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Canadian Minerals Yearbook (CMY) - 2009

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OVERVIEW

- In 2009, Canada was the world's second largest uranium producer with output totaling 10 174 tU (tonnes of uranium metal) representing 20.1% of world production.
- Domestic uranium exploration expenditures were \$205 million in 2009, 50% below 2008 exploration expenditures of \$409 million.
- As of January 1, 2010, Canada's total known uranium resources, recoverable at a cost of \$150/kgU, were approximately 427 000 tU.
- During 2009, the uranium spot market price decreased by 16%, closing the year at US\$44.50/lb U₃O₈.

DOMESTIC PRODUCTION AND DEVELOPMENTS

In 2009, Canadian uranium production totaled 10 174 tU, a 13% increase from 2008 production of 9000 tU. Canada was the world's second largest uranium producer in 2009 with 20.1% of total world uranium production of 50 772 tU. Kazakhstan became the world's largest uranium producer in 2009, surpassing Canada, which had been the largest uranium producer since 1992. All Canadian production was from three production centres that are operated in northern Saskatchewan by two of the world's largest uranium-producing companies ([Figure 1](#)). Direct employment in Canada's uranium mining industry increased from 1152 in 2006 to 1379 in 2009 ([Table 1](#)). Total uranium shipments reached a record value of more than \$1.2 billion in 2009 due to a combination of increased production and higher uranium prices ([Table 2](#)). Uranium continues to rank among Canada's top 10 metal commodities in terms of output value. [Table 3](#) documents the main operational characteristics of the existing uranium production centres in Canada in 2009.

[Table 4](#) updates the status of new projects that represent Canada's future production capability. All current production and new projects awaiting development are located in the Athabasca Basin of northern Saskatchewan ([Figure 2](#)). Uranium production in Canada in 2009 ([Figure 3](#)) was once again dominated by Cameco Corporation and AREVA Resources Canada Inc..

Athabasca Basin, Saskatchewan

McArthur River

Cameco Corporation is the operator of the McArthur River mine, which is a Cameco (70%) and AREVA (30%) joint venture. Production at this, the world's largest high-grade uranium mine, was 7273 tU in 2009. After raise bore mining of the high-grade ore is conducted behind a freeze curtain created to control groundwater inflow, a high-grade ore slurry is produced by underground crushing, grinding, and mixing. The slurry is then pumped to the surface and loaded on specially designed containers that are trucked 80 km to Key Lake, where all McArthur River ore is milled.

Key Lake

The Key Lake mill is a Cameco (83%) and AREVA (17%) joint venture operated by Cameco. Although mining at Key Lake was completed in 1997, the mill maintained its standing as the world's largest uranium production centre by producing 7339 tU in 2009. This total represents a combination of high-grade McArthur River ore slurry and stockpiled, mineralized Key Lake special waste rock that is blended to produce a mill feed grade of about 3.4% U.

A proposal to extend the lifespan and increase the annual production capacity of the Key Lake milling operation by 33% (from 7200 tU/y to 9600 tU/y) was submitted to the federal nuclear regulator, the Canadian Nuclear Safety Commission (CNSC), in May 2010. The proposal included increasing the storage capacity of the Deilmann Tailings Management Facility and modifications to the mill to allow treatment of a wider range of ore and waste rock from other deposits.

McClean Lake

The McClean Lake production centre, operated by AREVA, is a joint venture between AREVA (70%), Denison Mines Inc. (22.5%), and OURD (Canada) Co. Ltd., a subsidiary of Overseas Uranium Resources Development Corporation of Japan (7.5%). Production in 2009 amounted to 1388 tU. Modifications to the mill to increase capacity to 4600 tU/y and to process ore from the Cigar Lake mine have been completed. Mining at the Sue E and B pits was finished in 2008 and about 375 600 t of ore containing 2500 tU was stockpiled for processing at the McClean Lake JEB mill. Once processing of the stockpile is completed in the summer of 2010, the mill will be temporarily shut down until Cigar Lake ore becomes available (2012-13) for processing. AREVA has suspended a decision to proceed with mining of the Caribou deposit due to weakening uranium prices affecting the economic viability of the deposit, although the environmental assessment for development of the deposit is continuing.

Rabbit Lake

The Rabbit Lake production centre, wholly owned and operated by Cameco, produced 1447 tU in 2009. Exploratory drilling in the Eagle Point mine during 2009 delineated additional resources, extending the life of the mine until at least 2015. Cameco is continuing the exploratory drilling program in 2010.

Additional Production Possibilities

Three uranium mining projects in Saskatchewan could enter into production within a few years, extending the lives of existing production centres. Cigar Lake ore will provide feed for the McClean Lake and Rabbit Lake mills, Midwest ore will provide additional feed for the McClean Lake mill, and ore from the proposed Millennium mine will be processed at the Key Lake mill. In addition, there are several exploration projects in the Athabasca Basin that have identified significant high-grade uranium mineralization that may develop into proposals for new mines.

The environmental assessment for the Midwest project began on March 2, 2006. The Midwest project is a joint venture between AREVA (69.16%), Denison Mines Inc. (25.17%), and OURD (Canada) Co. Ltd. (5.67%). The proposal is to mine the Midwest deposit (16 700 tU averaging 4.4% U) by open pit and to transport the ore to McClean Lake for milling. In 2008, AREVA announced a decision to postpone development of the project due to low uranium prices, but will continue with the environmental assessment process. If the project receives regulatory approval and the economics of the project improve, it would take two years to develop the mine and a further two years to mine the ore. Milling of the Midwest ore is expected to take from five to seven years.

