

Uranium in Canada

(Updated 27 May 2010)

- Canada was the world's largest uranium producer for many years, accounting for about 22% of world output, but in 2009 was overtaken by Kazakhstan.
- Production comes mainly from the McArthur River mine in northern Saskatchewan province, which is the largest in the world.
- Production is expected to increase significantly after 2011 as the new Cigar Lake mine comes into operation.
- With known uranium resources of 499,000 tonnes of U_3O_8 (423,000 tU), as well as continuing exploration, Canada will have a significant role in meeting future world demand.



Canada is a country rich in uranium resources and a long history of exploration, mining and generation of nuclear power (for coverage of nuclear power, see information page on [Nuclear Power in Canada](#)). Exploration for uranium ore began in earnest in 1942 under direction of the government for military purposes. A wartime ban on private prospecting was lifted in 1947, which led in the early 1950s to the discovery of major deposits near Elliot Lake, Ontario, and northern Saskatchewan. By 1959, 23 mines and 19 treatment plants were in operation, and Canada's C\$330 million in uranium exports exceeded the value for every other mineral.

A second burst of exploration in the 1970s resulted in major discoveries in the Athabasca Basin in northern Saskatchewan. Mines at Rabbit Lake, Cluff Lake and Key Lake started up in 1975, 1980 and 1983, which up until 2000 accounted for most of Canada's uranium production (14,223 tonnes of U_3O_8 in 1998). Cluff Lake, Key Lake and the original open pit at Rabbit Lake have now been

mined out (underground mining continues at Rabbit Lake). Mines that began operation just a decade ago now contribute most of Canada's production (see also Appendix 1: [Brief History of Uranium Mining in Canada](#)).

Current production

Canada produced 10,617 tonnes of U_3O_8 in 2008, and in 2009 production was 11,997 tonnes U_3O_8 (10,173 tU) – 20% of world total. Most of this comes from its third generation mines, which started operation in 1999 at McClean Lake and McArthur River in northern Saskatchewan (the Rabbit Lake mine in the same region is the third source).

The main uranium producers are Cameco and Areva Resources Canada (formerly Cogema Resources), part of France's Areva Group. Cameco was formed in the 1988 merger of Saskatchewan Mining Development Corporation and the government-owned Eldorado Nuclear Ltd. The company issued its first public shares in 1991 and was fully privatized in 2002.

In the early 1990s, the Saskatchewan government had considered phasing out uranium mining in the province. This policy was later reversed after a joint Federal-Saskatchewan study panel on health, safety, environment and socio-economic impact found that the jobs provided by the industry would be hard to replace and that the environmental impact of mining could be minimized. Today, the provincial government actively supports uranium mining, and all new Saskatchewan uranium mines have international ISO 14001 environmental certification.

Annual uranium production (tonnes U_3O_8)^a

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| McArthur River | | 4409 | 7830 | 8490 | 6877 | 8491 | 8491 | 8492 | 8492 | 7528 | 8654 |
| Key Lake | 4400 | 474 | 353 | * | * | - | - | - | - | - | - |
| McClean Lake | 660 | 2722 | 2994 | 2762 | 2734 | 2724 | 2490 | 814 | 867 | 1476 | 1637 |
| Rabbit Lake | 3175 | 3290 | 2070 | 519 | 2690 | 2462 | 2732 | 2326 | 1821 | 1613 | 1706 |
| Cluff Lake | 1455 | 1702 | 1496 | 1918 | 32 | - | - | - | - | - | - |
| Total | 9690 | 12597 | 14743 | 13689 | 12333 | 13676 | 13713 | 11632 | 11180 | 10617 | 11997 |
| cf. World | 36643 | 40962 | 42886 | 42529 | 41998 | 47430 | 49052 | 46499 | 48680 | 51611 | 59772 |

Domestic production in tonnes of uranium (as opposed to U_3O_8) is given in [Note a](#).

Canadian uranium exports (tonnes uranium)^b

| | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------------------|-------|------|-------|-------|-------|
| Canadian production | 11628 | 9863 | 9477 | 9000 | 10173 |
| Less: domestic use | 1607 | 1620 | 1661* | 1670* | 1675* |
| Canadian export | 10021 | 8243 | 7816 | 7330 | 8498 |

McArthur River

The McArthur River uranium mine is the world's largest, with enormous reserves (about 150,000 tonnes U_3O_8) of high grade ore (21%) located 600 metres underground. Remote control raise boring methods are used to mine the ore, which is then trucked 80 km south to be milled at Key

Lake, site of the closed mine that once produced 15% of the world's uranium. At the mill, which has been modified for the McArthur River ore, the ore is blended with 'special waste rock' and processed to produce U_3O_8 . Tailings are deposited in a mined-out pit. The licensed capacity of the Key Lake mill is basically 8,485 t/yr, but after Cameco applied for an increase to 10,000 t/yr permission was given for production up to 9,250 t/yr to catch up earlier year shortfalls. It is now seeking to expand this to 11,340 t/yr U_3O_8 .

