

Uranium

Uranium - 2011 Annual Review and Outlook

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NOTE TO READERS

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Uranium – 2011 Annual Review and Outlook

HIGHLIGHTS

- In 2011, Canada was the world's second largest uranium producer with output totaling 9145 tonnes of uranium metal (tU) representing 16.7% of world production.
- Domestic uranium exploration expenditures were \$198 million in 2011, 3.6% above 2010 exploration expenditures of \$191 million.
- As of January 1, 2012, Canada's total known uranium resources, recoverable at a cost of less than \$150 per kilogram of uranium (kgU), were approximately 466 300 tU.
- During 2011, the uranium spot market price decreased by 16%, closing the year at US\$51.75 per pound (lb) of uranium concentrate (U_3O_8).

CANADIAN PRODUCTION AND DEVELOPMENTS

In 2011, Canadian uranium production totaled 9145 tU, a 4% decrease from 2010 production of 9775 tU. Canada was the world's second largest uranium producer in 2011 with 16.7% of the total world uranium production of 54 610 tU. Kazakhstan, which surpassed Canada as the world's largest uranium producer in 2009, increased its lead in 2011 by producing 19 451 tU.

Since 1996, all Canadian uranium production has been from the Athabasca Basin of northern Saskatchewan where three production centres are operated by two of the world's largest uranium-producing companies (Figure 1). Direct employment in Canada's uranium mining industry was 1316 in 2011 (Table 1). Despite lower production in 2011, the value of uranium shipments was relatively unchanged from the previous year due to higher long-term uranium prices, with the total value of shipments at \$1.1 billion (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 2011.

Table 4 updates the status of new projects that represent Canada's future production capability. All current producing mines and most new projects awaiting development are located in the Athabasca Basin

of northern Saskatchewan (Figure 2). Uranium production in Canada in 2011 (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 mine, which is the world's largest producing uranium mine, was 7626 tU in 2011. 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 into specially designed containers that are trucked 80 kilometres (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 7686 tU in 2011. 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% uranium.

A proposal to extend the lifespan and increase the 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%). There was no production in 2011. 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. All production since 2008 has been from this stockpiled ore. In July 2010, the mill was placed into care and maintenance status because it was not economically worthwhile to process the remaining low-grade ore in the stockpile. Production is expected to resume in 2013 when high-grade ore from Cigar Lake becomes available for processing. Modifications to the mill to increase its capacity to 4600 tU/y and to process ore from the Cigar Lake mine have been completed and there are plans to increase the capacity further.

Rabbit Lake

The Rabbit Lake production centre, wholly owned and operated by Cameco, produced 1459 tU in 2011. Surface exploratory drilling at the Eagle Point mine during 2010 delineated additional resources and extended the life of the mine until at least 2017. Cameco intends to conduct underground exploratory drilling in 2012.

Additional Production Possibilities

The Cigar Lake mine is scheduled to begin providing feed for the McClean Lake mill in mid-2013. This will significantly increase Canada's production. Beyond Cigar Lake, there are two uranium mining projects in Saskatchewan that could enter into production within a few years provided they receive regulatory approvals and are economically feasible. Ore from the Midwest mine would provide additional feed for the McClean Lake mill, and ore from the proposed Millennium mine would 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.

Cigar Lake, with reasonably assured resources (measured plus indicated) of 81 000 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 an annual production capacity of 6900 tU that will be transported as ore slurry to the McClean Lake JEB mill for 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 flooded the mine. In February 2008, Cameco completed work to seal off the inflow; however, when de-watering the mine in August 2008, a second inflow of groundwater occurred. Cameco then conducted work to seal the second inflow and dewatering of the mine was finally completed in February 2010. Restoration of the underground development has been completed and production from the mine is expected in mid-2013.

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 (13 300 tU averaging 4.6% U) by open pit and to transport the ore to McClean Lake for milling. In 2008, AREVA announced that development of the project would be postponed due to low uranium prices, although the environmental assessment process continued. The environmental assessment of the project received regulatory approval in August 2012 and the project is currently undergoing the licensing process. If a licence is obtained 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.