Cigar Lake, with reasonably assured resources (measured plus indicated) of 80 000 tU at an average grade of approximately 14.4% U, is the world's second-largest high-grade uranium deposit. The mine is a Cameco (50.025%), AREVA (37.1%), Idemitsu (7.875%), and TEPCO (5%) joint venture operated by Cameco. When completed, the mine is expected to have a full annual production capacity of 6900 tU that will be transported as ore to the McClean Lake JEB mill. After processing, about half of the Cigar Lake output from the JEB mill will be shipped as a uranium-rich solution to Cameco's Rabbit Lake mill for final processing.

Construction of the Cigar Lake mine began on January 1, 2005, with completion originally expected in 2007. In October 2006, construction was halted due to a major inflow of groundwater that could not be controlled and the mine became flooded. Cameco conducted work to seal off the breach; however, when de-watering the mine in 2008, a second inflow of groundwater occurred and operations were halted. Cameco completed work to seal off the second breach and dewatering of the mine was completed in February 2010. Work to secure and restore underground workings is expected to be completed by October 2010. Production from the mine is expected to begin in 2013.

In August 2009, Cameco submitted a proposal to the CNSC to develop the Millennium deposit located 35 km north of Key Lake. The proposed Millennium underground mine would produce 150 000 to 200 000 t of ore annually for six to seven years. The ore and associated waste materials, other than clean waste rock, would be transported to the Key Lake mill along a new 21-km access road. In addition to an environmental assessment, Cameco is conducting an economic feasibility study of the project.

There is also the possibility of mines being developed outside of Saskatchewan in the near future. AREVA is proposing to develop the Kiggavik and Sissons deposits in Nunavut, which contain an estimated 57 000 tU at an average grade of 0.2% U. The project is currently undergoing an environmental assessment and a feasibility study. In Quebec, Strateco Resources Inc. has applied for a licence to conduct underground exploration at the Matoush deposit. The Matoush deposit has identified resources of 6500 tU with an average grade of 0.42% U. In Labrador, Aurora Energy Resources Inc. is proposing to develop the Michelin and Jacques Lake deposits, which contain an estimated 52 000 tU at an average grade of 0.08% U. In 2008, the Nunatsiavut government placed a temporary three-year moratorium on developing uranium mines on Labrador Inuit land. As the moratorium applies to development of the Michelin deposit, Aurora has been working to gain community support to allow the project to proceed.

Decommissioning Activities

Elliot Lake was the major uranium mining centre in Canada for over 40 years. Since the last mining facility there closed in 1996, uranium mining companies have committed well over \$75 million to decommission all mines, mills, and waste management areas. Water treatment and minor engineering works continued to be the main activities at the closed Elliot Lake area uranium mine and mill sites in 2008. In October 2008, the State of Environment (SOE) report on the Serpent River Watershed was released. The water quality within the Serpent River Watershed has improved since the closure and decommissioning of the mines, and currently meets Ontario Drinking Water Standards.

The Cluff Lake mine, located in the western Athabasca Basin of Saskatchewan, ceased mining and milling operations in May 2002. A two-year decommissioning program was initiated in 2004 following a five year comprehensive study environmental assessment. Decommissioning was essentially completed by 2006 and AREVA continues to work on site-restoration activities such as the planting of tree seedlings. A follow-up monitoring program is in place to confirm that the objectives of the decommissioning plan are met.

On April 2, 2007, the governments of Canada and Saskatchewan announced funding for the first phase of the clean-up of closed uranium mines in northern Saskatchewan (principally the Gunnar and Lorado mines). The total cost of the clean-up, which the governments of Canada and Saskatchewan will share, will be C\$24.6 million. Although these mines were operated by the private sector from the 1950s until the early 1960s, the companies no longer exist. When the sites were closed, there was no regulatory framework in place to appropriately contain and treat the waste, which has led to environmental impacts on local soils and lakes. The project is now undergoing an environmental assessment.

Other Developments Affecting Canada's Uranium Industry

On July 19, 2007, uranium hexafluoride (UF_6) production was halted at Cameco's Port Hope conversion facility after the discovery of sub-surface uranium contamination. Operations restarted in September 2008 following an investigation and remediation work, but were halted again in December due to a shortage of hydrofluoric acid (HF) on world markets. Cameco signed a contract with its historic supplier of HF in May 2009 and negotiated agreements with other suppliers to broaden and diversify its supply base. The production of UF_6 resumed on June 17, 2009.

Canada has 22 CANDU reactors operated by public utilities and private companies in Ontario (20), Quebec (1) and New Brunswick (1). Of these 22 reactors, 17 were in full commercial operation in 2009, generating, on average, 15% of Canada's total electricity production (over 50% in Ontario). Of the five reactors that are not operating, two are shut down and three are being refurbished.

Refurbishment projects are currently under way or have been announced in Ontario, New Brunswick, and Quebec. In Ontario, Bruce Power's restart and refurbishment program of Bruce A Units 1 and 2 has been under way for a few years. Both units are scheduled to return to service in 2010/11. Bruce Power is also examining the life extension of the Bruce B units. New Brunswick Power began the refurbishment of Point Lepreau in March 2008. Hydro-Québec announced in 2008 that it will proceed with the refurbishment of Gentilly 2 in 2011/12. The refurbishment projects currently under way are progressing, although they have encountered some technical delays and cost overruns.

In February 2010, Ontario Power Generation (OPG) announced a two-part investment strategy for its Pickering and Darlington nuclear generating stations. First, OPG announced that it will proceed with a detailed planning phase for the mid-life refurbishment of its four nuclear power reactors at the Darlington station with the refurbishment expected to start in 2016. This will enable the station to operate for an additional 25-30 years. Second, OPG also announced that it will invest \$300 million to ensure the continued safe and reliable performance of its Pickering B station for approximately 10 more years. The Pickering B station is expected to be decommissioned at the end of the 10-year period.

