Corporation on November 8, 1994. Financing is expected to be a key factor in the negotiations.

Globally, 424 nuclear power plants were operating at the end of 1994. Combined nuclear generating capacity has grown to 340 gigawatts electric (GWe), an increase of some 8% from five years earlier. With 54 nuclear reactors under construction at year-end 1994, total world nuclear generating capacity could increase a further 10% to about 372 GWe by the end of this century.

OUTLOOK

In 1994, total uranium production and shipments in Canada approached 9600 tU and 11 200 tU, respectively, their highest levels since the late 1980s. Despite uncertainty in the international uranium market, Canada's uranium industry 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 year-end rise in uranium spot market prices has given some encouragement to Canada's uranium industry. Moreover, the prospect of a settlement to the Canada-U.S. NAFTA dispute, which would inject more clarity into the future of the market, may help reassure producers as they continue to advance their remaining new mining proposals through the environmental review process. These projects will form the basis of continued production well into the next century, as the shift in domestic uranium production from Ontario to the world-class, low-cost deposits of Saskatchewan continues.

In the longer term, there is significant potential for the discovery of additional uranium resources in Canada, and policies are in place to encourage investment in the industry and to maintain Canada's role as a reliable and very competitive supplier to its trading partners. A firm 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 other

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 "Canada Supplies 28% of World Uranium" – NRCan Mailing, September 21, 1994.

² 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 URAG survey are accounted for in the C\$40 million total.

³ NUEXCO, an international uranium brokerage firm, originally called the Nuclear Exchange Corporation.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 60. (2) Information in this review was current as of February 1, 1995.

TABLE 1. URANIUM PRODUCTION IN CANADA AND WORK FORCE SUMMARY, 1992 AND 1993

Province and Producer	Total Work Force ¹ (Dec. 31)		Annual Output ² (tU)	
	1992	1993	1992	1993
ATHABASCA BASIN, SASKATCHEWAN				
Cluff Mining (Cogema Resources Inc., 100%)	115	114	742	867
Key Lake JV (Cameco, 67%; Uranerz, 33%)	392	397	5 452	5 315
Rabbit Lake JV (Cameco, 67%; Uranerz, 33%)	230	245	2 160	2 313
Subtotal	737	756	8 354	8 495
ELLIOT LAKE, ONTARIO				
Denison Mines Limited ³	4	6	268	0
Rio Algom Limited Stanleigh	569	558	675	660
Subtotal	573	564	943	660
Total	1 310	1 320	9 297	9 155

Sources: Company annual reports; Atomic Energy Control Board open files.

¹ Figures (rounded) are for company employees only; on-site contractors are not included. ² Primary output only. In 1993, an additional 30 tU was recovered by the Elliot Lake producers from Cameco's refinery/conversion facility by-products, compared with about 40 tU in 1992. 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. ³ The Denison mine was permanently closed in March 1992.

TABLE 2. VALUE¹ OF URANIUM SHIPMENTS² BY PROVINCE, 1989-94

	Unit	1989	1990	1991	1992	1993	1994 ^p
Ontario producer shipments	tU	4 099	4 597	1 288	1 027	ND	ND
Value of shipments	\$ millions	501	627	271	173	ND	ND
Saskatchewan producer shipments	tU	6 896	5 123	6 911	8 125	ND	ND
Value of shipments	\$ millions	412	261	333	400	ND	ND
Total producer shipments	tU	10 995	9 720	8 199	9 152	8 727	11 200
Total value of shipments	\$ millions	913	888	604	573	497	585

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, 1993

Operating Entity/ Operator and Location	Ore-Processing Plant ¹			
	Capacity	Recovery	Annual Throughput	
	Nameplate/ Actual	Overall	Ore Total	Ore Grade
	(t/d)	(%)	(t)	(%)
Cluff Mining (Cogema operator) Cluff Lake, Saskatchewan	+ 900/ 770	99	103 000	0.85
Rabbit Lake JV (Cameco operator) Rabbit Lake, Saskatchewan	2 500 ^e / 2 360 ^e	96	355 000	0.68
Key Lake JV (Cameco operator) Key Lake, Saskatchewan	+ 800/ 810 ^e	98	288 000	1.88
Stanleigh Mine (Rio Algom operator) Elliot Lake, Ontario	+ 4 500/3 200	95	912 000	0.087

Sources: Corporate annual reports; Atomic Energy Control Board open files.