In August 2009, Cameco submitted a proposal to the CNSC to develop the Millennium deposit located 35 km north of Key Lake. The Millennium deposit has reasonably assured resources of 19 600 tU averaging 3.8% U. The Millennium underground mine would produce 150 000-200 000 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-long access road. In addition to an environmental assessment that is currently being conducted, Cameco will conduct an economic feasibility study of the project.

There is the possibility of uranium 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 44 000 tU at an average grade of 0.47% 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 1100 tU with an average grade of 0.48% U.

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 2011. Water quality within the Serpent River watershed has improved since the closure and decommissioning of the mines and it 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 over 800 000 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 uranium mining sites (principally the Gunnar and Lorado mines) that operated in northern Saskatchewan from the late 1950s to early 1960s. The private-sector companies that operated these facilities no longer exist. When the sites were closed, there was no regulatory framework in place to appropriately contain and treat the waste, which led to environmental impacts on local soils and lakes. The projects to decommission the Gunnar and Lorado sites are currently undergoing environmental assessments.

Other Developments Affecting Canada's Uranium Industry

Nuclear energy represents an important component of Canada's electricity sources. In 2011, nuclear energy provided 15% of Canada's total electricity needs (over 50% in Ontario) and should continue to play an important role in supplying Canada with power in the future. Canada has 22 CANDU reactors operated by public utilities and private companies located in Ontario (20), Quebec (1), and New Brunswick (1). Of these 22 reactors, 17 were in full commercial operation in 2011. Of the five reactors that were not operating in 2011, two were shut down and three were being refurbished to be reconnected to the grid in 2012.

In recent years, the construction of new nuclear power reactors has been considered by some public and private companies in Canada. Following the completion of a positive environmental assessment for the proposed construction of a new nuclear power plant in Ontario (Darlington New Nuclear Project), the CNSC issued a Licence to Prepare Site to Ontario Power Generation (OPG) on August 17, 2012. OPG has requested that Candu Energy and Westinghouse provide cost and technical information on their reactor designs by June 2013.

Refurbishment projects in New Brunswick (Point Lepreau) and Ontario (Bruce A units 1 and 2) were completed in 2012 and Canada has, for the first time in over 15 years, 20 power reactors that have received regulatory approval from the CNSC to connect to the grid. In October 2012, the Government of Quebec announced that it will not proceed with refurbishment of the Gentilly-2 nuclear generating station and it will be shut down on December 28, 2012, reducing the number of operating reactors to 19.

In 2010, 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 nuclear generating station, with construction expected to start in 2016. This will enable the station to operate for an additional 25-30 years. Second, OPG announced that it will invest \$300 million to ensure the continued safe and reliable performance of the Pickering nuclear generating station (the two Pickering A units and the four Pickering B units) until 2020 when it will reach the end of its operating life. Then, OPG will begin the long-term decommissioning of the facility.

In October 2011, the Government of Canada completed the sale of the assets of Atomic Energy of Canada Limited's Candu Reactor Division to CANDU Energy Inc., a wholly owned subsidiary of SNC-Lavalin. Under the terms of the sale, SNC-Lavalin acquired the Candu Reactor Division's three business lines: services to the existing fleet, life-extension projects, and reactor new builds.

EXPLORATION

Approximately 70 companies were actively exploring for uranium in Canada in 2011. Major companies such as Cameco, AREVA, and Denison account for an important portion of exploration expenditures.

During 2011, 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, similar geologic settings in the Thelon Basin of Nunavut and the Northwest Territories. Uranium exploration also remained active in the Otish Mountains of Quebec and in the Central Mineral Belt of Labrador. Very little exploration activity occurred in other areas of Canada in 2011.

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.

There has been considerable investment in uranium exploration over the last several years. This has resulted in new 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.), and Roughrider (Rio Tinto Inc.).

The Wheeler River Phoenix Zone is along strike from the McArthur River deposit and, as such, is similar in mineralization style and potential. An indicated resource estimate of more than 13 000 tU at an average grade of 15% U was reported by Denison in November 2010.