There are currently no firm commitments from any province or territory within Canada to build a new nuclear power reactor. However, new nuclear build projects have been considered by public and private companies in Canada over the past several years. The actual number of new reactor units to be built will hinge largely on refurbishment plans for existing units, demand for electricity, and economics.

In March 2008, the Ontario government announced a two-phase competitive procurement process to choose a preferred vendor to build two new nuclear power reactors in the province. In February 2009, AECL, along with AREVA and Westinghouse, submitted bids to the Ontario government; however, in June 2009, the government decided to suspend the selection process. The Province noted that the proposal put forth by AECL was the only one compliant with the terms of the Request for Proposals and the objectives of the Ontario government. In early March 2010, Ontario's Energy Minister indicated that the Province's long-term energy policy still includes building two new nuclear reactors at the Darlington nuclear station.

Over the past few years, the provinces of Alberta and Saskatchewan have both received proposals by Bruce Power, the company who manages the Bruce units in Ontario, to build nuclear power units, a first for either province. In December 2009, the Government of Alberta announced that it was not opposed to nuclear development, but would not invest any public funds, while the Government of Saskatchewan indicated that it will not be considering nuclear development until after 2020.

EXPLORATION

As uranium prices continued to weaken, the number of companies with major uranium exploration programs in Canada declined in 2009. Although major companies such as Cameco and AREVA account for the majority of exploration expenditures, more than 100 junior exploration companies are active in uranium exploration.

During 2009, exploration efforts continued to focus on areas favourable for the occurrence of deposits associated with Proterozoic unconformities in the Athabasca Basin of Saskatchewan, and to a lesser extent, in similar geologic settings in the Thelon and Hornby Bay Basins of Nunavut and the Northwest Territories. Uranium exploration also remained very active in the Otish Mountains of Quebec where Strateco Resources Inc. has applied for a licence to conduct underground exploration on the Matoush deposit. Exploration activity in the Central Mineral Belt of Labrador, where Aurora Energy Resources Inc. is proposing to develop the Michelin and Jacques Lake deposits, reduced significantly

after April 2008 when the Nunatsiavut government imposed a three-year moratorium prohibiting uranium mining on Labrador Inuit lands. The continued drop in uranium spot prices since 2007 has curtailed exploration activity in other areas of Canada.

Surface drilling, geophysical surveys, and geochemical surveys continued to be the main tools used to identify new uranium occurrences, define extensions of known mineralized zones, and reassess deposits that were last examined in the 1970s and 1980s.

The recent increased exploration activity has led to new uranium discoveries in the Athabasca Basin. Notable high-grade uranium mineralization discoveries include Centennial (UEM Inc.), Shea Creek (AREVA Resources Canada Inc.), Wheeler River (Denison Mines Inc.), Midwest A (AREVA Resources Canada Inc.), and Roughrider (Hathor Exploration Ltd.).

Domestic uranium exploration expenditures were \$205 million in 2009, down 50% from the peak in exploration expenditures of \$413 million that occurred in 2007. Over 70% of the combined exploration and development drilling in 2009 took place in Saskatchewan.

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 uranium resources have been restricted to those recoverable from mineable ore at prices of \$300/kgU or less. [Table 6](#) shows the breakdown of the latest resource estimates, compared with those of the previous two years. As of January 1, 2010, total recoverable known uranium resources, recoverable at prices of less than \$150/kgU, were estimated at 427 600 tU, compared with 485 000 tU as of January 1, 2009, and 498 000 tU as of January 1, 2008. This decrease is primarily due to resources being reclassified into the higher-cost category of \$150-\$300/kgU as estimated development and operating costs increase.

SUPPLY CAPABILITY

Canada's supply capability will increase with the opening of new mines, notably Cigar Lake, Midwest, and Millennium, and with approval of the proposal to expand McArthur River production by almost 20%. Timely licensing approvals and continued positive market conditions will be required to allow Canada's production capability to expand to its full potential of over 15 000 tU annually.

Developments in the international uranium market, the rate at which projects receive environmental approvals, and uncertainty regarding the costs associated with development of the planned new projects preclude projecting future production capability levels with much certainty. [Table 7](#) ranks Canada second among the world's major producers based on actual uranium production from 2003 through 2009. [Figure 4](#) illustrates Canada's share of world output in 2009 compared with other major producing countries.

URANIUM MARKET

Overview

During 2009, the uranium spot market price declined from US\$55.00/lb U₃O₈ in January to US\$44.50/lb U₃O₈ in December. Long-term contract prices for uranium decreased from US\$69.50/lb U₃O₈ to US\$61.00/lb U₃O₈ during the same period. World production increased from 43 930 tU in 2008 to 50 770 tU in 2009, primarily due to increased output from Kazakhstan and Canada. It is expected to increase further in 2010.

The uranium supply is expected to ease over the next few years as production from Kazakhstan, Australia, and Namibia increases. Canada's production will increase significantly in 2013 when the Cigar Lake mine begins production.

New resources are being identified as a result of the increased uranium exploration activity that occurred over the last several years. The long planning and development cycle for both new mines and new nuclear power plants may provide sufficient time for production to catch up with current levels of demand for uranium.

Uranium Prices

In 2009, uranium spot market prices, as reported by the Ux Consulting Company ¹, continued the decline that began in the second half of 2007 ([Figure 5](#)). Spot market prices, which were US\$55.00/lb U₃O₈ in January, fell to US\$44.50/lb by the end of the year. Prices continued to decline in early 2010, falling to US\$40.75/lb U₃O₈ by May. Most uranium is traded through fixed-price long-term contracts between the suppliers and utilities. During 2009, the average long-term contract price declined from US\$69.50/lb U₃O₈ in January to US\$61.00/lb in December, a decrease of about 12%.