Cameco is the majority owner and operator of McArthur mine as well as the Key Lake Mill (Areva is a 30.2% and 16.7% partner, respectively). Areva has applied for a licence to process some McArthur river ore at McClean Lake.

Other deposits close to McArthur River are prospective.

McClean Lake

After starting operation in mid-1999, McClean Lake produced about 2500 t/yr of U_3O_8 from 2.4% ore up until 2005, although production was well down in 2006 through to 2009 due to lower ore grades. The mine has now been relicensed at 3640 t/yr. Operations have comprised three open pits, with an underground mine planned for the future. McClean Lake also has high-quality new plant and infrastructure. It uses the first mined-out pit for tailings disposal.

The mill has been expanded to 5,500 t/yr U_3O_8 to accommodate the ore that eventually will be shipped from the Cigar Lake mine now under construction (see section on [Cigar Lake](#) below). Areva says that the mill is the most technologically-advanced in the world, being able to treat ore from less than 1% to 30% U. Efforts to increase production to fill the gap left by the delay in Cigar Lake production have had limited success, and development of the nearby small Caribou deposit awaits improved economic conditions. Mining of Sue E deposit 2005-08 and Sue B in 2008 provides ore for the mill until mid-2010. The mill is then scheduled to close and go on to care and maintenance until about a year before the Cigar lake ore starts to be processed. In March 2010, Areva applied for a licence to divert the Areva share of McArthur River high-grade ore there over that period. After mid-2010 some 115,000 tonnes of low-grade ore will remain stockpiled to be treated when markets improve, or possibly as a diluent for the McArthur River ore. Reserves are small.

McClean Lake is majority-owned (70%) and operated by Areva Resources. Denison Mines (22.5%) and the Japanese company Overseas Uranium Resources Development (OURD, 7.5%) are Areva's joint venture partners.

Rabbit Lake

Uranium was discovered at Rabbit Lake in 1968 and it was brought into production by Cameco in 1975. Most of the deposit has been mined out, but reserves still exist at Eagle Point, where 1,613 tonnes of U_3O_8 from an ore grade of 2.1% were mined in 2008. However, production is expected to diminish in the next few years.

Future mines

Uranium production in Canada is likely to increase significantly as several new mines, now planned or under construction, go into operation sometime after 2011. The two largest projects are Cameco's Cigar Lake mine and Areva's Midwest mine, both in northern Saskatchewan. The mill at McClean Lake has been modified to process ore from both mines. The Rabbit Lake mill will also

be modified to take ore from Cigar Lake. Total production is expected to be 8,200 t/yr U₃O₈ from Cigar Lake and 2,600 t/yr from Midwest.

Canadian uranium resources^C

| Mine | Operator | tonnes U | tonnes U ₃ O ₈ | Average ore grade ^d | Category |
|-----------------------|----------|----------|--------------------------------------|--------------------------------|--------------------------------|
| Rabbit Lake | Cameco | 8200 | 9660 | 0.88% | proven & probable reserves |
| McClean Lake | Areva | 1031 | 1216 | 0.53% | proven reserves |
| | | 4115 | 4853 | 2.14% | measured + indicated resources |
| McArthur River | Cameco | 66,400 | 78,300 | 15.72% | proven reserves |
| | | 62,500 | 73,700 | 26.33% | probable reserves |
| | | 8270 | 9750 | 8.49% | measured + indicated resources |
| | | 36,500 | 43,000 | 7.35% | inferred resources |
| Cigar Lake | Cameco | 80,500 | 95,000 | 17.04% | proven & probable reserves |
| | | 2,500 | 3,000 | 4.86% | indicated resources |
| | | 45,500 | 53,700 | 16.92% | inferred resources |
| Midwest | Areva | 16,340 | 18,900 | 3.84% | measured + indicated resources |
| Dawn Lake | Cameco | 5,000 | 5,900 | 1.69% | indicated resources |
| Millennium | Cameco | 18,060 | 21,300 | 4.53% | indicated resources |
| | | 3,700 | 4,400 | 2.06% | inferred resources |
| Kiggavik | Areva | 49,153 | 57,966 | 0.22% | inferred resources |
| Michelin | Aurora | 26,000 | 30,600 | 0.11% | measured + indicated resources |
| | | 13,670 | 16,100 | 0.12% | inferred resources |
| Jacques Lake | Aurora | 4000 | 4700 | 0.08% | measured + indicated resources |