^e Estimated.

¹ Figures are rounded.

TABLE 4. URANIUM EXPLORATION ACTIVITY IN CANADA, 1976-93

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

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 31, 1994

Project, Province/Operator	Owners Share	Deposit Type/ Discoverer and Discovery Date	Resources (Company Estimates)	Ore Grade and Notes on Deposits	Mining Method/ Milling and Capacity Rate	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 148 000 tU, <i>geological, i.e., in-situ</i>	7.7% U average at depth of 450 m; grades can exceed 50% U	Underground by "non- entry" methods; output capacity 4600 tU/y; using existing mills studied as alternative to new mill	C\$500 million project; test mining completed in 1992; EIS expected by mid-1995; public hearings likely in 1995	670 km N of Saskatoon; 500-m-deep shaft sunk; freezing of ore zone to permit mining; earliest start-up in 1998
McClellan Lake, Sask./Minatco Limited (<i>Wolly Project</i>)	Cogema (70), Denison (22.5), OURD (7.5)	Unconformity-related/ original McClellan by CanOxy/Inco 1979-80; Jeb & Sue from 1982 to 1990 by Minatco	Overall property 17 000 tU, <i>mineable</i>	2.7% U average overall; open-pit depths from 20 to 145 m; McClellan ore underground 2% U at depth of 170 m	75% by open pit at Jeb, Sue A, B & C; under- ground at McClellan; co- enterprise mill capacity 2300 tU/y	C\$200 million project with Midwest; 1993 public hearings and approval to proceed; 1994 AECB licensing	350 km N of La Ronge; mining at JEB expected in 1995 with milling by 1997; mine-life of the co-enterprise = 2010
South McMahon Lake, Sask./Minatco (<i>Midwest Project</i>)	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 14 000 tU, <i>geological, i.e., in-situ</i>	3.8% U average at depth of 200 m; grades down to 2.5% U can be processed	Underground "non-entry vertical panel" mining; milling at McClellan at 2300 tU/y capacity	Co-venture with McClellan Lake; 1993 public hearings led to rejection of proposal as submitted	710 km N of Saskatoon; 185-m-deep shaft sunk and test mining; new operator to resubmit EIS for approval
McArthur River, Sask./Cameco Corporation	Cameco (53.991), Uranerz (29.775), Cogema (16.234)	Unconformity-related/ Cameco 1988	Overall property 100 000 tU, <i>geological, i.e., in-situ</i>	4.2% U average at depth of 500-570 m; 25 m of ore at 36% U; silicified sandstone/clay alteration missing Ni/As	Underground by "non- entry" methods; milling at Key Lake where licensed capacity is 5700 tU/y	C\$100 million project; UEP in 1993; EIS to be submitted by mid-1995; public hearings likely in 1995	70 km NE of Key Lake; start- up by 1997/98; will extend mine life at Key Lake well beyond 2010
Kiggavik, N.W.T./ Urangesellschaft Canada Limited	Urangesellschaft (79), CEGB Expl'n (20), Daewoo Corp. (1)	Unconformity-related/ Urangesellschaft 1977	Overall property 15 000 tU, <i>mineable</i> ; tributary resources much larger (incl. Andrew Lake)	0.41% U average overall; depth Centre pit 100 m, Main pit 200 m	Open-pit methods; 1200 t/d mill feed; 1200 tU/y	EIS submitted but reviewed as deficient; new EIS delayed; project under review	75 km W of Baker Lake; start- up not likely before 2000; >11-year mine life with tributary ore
EXTENSIONS OR EXPANSIONS TO EXISTING OPERATIONS							
Dominique-Janine Extension (DJX) at Cluff Lake, Sask./ Cluff Mining	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 by Amok 1980-86	D-J Extension (DJX), 5250 tU <i>mineable</i> ; overall property 16 000 tU <i>mineable</i>	Mill-feed grade for 1993 was 0.85% U; DJX report- edly 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 1500 tU/y; milling at half capacity 1993/94, but increasing for full operations by 1996	C\$10 million project; 1993 public hearings and approval to proceed; 1994 AECB licensing after major project revision	720 km N of Saskatoon; revised three-phase mine plan offers more production flex- ibility; mine life well 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 for Rabbit Lake (depleted 1984); 1971-79 for Collins Bay ("B" pit depleted 1991); 1980 for Eagle Point	Eagle Point et al, 20 000 tU <i>mineable</i> & 13 800 tU <i>geological/ in-situ</i> ; overall property 37 100 tU (incl. stockpiles)	Mill feed grade for 1993 was 0.68% U; <i>mineable</i> resources grade 1.16% U for Eagle Point, 3.45% U for Collins "A&D" and 0.5% U for Collins "B"	Underground by "non- entry" methods at Eagle Point, open pit for remainder; licensed mill capacity 5400 tU/y; mill below capacity but to be increased in 1995	Test mining at Eagle Point during 1992/93; federal EARP Panel reviewed EIS in 1993; 1994 approval to proceed and AECB licensing	805 km N of Saskatoon; mining of Eagle Point ore at full-scale since late June 1994; expansion will extend mine life beyond 2020