REFINING AND CONVERSION

Cameco operates Canada's only uranium refining and conversion facilities located at Blind River and Port Hope, Ontario, respectively. At the Blind River refinery, which is the world's largest, uranium mine concentrates from Canada and abroad are refined to uranium trioxide (UO₃), an intermediate product. The UO₃ is then trucked to the Port Hope facility, which has about one quarter of the Western World's annual uranium hexafluoride (UF₆) conversion capacity and currently provides the only commercial supply of fuel-grade natural uranium dioxide (UO₂). UF₆ from the Port Hope facility is exported and enriched outside Canada for use in foreign light-water reactors, while natural UO₂ is used to fabricate

fuel bundles for CANDU reactors in Canada and abroad. About 80% of the UO_3 from Blind River is converted to UF_6 , while the remaining 20% is converted to UO_2 .

OUTLOOK

The prospect of a worldwide increase in the use of nuclear power indicates that future demand for Canadian uranium will increase. Inventories are low and world uranium production has not increased sufficiently to meet the prospects of increased demand. Significant quantities of Canadian uranium will be required to meet global demand well into the foreseeable future. With a large, low-cost uranium resource base and current output, Canada is well positioned to remain a leading uranium producer for several decades. Given the high potential for economically attractive uranium occurrences in Canada, the recent increase in uranium exploration will likely result in additions to the resource base. However, although there are significant quantities of uranium in the ground, bringing this material to the market is a challenging task that requires expertise, time, and capital. Continued success in bringing environmentally sustainable Canadian uranium mining operations on stream in a timely fashion will ensure that Canada remains a leading uranium producer well into the future.

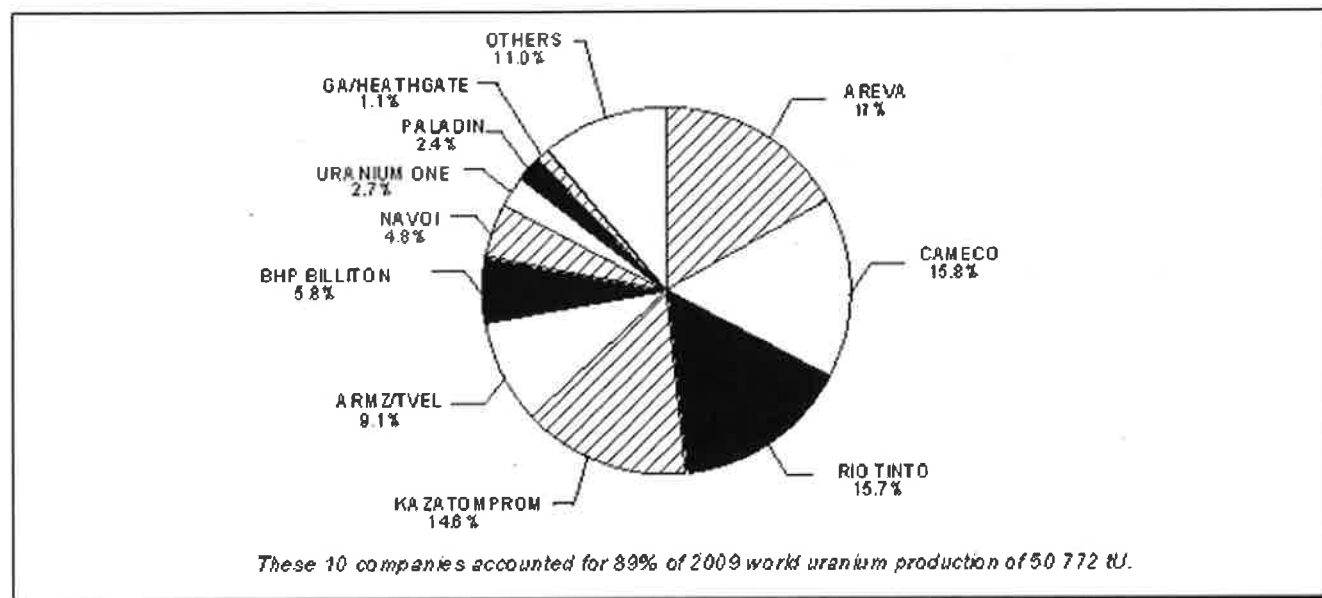
¹ The Ux Consulting Company, LLC (UxC) was founded in March 1994 as an affiliate of The Uranium Exchange Company (Ux). UxC publishes *The Ux Weekly* and the *UxC Market Outlook Reports* on uranium, enrichment, and conversion.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to the chapter entitled "Definitions and Valuation: Mineral Production, Shipments, and Trade." (2) Information in this review was current as of June 30, 2010. (3) This paper, and other information on developments in Canadian nuclear policy, can be accessed via the Internet at nuclear.nrcan.gc.ca. (4) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/minerals-metals/business-market/canadian-minerals-yearbook/4070.

Note to Readers

The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this document.