Cigar Lake

The proven and probable ore reserves at Cigar Lake are extremely large and very high grade. A 450-metre-deep underground mine is being developed in very poor ground conditions. Hence it will use ground freezing and high pressure water jets to excavate the ore. High-grade ore slurry from remote mining will be trucked for toll treatment at Areva's expanded McClean Lake mill, 70 km northeast, for the first two years. The average feed grade will be 20.7% U₃O₈. Then, as production approaches full capacity, all of the leaching will be done at McClean Lake but about half of the uranium solution will go on to Cameco's Rabbit Lake mill 70 km east for final production of uranium oxide concentrate. From both mills total production is expected to be 8,200 t/y U₃O₈ (7,000 tU/y) ramping up to this over three years from production start. Known resources are 160,000 tonnes U₃O₈ at about 19% average grade, and with other resources the mine is expected to have a life of at least 30 years.

Construction on the project began in 2005 with production originally scheduled to start in 2011. However, underground floods in 2006 and 2008 set the start date back until about mid-2013 and increased the overall cost of the project from C\$660 million to more than C\$1.8 billion. There will be extra requirements for pumping capacity and ground refrigeration. In February 2010, dewatering was complete and remediation was proceeding with the expectation that works will be completed during 2010. The estimated average cash operating cost for Cigar Lake has increased from \$14.40 per pound U₃O₈ in 2007 to \$23.14.

Some 1.3 million cubic metres of waste rock from Cigar Lake is being emplaced under water in the

Sue C pit at McClean Lake, to prevent acid generation from it. Tailings will remain at McClean Lake and Rabbit Lake.

A Cigar Lake II deposit nearby is being investigated.

Cameco, which has 50% ownership, is managing the joint venture, with Areva holding 37%, Idemitsu 8% and TEPCO 5%.

Midwest

Proven and probable reserves at Midwest are 18,900 tonnes of U_3O_8 with an average ore grade of 5.47%. A further prospect 3 km to the north is also being evaluated. The original plans were for an underground mine, utilising ground freezing and water jet boring, but new plans call for a large open pit mine that will go to a depth of 215 metres. The ore will be shipped 15 km to the McClean Lake mill to produce 2600 t/y U_3O_8 for seven years. A comprehensive environmental assessment for the project began in 2006.

Production was originally scheduled to begin in 2011, but in late 2008 the starting date was postponed due several factors, including a 50% rise in the initial estimated capital costs of \$435 million. The Midwest project is being managed by Areva Resources, which owns 69.16%. Denison Mines has a 25.17% stake and OURD Canada 5.67%.

Dawn Lake

Although its development is much further off, a deposit of more than 5,000 tonnes of indicated uranium resources is prospective at Dawn Lake in northern Saskatchewan. Grades of up to 30% ore at depths of 280 metres have also been reported nearby. Cameco has 57.4%, Areva 23.1% and Japan-Canada Uranium subsidiary JCU (Canada) Exploration 19.4%.

Exploration prospects

In addition to mining operations planned for the near future, active exploration involving more than 40 companies continues in many parts of Canada. While exploration has concentrated on northern Saskatchewan, new prospects extend to Labrador and Nova Scotia in the Atlantic provinces, Quebec province, Nunavut Territory in the far north, and Ontario's Elliott Lake area. Resource figures quoted are generally NI 43-101 compliant.

In uranium-rich northern Saskatchewan, exploration projects are now well-advanced at several locations. The **Millennium** deposit (42% owned by Cameco, 30% by JCU and 28% Areva Resources) has indicated resources of 21,000 tonnes of 4.5% grade U_3O_8 and 4,400 tonnes of 2.1% grade inferred. It is between McArthur River and Key Lake, and ore would be milled at Key Lake. A feasibility study on the project has led to Cameco seeking approval to mine it. Underground development is envisaged over 2013-17. The Tamarack deposit associated with Dawn Lake is also a focus of interest.