In May 2011, Hathor Exploration Ltd. announced a revised total resource estimate for the Roughrider deposit of 22 300 tU at 4% U, doubling the size of the deposit as previously defined. Hathor was acquired by Rio Tinto PLC in December 2011.

Domestic uranium exploration expenditures were \$198 million in 2011, up 3.6% from 2010 exploration expenditures of \$191 million. Over 70% of the combined exploration and development drilling in 2011 took place in Saskatchewan.

RESOURCES

Natural Resources Canada's (NRCan) 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 three years. As of January 1, 2012, total recoverable known uranium resources, recoverable at prices of less than \$150/kgU, were estimated at 466 300 tU, compared with 468 600 tU as of January 1, 2011. This decrease is primarily due to extraction slightly exceeding the identification of additional resources.

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 18 000 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 currently ranks Canada second among the world's major producers based on actual uranium production from 2004 through 2011. Figure 4 illustrates Canada's share of world output in 2011 compared with other major producing countries.

URANIUM MARKET

During 2011, the uranium spot market price decreased from US\$62.50/lb U₃O₈ in December 2010 to US\$51.75/lb in December 2011. Long-term contract prices for uranium increased slightly from US\$62.50/lb U₃O₈ to US\$63.00/lb during the same period. World production decreased slightly from 54 670 tU in 2010 to 54 610 tU in 2011, primarily due to the decrease in production from Canada, Namibia, and Russia being greater than the increase in production from Kazakhstan. World production is expected to increase slightly in 2012.

The uranium supply is expected to increase 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 continue to be 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 meet current and future uranium demand.

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 (UO_3), an intermediate product. The UO_3 is then transported to the Port Hope conversion facility, which has about one quarter of the Western World's annual uranium hexafluoride (UF_6) conversion capacity and currently provides the only commercial supply of fuel-grade natural uranium dioxide (UO_2). UF_6 from the Port Hope facility is exported and enriched outside Canada for use in foreign light-water reactors, while natural UO_2 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 .