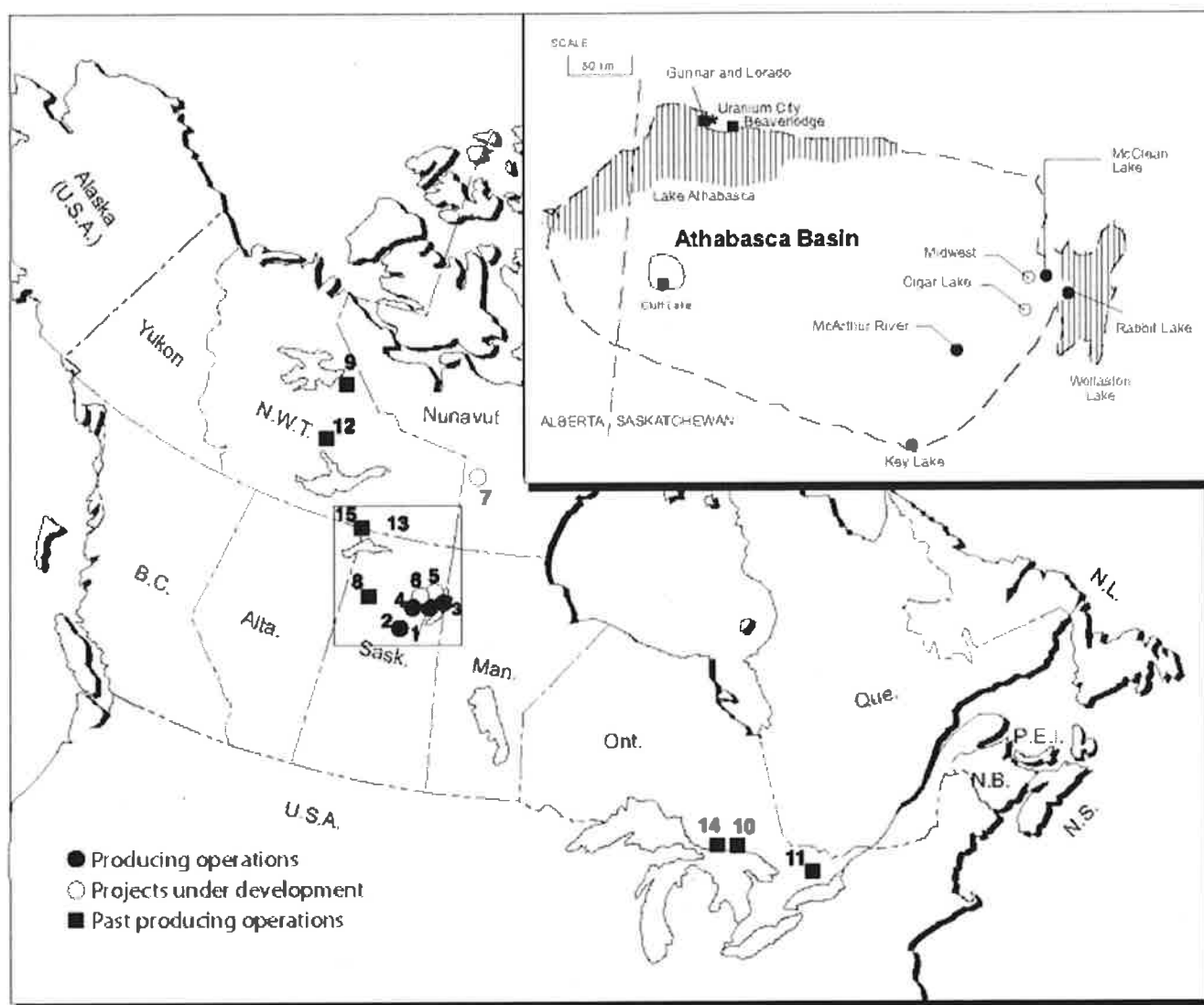
Figure 1
World's Top Uranium Mining Companies in 2009



Source: World Nuclear Association.

Note: Ranking reflects equity interest in production facilities and not market share.

Figure 2
Uranium Mining in Canada, 2009



Numbers refer to locations on map above.