The **Shea Creek** project (51% owned by Areva, 49% UEX Corp.) in the western Athabasca Basin 13 km south of Cluff Lake has reported very high grade ore and a 900 metre shaft is being sunk to provide better access. UEX (21.3% owned by Cameco) has invested about C\$30 million in exploration. In May 2010 UEX announced indicated resources of 29,000 t U_3O_8 grading 1.54% and inferred resources of 11,100 tonnes grading 1.04%, as of January, with cut-off 0.30%. The deposit remains open.

UEX is also exploring the Horseshoe and Raven deposits at **Hidden Bay** in the eastern Athabasca basin (close to Rabbit Lake and McClean Lake). The Horseshoe deposit has indicated resources of 10,400 tonnes of U_3O_8 at a grade of 0.20% and Raven has indicated resources of 5500 tonnes at 0.11%, with cut-off 0.05%. These amounts increase slightly with 0.02% cut-off.

Denison is actively exploring the **Wheeler River** deposit half way between Key Lake and McArthur River. It is a long strike from the latter and geologically very similar, with some high-grade uranium mineralisation. Denison has a 60% interest, Cameco 30% and JCU (Canada) 10%.

Fission Energy Corp with a consortium led by Korea Electric Power Corp (Kepco) is exploring the **Waterbury Lake** area near Midwest.

The main Labrador prospect centres on the **Michelin** deposit, which is being drilled in a C\$21million program by Aurora Energy Resources (subsidiary of Fronteer Development). Michelin and the adjacent Jacques Lake deposit have measured and indicated resources of 35,000 tonnes of U_3O_8 , plus 16,000 t inferred resources, mostly requiring underground mining. In 2009, a positive economic assessment of the project proposed investment of US\$ 984 million to set up mine and mill, with production ramping up to 3000 t/y. A Nunatsiavut government moratorium until March 2011 is in place, and expiry of this will coincide with completion of a land use planning assessment being undertaken jointly by the Nunatsiavut and Newfoundland-Labrador governments. Bayswater Uranium Corp. has announced a very small deposit at Anna Lake nearby.

In Nova Scotia, exploration has been proposed at Millet Brook, but it awaits a review of a 1985 moratorium on uranium mining in the province.

In Quebec, exploration is underway at several locations with a total of more than 40,000 tonnes of indicated or inferred deposits. Strateco Resources has reported indicated resources of 3400 t U_3O_8 grading 0.75% and inferred resources of 6,000 tonnes grading 0.50% at its **Matoush** deposit in the Otish Basin of central Quebec. Abitex Resources has 6,000 t U_3O_8 mostly inferred resources at its **Lavoie** project in the Otish Mountains. The company completed a scoping study in 2008 and will begin underground development in 2010, with a view to mine production in 2013. Azimut Exploration has committed C\$42 million to uranium exploration, mainly for the **Katavik** project in Quebec's northern Nunavik region and other prospects in the Ungava Bay region further north. Uracon Resources reports 19,900 tonnes U_3O_8 of inferred resources at its North Shore prospect in eastern Quebec.

In the Nunavut Territory, some 500 km north of Manitoba, a joint venture headed by Areva is conducting a feasibility study on the **Kiggavik** uranium deposit in the Thelon Basin, with an estimated 67,000 tonnes U_3O_8 at 0.24% grade. The indigenous Inuit organization, Nunavut Tunngavik, reversed its previous ban on uranium exploration and mining in 2006, but the project has faced opposition from other groups. In March 2010, the Nunavut government ruled that the proposal would be reviewed by a territorial regulator rather than undergo a federal environmental assessment. The project involves the development of three open pit mines at Kiggavik and both an open pit mine and an underground mine at **Sissons**. Areva and its partners, JCU (Canada) Exploration and Daewoo, hope for a start-up of the mine and mill complex in 2015.^e Also in Nunavut, at Amer Lake, Uranium North Resources has reported inferred resources of 8,770 t U_3O_8 .

The Elliot Lake area of Ontario, which was the centre of Canada's early uranium mining, is again attracting exploration. In September 2008, Pele Mountain Resources commenced the permitting

process for its **Eco Ridge** underground uranium mine and processing facility in the region. Eco Ridge contains indicated resources of 5,700 tonnes U₃O₈ and inferred resources of 37,300 tonnes U₃O₈. The Serpent River-Pecors deposit is a few kilometres east.

In British Columbia, the **Blizzard** prospect south of Kelowna, which was first explored in the 1980s, has been revived by Boss Power. The company has challenged a provincial government moratorium on exploration and mining imposed in April 2008, and the British Columbia government has indicated the Blizzard project may be able to go forward.