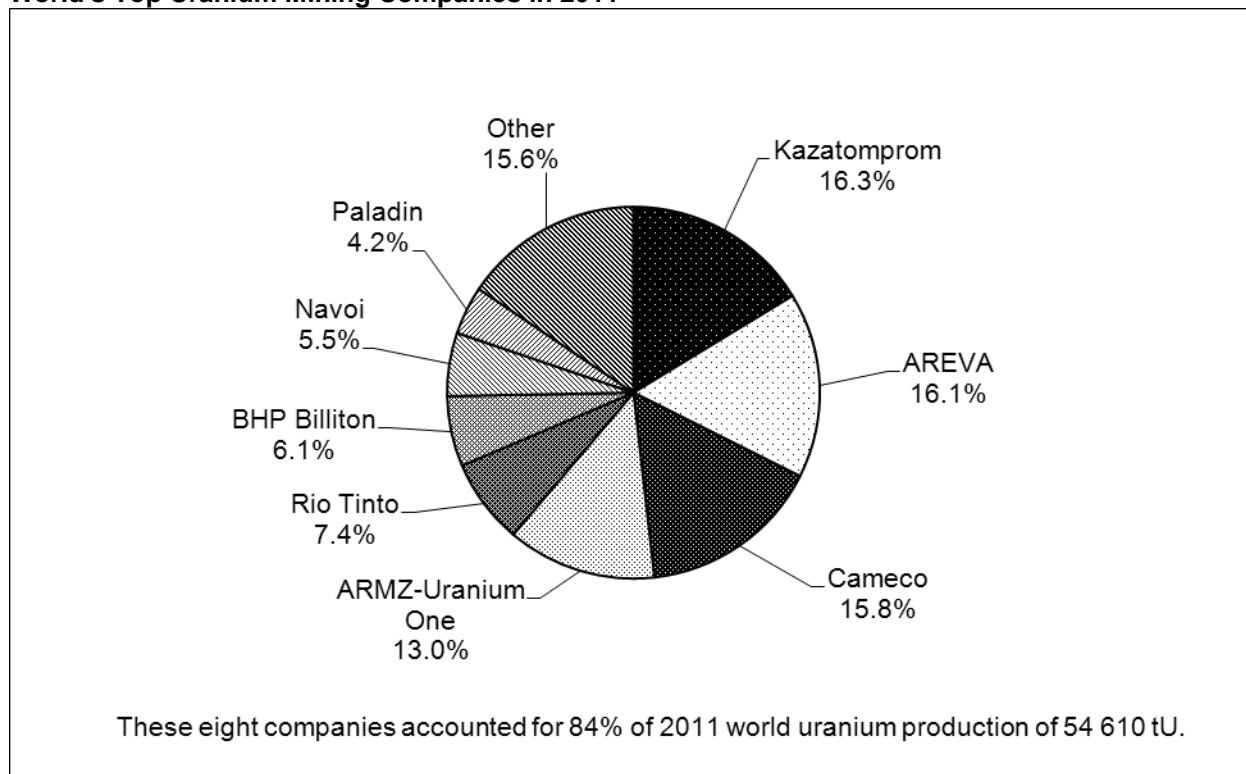
OUTLOOK

The prospect of a worldwide increase in the use of nuclear power, especially in Asia, indicates that future demand for Canadian uranium will increase. 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, 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.

¹The 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 document entitled "Definitions and Valuation: Mineral Production, Shipments, and Trade." (2) Information in this review was current as of October 31, 2012. (3) This paper, and other information on developments in Canadian nuclear policy, can be accessed 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.

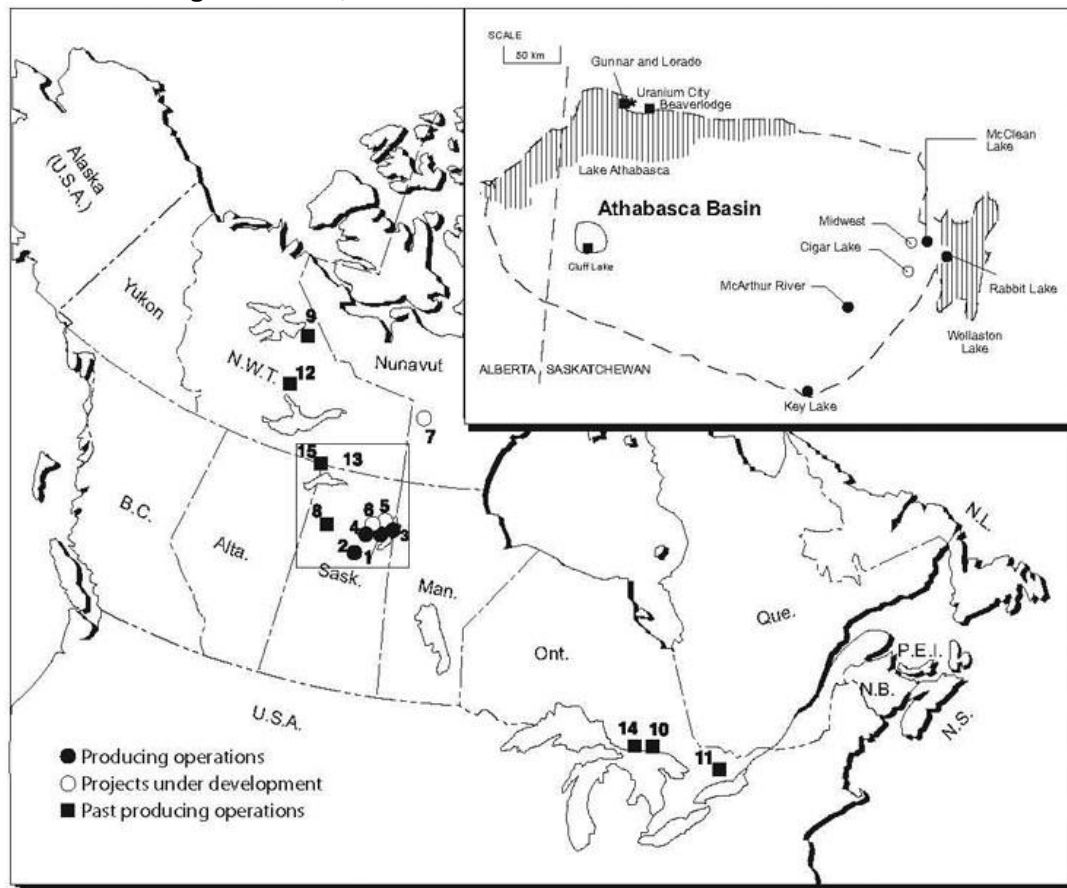
Figure 1
World's Top Uranium Mining Companies in 2011



Source: World Nuclear Association.