Producing Operations

1. Rabbit Lake
2. Key Lake
3. McClean Lake
4. McArthur River

Projects Under Development

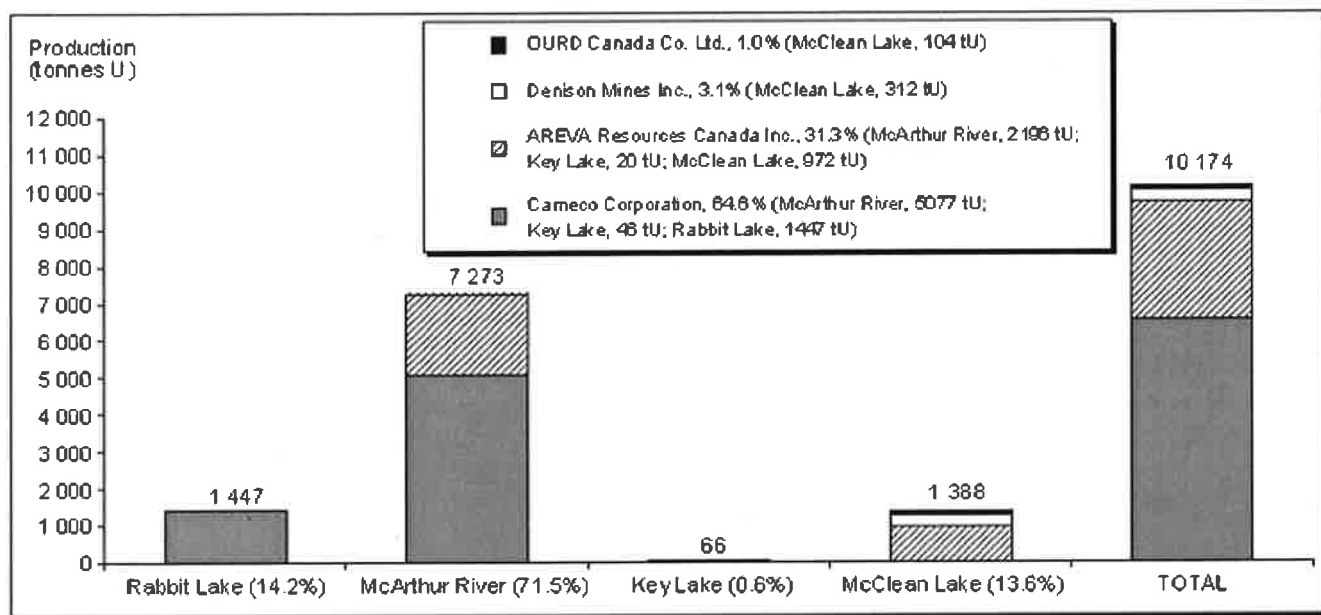
5. Midwest
6. Cigar Lake
7. Kiggavik

Past Producing Operations

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

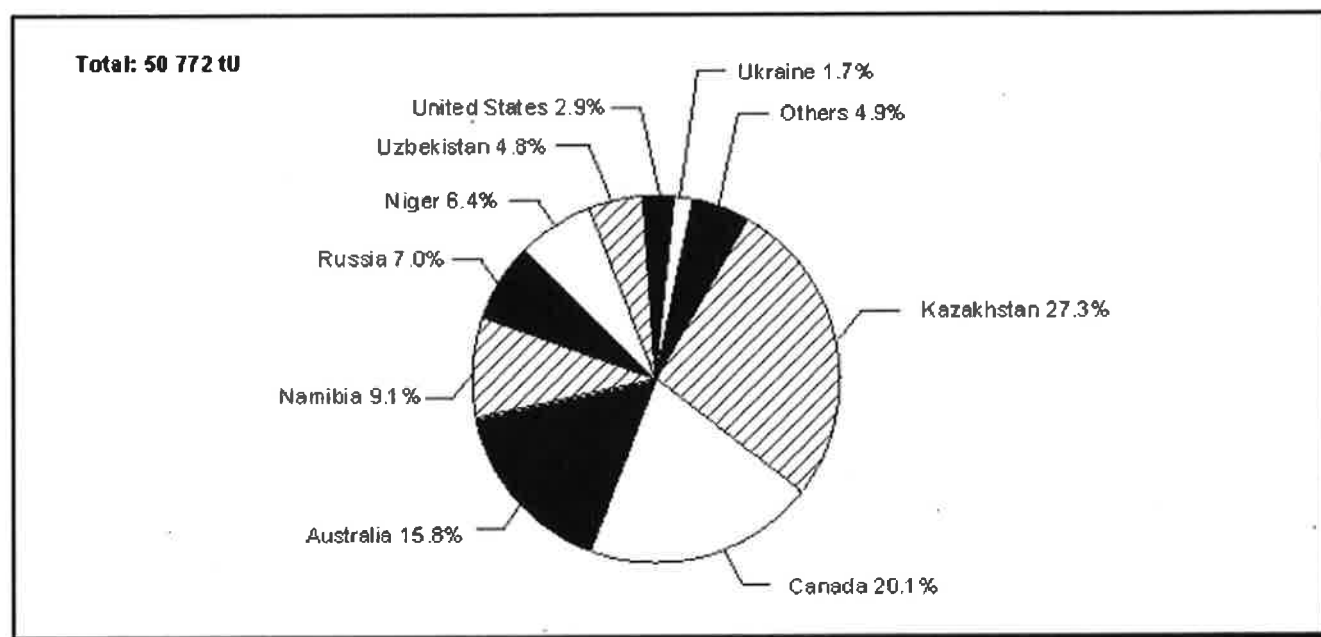
Source: Uranium and Radioactive Waste Division, Natural Resources Canada.

Figure 3
Canadian Uranium Production and Ownership, 2009



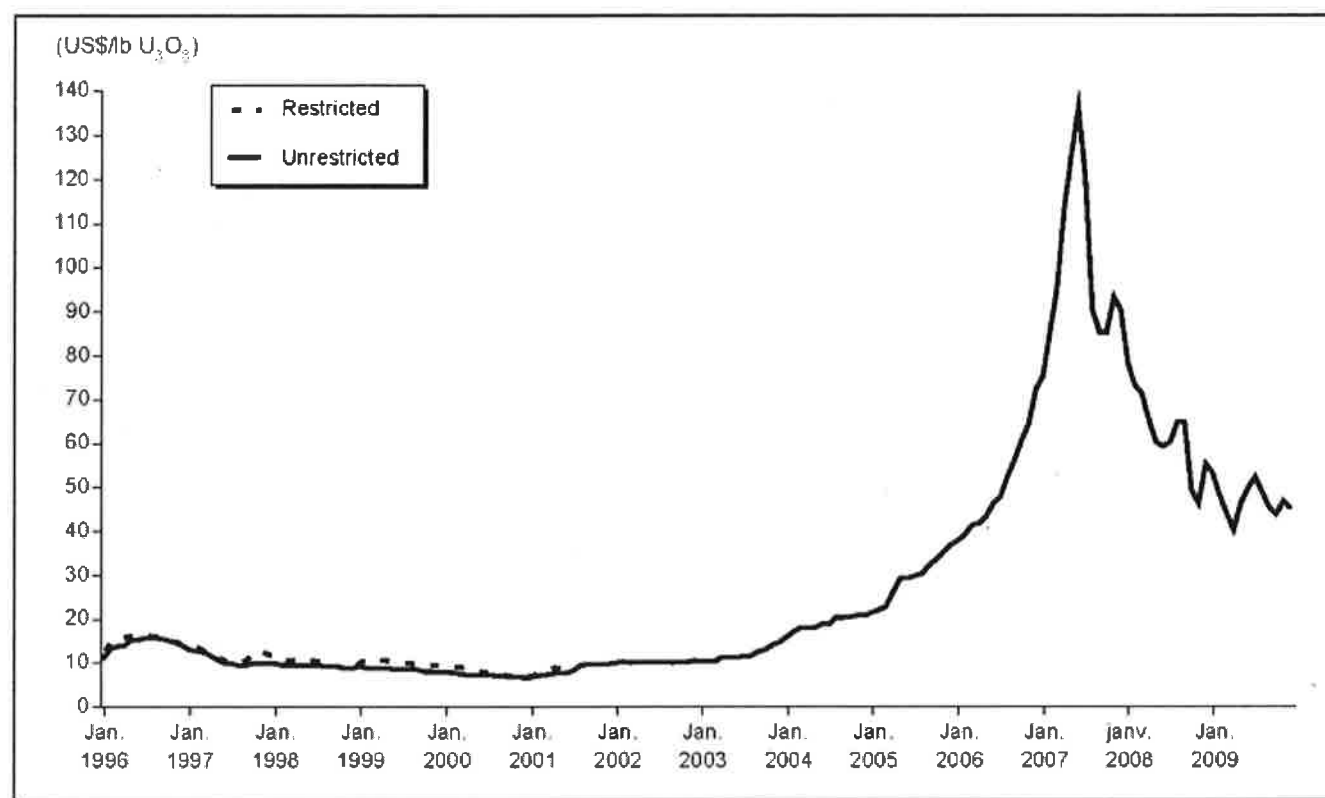
Source: Uranium and Radioactive Waste Division, Natural Resources Canada.