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, 1993, AND JANUARY 1, 1994

Price Ranges Within Which Mineable Ore is Assessed ²	Measured		Indicated		Inferred	
	1/1/93	1/1/94	1/1/93	1/1/94	1/1/93	1/1/94
	(000 tU)					
Up to C\$100/kgU	47	64	230	214	31	35
C\$100 to \$150/kgU	1	<1	119	119	43	43
Total	48	64	349	333	74	78

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 1992/93 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 URAG to illustrate those resources that were of economic interest to Canada during this period.

Note: \$1/lb U₃O₈ = \$2.6/kgU.

TABLE 7. PRODUCTION OF URANIUM IN CONCENTRATES BY SELECTED MAJOR PRODUCING COUNTRIES, 1988-93

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

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.

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, India, Israel, Japan, Portugal, Spain and Yugoslavia; from 1990 includes Pakistan and Hungary; in 1992, includes Bulgaria, China, the Czech Republic, Kazakhstan, Mongolia, Romania, Russia, Ukraine and Uzbekistan. ³ Totals are of the listed figures only.

Note: Country figures are rounded to the nearest 10 tU.

TABLE 8. CANADIAN URANIUM UNDER EXPORT CONTRACTS¹

Country of Buyer ²	Tonnes U
Argentina ³	69
Belgium	2 898
Finland	2 864
France	17 739
Germany	15 170
Italy	1 115
Japan	23 851
South Korea	8 042
Spain	4 068
Sweden	9 628
Switzerland	154
United Kingdom	7 667
United States	79 227
Total	172 492

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, 1994. 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 1974-94

Year	Average Export Prices		Spot Sale Portion of Deliveries
	Current Dollars	Constant 1994 Dollars	
	(C\$/kg/U ²)		(%)
1974	39	109	n.r.
1975	52	133	n.r.
1976	104	245	n.r.
1977	110	243	n.r.
1978	125	261	n.r.
1979	130	247	n.r.
1980	135	231	n.r.
1981	110	170	1
1982	113	161	1.5
1983	98	133	10
1984	90	118	26
1985	91	117	20
1986	89	111	21
1987	79	94	35
1988	79	90	13
1989	74	81	<1
1990	71	75	<1
1991	61	63	<2
1992	59	60	<1
1993	50	50	<1
1994	51	51	<1

n.r. Not reported.

¹ NRCan's Uranium Resource Appraisal Group (URAG) 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 U₃O₈.

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, 1988-93

Country of Final Destination	1988	1989	1990	1991	1992	1993
(tonnes of contained uranium ¹)						
Argentina	–	–	–	19	20	29
Belgium	153	190	–	–	–	–
Finland	151	71	83	–	–	–
France	964	696	799	822	111	461
Germany	806	615	220	459	534	665
Indonesia	–	1	–	–	–	–
Italy	–	46	–	–	–	–
Japan	717	1 729	2 005	399	2 328	523
South Korea	874	635	339	215	104	715
Spain	100	97	–	–	–	–
Sweden	783	497	285	91	170	–
United Kingdom	1 204	871	882	498	19	–
United States	4 682	3 950	4 035	5 307	4 032	6 291
Total	10 434	9 398	8 648	7 810	7 318	8 684

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 OCTOBER 1994

Reactors	Owner	Net Capacity (MWe)	In-Service Dates
Pickering 1 to 4	Ontario Hydro	2 060	1971-73
Bruce 1 to 4	Ontario Hydro	3 076	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)		15 437	

¹ The New Brunswick Power Corporation.