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

Figure 2
Uranium Mining in Canada, 2011



Numbers refer to locations on map above.

PRODUCING OPERATIONS

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

PROJECTS UNDER DEVELOPMENT

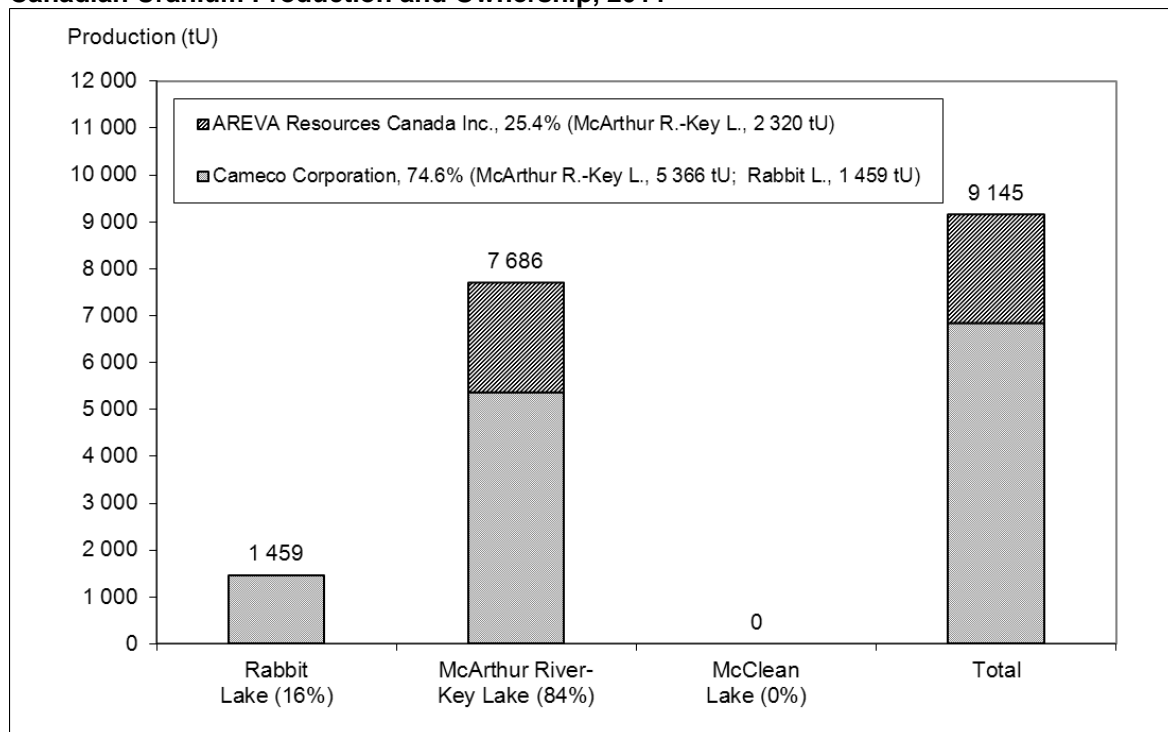
5. Midwest
6. Cigar Lake
7. Kiggavik

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/Panell/Denison and Stanleigh et al (Elliot Lake)
15. Gunnar and Lorado et al