Uranium exploration appears to be on the upswing throughout Canada. Cameco spent C\$57 million on exploration in 2008 (plus a further \$32 million in three strategic partnerships with junior explorers) and plans C\$50-55 million for 2009, mainly in Saskatchewan, Nunavut and the Northwest Territories. In late 2007, Cameco announced an agreement with the Russian company Uranium Holding ARMZ (JSC Atomredmetzoloto) to create a joint venture to explore and mine uranium in northwest Russia, Saskatchewan and Nunavut.

Further Information

Appendix

Appendix 1: [Brief History of Uranium Mining in Canada](#)

[Related information pages](#)

[Nuclear Power in Canada](#)

Notes

a. Data: company sources. Where an asterisk (*) is shown, the figures are small and included with the McArthur River figure.

Annual uranium production (tonnes U)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| McArthur River | | | 3739 | 6640 | 7199 | 5831 | 7200 | 7200 | 7200 | 7199 | 6383 | 7339 |
| Key Lake | 5386 | 3731 | 402 | 299 | * | * | - | - | - | - | - | - |
| McClean Lake | | 560 | 2308 | 2539 | 2342 | 2318 | 2310 | 2112 | 690 | 734 | 1249 | 1388 |
| Rabbit Lake | 4502 | 2693 | 2790 | 1755 | 440 | 2281 | 2087 | 2316 | 1972 | 1544 | 1368 | 1447 |
| Cluff Lake | 1039 | 1234 | 1443 | 1269 | 1626 | 27 | - | - | - | - | - | - |
| Total | 10924 | 8214 | 10682 | 12501 | 11607 | 10458 | 11597 | 11628 | 9863 | 9477 | 9000 | 10173 |
| cf. World | 33728 | 31065 | 34734 | 36366 | 36063 | 35613 | 40219 | 41595 | 39429 | 41279 | 43764 | 50684 |

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b. Data: company sources. Where an asterisk (*) is shown, the figures are from the World Nuclear Association Market Report. [\[Back\]](#)

c. Data: company sources. In Canadian figures resources do not include reserves and are reported in accordance with Canadian standard NI-43-101. [\[Back\]](#)

d. Average ore grades given as percentage of U_3O_8 in the ore. [[Back](#)]

e. The two parts of the project (Kiggavik and Sissons) are operated by Areva Resources Canada Inc.; Sissons is held 50% by Areva in joint venture with JCU (Canada) Exploration Co. Ltd. (48%) and Daewoo Corporation (2%); and Kiggavik itself is held 99% by Areva and 1% by Daewoo. [[Back](#)]

General sources

Uranium webpage on Natural Resources Canada website (www.nrcan.gc.ca)

Cameco [annual reports](#)

Uranium in Saskatchewan series of fact sheets available on Cameco's website (www.cameco.com)

Areva Resources website (www.cri.ca)

Canadian Nuclear Association website (www.cna.ca)

Uranium 2007 - Resources, Production and Demand, OECD Nuclear Energy Agency and International Atomic Energy Agency, OECD Publishing, June 2008 (ISBN: 9789264047662)

Brief History of Uranium Mining in Canada

Uranium in Canada Appendix 1

Early uranium mining

In Canada, uranium ores first came to public attention in the early 1930s when the Eldorado Gold Mining Company began operations at Port Radium, Northwest Territories, to recover radium. A refinery to produce radium was built the following year at Port Hope, Ontario, some 5000 km away.

Exploration for uranium began in earnest in 1942, in response to a demand for military purposes. The strategic nature of such material resulted in a ban on prospecting and mining of all radioactive materials across Canada. In 1943, the federal government took over the Eldorado company and formed a new crown corporation - Eldorado Mining and Refining Limited - which later became Eldorado Nuclear Ltd. Uranium exploration was restricted to the joint efforts of Eldorado and the Geological Survey of Canada.

Postwar, uranium exploration gathered pace when the ban on private prospecting was lifted in 1947. Deposits around the Bancroft, Ontario, area were discovered by the early 1950s, and the first discovery in Ontario's Elliot Lake region was in 1953. The northern Saskatchewan uranium province was also discovered in the 1950s and Eldorado Nuclear began mining at Beaverlodge in 1953.

By 1956, thousands of radioactive occurrences had been discovered. Several proved to be viable deposits, and by 1959, 23 mines with 19 treatment plants were in operation in five districts. Of these 19, about 11 in the Elliot Lake area, including the largest plants, would come to be operated by Rio Algom Ltd and Denison Mines Ltd. Three other plants were located near Bancroft (in southeast Ontario), three in northern Saskatchewan and two in Northwest Territories.