Figure 4
World Uranium Production, 2009



Source: World Nuclear Association.

Figure 5
Trend in Uranium Spot Prices, 1996-2009



Source: TradeTech.

TABLE 1. URANIUM PRODUCTION AND ASSOCIATED WORK FORCE IN CANADA, 2006-09

Production Centre and Producer	Company Work Force (1) (Dec. 31)				Annual Output (2) (tU)			
	2006	2007	2008	2009	2006	2007	2008	2009
ATHABASCA BASIN, SASKATCHEWAN								
Key Lake JV (Cameco operator)	311	344	370	500	196	114	70	66
Rabbit Lake JV (Cameco, 100%)	231	266	317	314	1 972	1 544	1 368	1 447
McClean Lake JV (AREVA operator)	294	325	348	268	690	734	1 249	1 388
McArthur River JV (Cameco operator)	316	357	381	297	7 004	7 085	6 313	7 273
Cigar Lake JV (pre-production)	—	—	—	—	—	—	—	—
Total	1 152	1 294	1 416	1 379	9 862	9 476	9 000	10 174

Sources: Natural Resources Canada; Company annual reports.

- Nil.

(1) Figures are for company payroll employees only; on-site contractors (mining, construction, services, etc.) are not included. (2) All McArthur River ore is milled at Key Lake. Key Lake output is from Key Lake special waste rock which is blended with McArthur River ore before milling.

TABLE 2. VALUE (1) OF URANIUM SHIPMENTS (2) BY PRODUCERS IN CANADA, 2004-09

	Unit	2004	2005	2006	2007	2008	2009 (p)
Total producer shipments	tU	11 548	12 597	9 781	9 098	8 703	10 131
Total value of shipments	\$ millions	520	620	615	835	1 038	1 231

Source: Natural Resources Canada.

(p) Preliminary.

(1) Value of shipments is estimated from an average market price. (2) Shipments in tonnes of uranium (tU) contained in concentrate from ore-processing plants.

TABLE 3. OPERATIONAL CHARACTERISTICS OF EXISTING CANADIAN URANIUM PRODUCTION CENTRES, 2009

Operating Entity (Operator)/Location	Ore-Processing Plant (1)			
	Capacity	Recovery	Annual Throughput	
	Nameplate	Overall	Total Ore	Ore Grade
	(t/d)	(%)	(t)	(%)
McClean Lake JV (AREVA)/at McClean Lake, Saskatchewan	500	94.6	181 203	0.82
Rabbit Lake (Cameco Corporation)/at Rabbit Lake, Saskatchewan	2 400	96.4	216 389	0.69
Key Lake JV (Cameco Corporation)/at Key Lake, Saskatchewan (2)	864	98.5	186 981	3.98

Sources: Corporate annual reports; Canadian Nuclear Safety Commission open files.

(1) Figures are rounded. (2) All McArthur River ore is processed at the Key Lake mill.

TABLE 4. CANADIAN URANIUM MINING PROJECTS PLANNED FOR PRODUCTION AS OF JUNE 30, 2010

Project, Province or Territory/Operator	Owners' Share (%)	Deposit Type/Discoverer and Discovery Date	Resources (Company Estimates as of January 1, 2010)	Ore Grade and Notes on Deposits	Mining Method, Milling Rate and Capacity	Project Particulars and Status	Location of Project/Notes of Interest
Cigar Lake, Sask./Cameco Corporation	Cameco (50.025), AREVA (37.100), Idemitsu (7.875), TEPCO (5)	Unconformity-related/AREVA, 1981	Overall property 89 000 tU <i>mineable</i>	Overall property grade of 17% U; grades vary from 5% to 70% U; orebody at depth of 450 m	"Non-entry" underground mining method; milling at McClean Lake and Rabbit Lake; contributing 6900 tU/y at full production	Test mining completed in 1992; EIS submitted in October 1995; final phase of construction initiated January 2005; mine flooded in October 2006 and dewatered in 2009	670 km N of Saskatoon; 500-m-deep shaft sunk; brine freezing of ground is required to mine the ore; flooding of mine has delayed production until 2013-14
Millennium, Sask./Cameco Corporation	Cameco (41.96), JCU (30.1), AREVA (27.94)	Unconformity-related/ Cameco, 2000	Overall property 21 700 tU <i>mineable</i>	Overall property grade of 3.2% U, orebody at a depth of 615-730 m	Underground, milling at Key Lake 150 000 to 200 000 t of ore annually for six to seven years	Environmental assessment began in August 2009	36 km N of Key Lake, 620 km N of Saskatoon; road to built to haul ore to Key Lake mill
Midwest, Sask./AREVA Resources Canada Inc.	AREVA (69.1), Denison Mines (25.2), OURD (5.7)	Unconformity-related/Esso Minerals Canada, 1977 (interests of Bow Valley, Numac Oil & Gas, <i>et al</i> bought by partners)	Overall property 16 000 tU <i>mineable</i>	Overall property grade of 4.6% U; grades vary from 2% to 30% U; orebody at depth of 200 m	Open-pit; milling at McClean Lake; contributing 2300 tU/y	\$80 million co-venture with McClean; Currently undergoing environmental assessment	710 km N of Saskatoon; 185-m-deep test-mine shaft; pending regulatory approval and economic feasibility