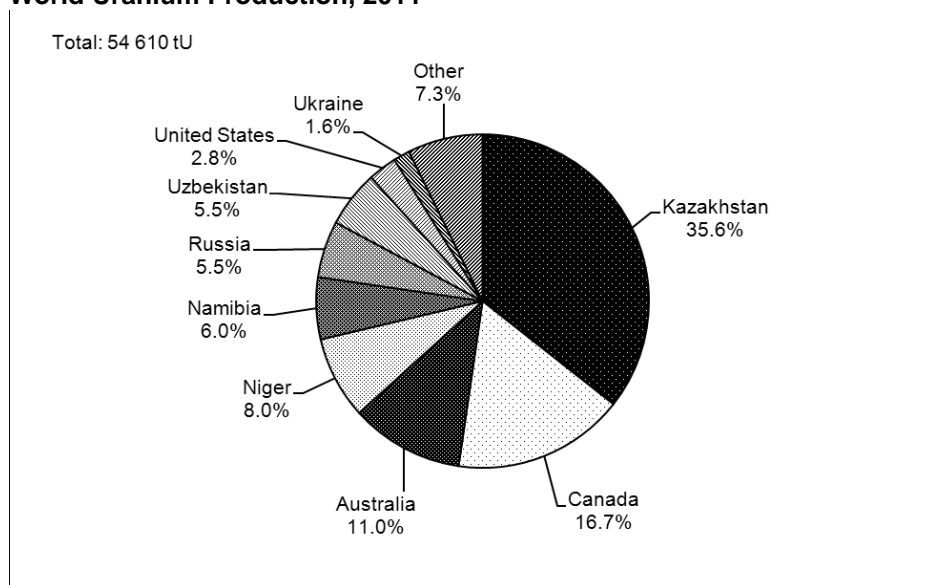
Source: Uranium and Radioactive Waste Division, Natural Resources Canada.

Figure 3
Canadian Uranium Production and Ownership, 2011



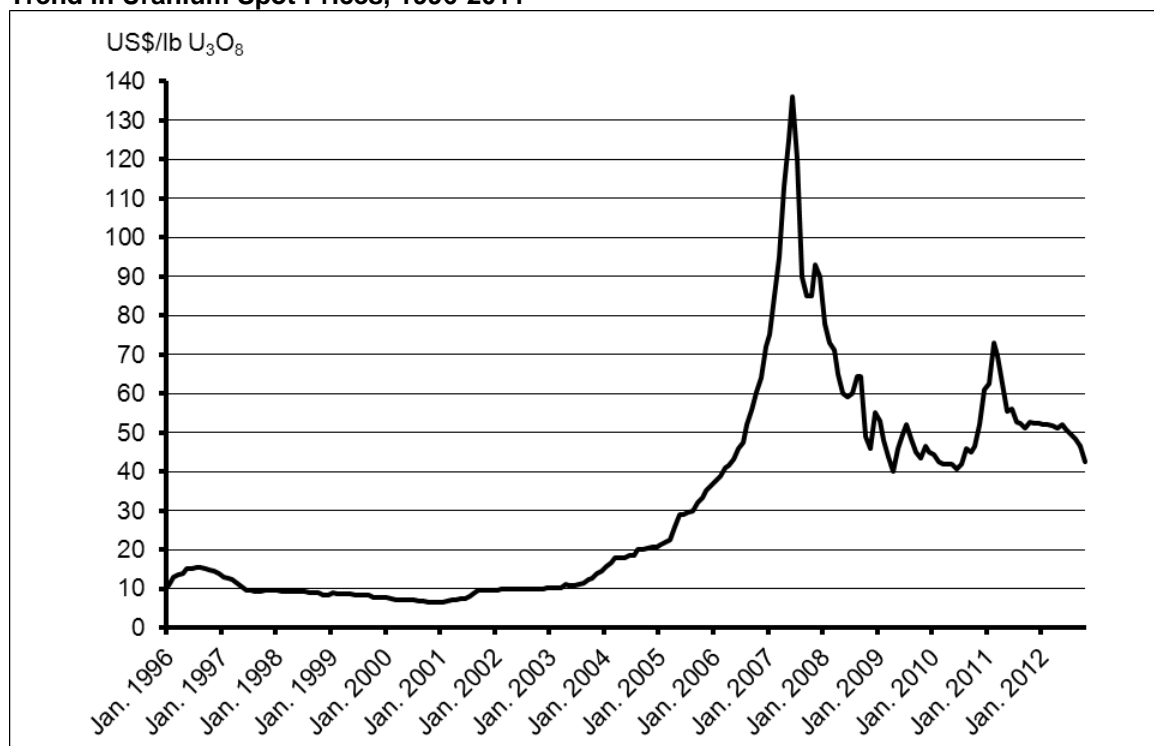
Source: Uranium and Radioactive Waste Division, Natural Resources Canada.