This first phase of Canadian uranium production peaked in 1959 when more than 12,000 tonnes of uranium was produced. The uranium yielded C\$330 million in export revenue, more than for any other mineral export from Canada that year. However, the level of uranium exploration waned in the 1960s, and over the next few years the number of mines declined to four. During the 1960s the federal government supported the domestic uranium industry by initiating a stockpiling program which ended in 1974, after some 7000 tonnes of uranium was purchased at a cost of C\$100 million. Uranium exploration was revived by expectations of nuclear power growth, and as a result several new uranium deposits were discovered in northern Saskatchewan's Athabasca Basin, starting in the late 1960s.

Uranium production in the Bancroft area and at Beaverlodge, Saskatchewan, ceased in 1982 and the last of the labour-intensive, lower-grade Elliot Lake mines closed in 1996.

Recent uranium mining

Canada's uranium production in 2001 was about 12,500 tonnes uranium (tU), one third of world mine output, all from mines in northern Saskatchewan. By 2007, the share of world uranium production had decreased to 23%, with just under 9500 tU produced that year in the country. Canada's uranium ore reserves are about 14% of world total.

In 1968, the Rabbit Lake deposit was discovered in northern Saskatchewan, and was brought into production in 1975. In that year Cluff Lake and Key Lake were discovered on the west and south of the same Athabasca Basin, and these started up in 1980 and 1983 respectively. Exploration expenditure in the region peaked at this time, resulting in the discoveries of Midwest, McClean Lake and Cigar Lake. Then in 1988 the newly-formed Cameco Corporation discovered the massive McArthur River deposit.

In the late 1970s, the Saskatchewan Mining Development Corporation, a provincial crown corporation, had taken a 20% interest in the Cluff Lake development and a 50% interest in Key Lake. In 1988 this merged with Eldorado Nuclear Ltd to form Cameco Corporation, now the world's largest uranium producer. In 1991 Cameco made its first public share issue.

The Federal and Saskatchewan governments have adopted a policy of supporting uranium mining where it can be demonstrated to be environmentally acceptable. In 1991 the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan (Canada) was formed to study the health, safety, environmental and socio-economic impacts of five proposed uranium mining developments. A Federal Panel was formed to examine a sixth proposal.

Through the 1990s, Cameco's Key Lake was the world's largest high-grade uranium mine, supplying 15% of the world's uranium mine production in 1997. Cameco is also owner and operator of Rabbit Lake, another major producer.

The other uranium mine in operation in the late 1990s was Cluff Lake, owned and operated by Cogema Resources Inc (now Areva Resources) and which ceased production in 2002. Rio Algom's Stanleigh Mine, the last at Elliot Lake in Ontario, closed in mid 1996.

Four new uranium projects became the focus of attention in the late 1990s as reserves in the older mines became depleted. All are located in northern Saskatchewan. Of these four new mines, three use or will use a common treatment plant, at McClean Lake.

The McClean Lake mine commenced operation in mid-1999. It was producing about 2,500 t/y U_3O_8 (2,120 tU) from 2.4% ore but has been relicensed for 3,640 t/y. It has new plant and other infrastructure and uses the first mined-out pit for tailings disposal (the ore having been stockpiled). Production in 2006 was well down due to lower grades. Expansion of the mill to prepare for Cigar Lake ore will be complete in 2007. McClean Lake involves four open pits and later will become an underground mine. Efforts are being made to increase production to fill the gap left by the delay in Cigar Lake production. McClean Lake is owned by Areva Resources (70%, also operator), in joint venture with Denison Energy (22.5%) and OURD (7.5%).

The McArthur River mine operated by Cameco has enormous reserves of very high-grade ore and opened its underground mine at the end of 1999. Remote-control raise boring methods are used for mining, some 600 metres underground. Ore is trucked to the Key Lake mill, 80 km south.

The high-grade Cigar Lake mine to be operated by Cameco will also be underground, utilising ground freezing and water jet boring, with remotely-operated equipment. Ore will be trucked 70-80 km for treatment at the Rabbit Lake and McClean Lake mills. Flooding in one of the shafts has delayed the project to beyond the planned startup date of 2011.

Ore from the Midwest underground mine (majority-owned by Areva) is also likely to be milled at McClean Lake nearby from mid-2011.

[Related information pages](#)

[Uranium Production in Canada](#)