Kiggavik-Sissons, Nunavut/AREVA	Kiggavik: AREVA (99), Daewoo Corporation (1); Sissons: AREVA (50), JCU (48), Daewoo (2)	Unconformity- related/ Urangesellschaft, 1977	Overall property 57 000 tU <i>mineable</i>	0.24% U average overall; Centre pit depth 100 m, Main pit 200 m	Open-pit mining and underground methods; mill feed at 1200 t/d; output rate of 1200 tU/y originally expected	Currently undergoing environmental assessment	75 km W of Baker Lake; AREVA to conduct feasibility study >11- year mine life with tributary ore included
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Notes: Idemitsu Uranium Exploration Canada Ltd. is a wholly owned subsidiary of Idemitsu Kosan Co., Ltd. of Japan. TEPCO Resources Inc. is a subsidiary of Tokyo Electric Power Co., Inc. (TEPCO), Japan's largest nuclear power utility. Denison Mines Inc. is a wholly owned subsidiary of Denison Mines Corp. OURD (Canada) Co., Ltd. is a subsidiary of the Overseas Uranium Resources Development Corporation (OURD) of Japan. AREVA Resources Canada Inc. is a subsidiary of AREVA-NC Inc., which is wholly owned by the AREVA Group of France.

TABLE 5. URANIUM EXPLORATION ACTIVITY IN CANADA, 1990-2009

Year	Expenditures (1)	Drilling (2)	Million-Dollar Projects (3)
	(\$ millions)	(km)	(no.)
1990	45	66	6
1991	44	67	4
1992	46	79	4
1993	40	62	5
1994	36	67	8
1995	44	75	10
1996	39	79	8
1997	58	104	6
1998	60	95	6
1999	49	89	3
2000	46	77	3
2001	25	48	3
2002	35	78	7
2003	36	74	6
2004	44	119	8
2005	99	275	22
2006	213	472	58
2007	413	654	82
2008	409	672	104
2009	205	406	43

Source: Natural Resources Canada.

(1) Direct exploration and drilling expenditures in current dollars; from the late 1980s, includes advanced underground exploration and deposit appraisal expenditures; from the mid-1990s, may also include care-and-maintenance costs associated with deposits awaiting production approvals. (2) Exploration and surface development drilling; excludes development drilling on producing properties. (3) Number of projects where direct exploration and drilling expenditures exceeded \$1 million in current dollars.

TABLE 6. ESTIMATES OF CANADA'S URANIUM RESOURCES RECOVERABLE FROM MINEABLE ORE, (1) JANUARY 1, 2008, JANUARY 1, 2009, AND JANUARY 1, 2010

Price Ranges Within Which Mineable Ore is Assessed (2)	Measured			Indicated			Inferred		
	1/1/08	1/1/09	1/1/10	1/1/08	1/1/09	1/1/10	1/1/08	1/1/09	1/1/10
	(000 tU)								
Up to \$50/kgU	244	221	216	21	46	16	83	100	111
\$50 to \$100/kgU	—	—	—	104	70	29	31	10	11
\$100 to \$150	—	4	5	—	20	25	15	14	14
Total	251	244	221	78	125	116	94	113	110
\$150 to \$300	—	1	5	—	25	27	—	33	104
Total	244	226	226	125	161	97	129	157	240

Source: Natural Resources Canada.

— Nil.

(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 75-85% of the ore-in-place; higher mining recoveries are achievable in open-pit operations. Canada's weighted average ore processing recovery for existing conventional operations exceeded 97% over the survey 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.

Note: \$1/lb U₃O₈ = \$2.6/kgU.

TABLE 7. PRODUCTION OF URANIUM IN CONCENTRATES BY SELECTED MAJOR PRODUCING COUNTRIES, 2003-2009

	2003	2004	2005	2006	2007	2008	2009
	(tonnes U)						
Canada	10 450	11 600	11 630	9 860	9 480	9 000	10 170
Australia	7 570	8 980	9 520	7 590	8 610	8 430	7 980
China	730	730	750	750	710	770	750
Kazakhstan	3 330	3 720	4 360	5 280	6 640	8 520	14 020
Namibia	2 040	3 040	3 150	3 070	2 880	4 370	4 630
Niger	3 160	3 260	3 090	3 440	3 150	3 030	3 240
Russia	3 070	3 200	3 430	3 190	3 410	3 520	3 560
South Africa	760	750	670	530	540	660	560
Uzbekistan	1 600	2 090	2 300	2 260	2 320	2 340	2 430
United States	770	880	1040	1 800	1 650	1 430	1 450
Other	2 000	2 000	1 750	1 820	1 890	1 860	1 980
Total	35 490	40 260	41 700	39 600	41 280	43 930	50 770

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.

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

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