Figure 4
World Uranium Production, 2011



Source: World Nuclear Association.

Figure 5
Trend in Uranium Spot Prices, 1996-2011



Source: Ux Consulting Company.

TABLE 1. URANIUM PRODUCTION AND ASSOCIATED WORK FORCE IN CANADA, 2007-11

Production Centre and Producer	Company Work Force (1) (December 31)					Annual Output (2) (tU)				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
ATHABASCA BASIN, SASKATCHEWAN										
Rabbit Lake JV (Cameco, 100%)	266	317	314	318	321	1 544	1 368	1 447	1 463	1 459
McClellan Lake JV (AREVA operator)	325	348	268	136	139	734	1 249	1 388	657	0
McArthur River JV and Key Lake JV (Cameco operator)	701	751	797	851	856	7 199	6 383	7 339	7 654	7 686
Cigar Lake JV (pre-production)	–	–	–	–	–	–	–	–	–	–
Total	1 294	1 416	1 379	1 305	1 316	9 476	9 000	10 174	9 775	9 145

Sources: Natural Resources Canada; company annual reports.

– Nil; JV Joint venture; tU Tonnes of uranium.

(1) Figures are for company payroll employees only; on-site contractors (mining, construction, services, etc.) are not included.

(2) All McArthur River ore is blended with Key Lake special waste rock before milling at Key Lake.

TABLE 2. VALUE (1) OF URANIUM SHIPMENTS (2) BY PRODUCERS IN CANADA, 2005-11

	Unit	2005	2006	2007	2008	2009	2010	2011 (p)
Total producer shipments	tU	12 597	9 781	9 098	8 703	10 131	9 927	8 690
Total value of shipments	\$ millions	620	615	835	1 038	1 231	1 209	1 110

Source: Natural Resources Canada.

(p) Preliminary; tU Tonnes of uranium.

(1) The value of shipments is estimated from an average market price (spot price and long-term price). (2) Shipments are in tonnes of uranium contained in concentrate from ore-processing plants.

TABLE 3. OPERATIONAL CHARACTERISTICS OF EXISTING CANADIAN URANIUM PRODUCTION CENTRES, 2011

Operating Entity (Operator)/Location	Ore-Processing Plant (1)			
	Capacity	Recovery	Annual Throughput	
	Nameplate	Overall	Total Ore	Ore Grade
	(t/d)	(%)	(t)	(%)
McClellan Lake JV (AREVA) at McClellan Lake, Saskatchewan	500	n.a.	n.a.	n.a.
Rabbit Lake (Cameco Corporation) at Rabbit Lake, Saskatchewan	2 880	96.8	209 040	0.7
Key Lake JV (Cameco Corporation) at Key Lake, Saskatchewan (2)	864	98.7	189 821	4.12

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

JV Joint venture; n.a. Not applicable; t Tonnes; t/d Tonnes per day.

(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, 2012

Project, Province or Territory/Operator	Owners' Share (%)	Deposit Type/ Discoverer and Discovery Date	Resources (Company Estimates as of January 1, 2011)	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 81 000 tU mineable	Overall property grade of 14% U; grades vary from 5% to 70% U; orebody at depth of 450 m	"Non-entry" underground mining method; milling at McClean Lake; contributing 6900 tU/y at full production	Test mining completed in 1992; EIS submitted in October 1995; final phase of construction initiated in January 2005; mine flooded in October 2006; construction completed in 2013	670 km north of Saskatoon; 500-m-deep shaft sunk; brine freezing of ground is required to mine the ore; pro-duction expected in 2013
Millennium, Sask./ Cameco Corporation	Cameco (41.96), JCU (30.1), AREVA (27.94)	Unconformity-related / Cameco, 2000	Overall property 19 600 tU mineable	Overall property grade of 3.8% U; orebody at a depth of 615 to 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 north of Key Lake, 620 km north of Saskatoon; road to be 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, et al bought by partners)	Overall property 13 300 tU mineable	Overall property grade of 4.6% U; grades vary from 2% to 30% U; orebody at depth of 200 m	Open-pit mining; milling at McClean Lake; contributing 2300 tU/y	Environmental assessment completed in August 2012; currently undergoing an economic feasibility study	710 km north of Saskatoon; 185-m-deep test-mine shaft; pending regulatory approval and economic feasibility
Kiggavik-Sissons, Nunavut/AREVA	Kiggavik: AREVA (64.8), JCU (33.5), Daewoo Corporation (1.7)	Unconformity-related/ Urangesellschaft, 1977	Overall property 49 000 tU mineable	0.44% 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 west of Baker Lake; AREVA to conduct feasibility study; >11-year mine life with tributary ore included

km Kilometres; m Metres; t Tonnes; t/d Tonnes per day; tU Tonnes of uranium; tU/y Tonnes of uranium per year.

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, 2000-2011

Year	Expenditures (1)	Exploration and Deposit Appraisal Drilling	Development Drilling
	(\$ millions)	(km)	
2000	34	76	1
2001	27	47	1
2002	31	78	–
2003	31	74	–
2004	44	118	1
2005	91	266	10
2006	214	424	229
2007	413	655	198
2008	409	725	96
2009	188	410	38
2010	191	317	57
2011	198	412	105

Source: Natural Resources Canada.

– Nil; km Kilometres.

(1) Direct exploration and drilling expenditures in current dollars; includes advanced underground exploration and deposit appraisal expenditures. Does not include development drilling expenditures.

TABLE 6. ESTIMATES OF CANADA'S URANIUM RESOURCES RECOVERABLE FROM MINEABLE ORE, (1) JANUARY 1, 2009, JANUARY 1, 2010, JANUARY 1, 2011 AND JANUARY 1, 2012

Price at Which Mineable Ore Is Assessed (2)	Measured				Indicated				Inferred				Total			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
	(000 tU)															
Up to \$50/kgU	221	216	216	214	46	16	22	43	100	111	113	85	367	343	351	342
\$50 to \$100/kgU	–	–	–	–	70	29	54	54	10	11	11	14	485	427	468	466
\$100 to \$150/kgU	4	5	4	4	20	25	23	24	14	14	25	28	38	44	52	56
Subtotal	225	221	220	218	136	70	99	121	124	136	149	127	485	427	468	466
\$150 to \$300/kgU	1	5	3	4	25	27	100	95	33	104	44	57	59	136	147	156
Total	226	226	223	222	161	97	199	215	157	240	193	181	544	563	615	618

Source: Natural Resources Canada.

– Nil; kgU Kilograms of uranium; lb Pound; tU Tonnes of uranium; U₃O₈ Uranium concentrate.

(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, 2004-11

	2004	2005	2006	2007	2008	2009	2010	2011
	(tonnes U)							
Canada	11 597	11 628	9 862	9 476	9 000	10 174	9 775	9 145
Australia	8 982	9 512	7 593	8 602	8 433	7 934	5 918	5 983
China	730	750	750	710	770	1 200	1 350	1 500
Kazakhstan	3 719	4 346	5 281	6 633	8 512	14 020	17 803	19 451
Namibia	3 038	3 146	3 076	2 832	4 365	4 626	4 503	3 258
Niger	3 185	3 322	3 443	3 193	2 993	3 425	4 197	4 351
Russia	3 290	3 285	3 190	3 413	3 520	3 565	3 562	2 993
South Africa	747	673	534	540	566	563	582	582
United States	943	1171	1 805	1 747	1 492	1 594	1 630	1 537
Uzbekistan	2 087	2 300	2 270	2 270	2 283	2 657	2 874	3 000
Other	1 870	1 810	1 813	1 828	1 824	1 768	2 476	2 810
Total	40 188	41 943	39 617	41 244	43 758	51 526	54 670	54 610

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.