## **CLUFF LAKE** PORTRAIT OF A CANADIAN MINE

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Cover photographs, left to right: Alex Flett, trapper and former COGEMA Resources employee. Heather Morin, mill operator, COGEMA Resources. Hans Stegman and Allen Janvier, miners, Mudjatik Thyssen Mining. Ed Flett, equipment operator, COGEMA Resources.

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## CLUFF LAKE PORTRAIT OF A CANADIAN MINE



BROCK V. SILVERSIDES , SEAN FRANCIS MARTIN

#### Preface

While dining in the Cluff Lake mine kitchen or fishing on nearby Carswell Lake, it is easy to forget the world that affects almost every part of our northern Saskatchewan operations. At Cluff, you are as likely to speak Cree or Dené as you are English or French. And a good hunter still has more status than does almost anyone else. This is where over half of the workers are from small northern, primarily aboriginal, communities and you get respect for being a northerner as well as a miner. But here, you also get respect for supplying the fuel to light up homes in places like Paris, France and Tokyo, Japan.

Cluff Lake was the first uranium mine to be developed following the 1970's Bayda inquiry that examined the future of Saskatchewan's uranium mining industry. The scrutiny the project received - high for those days - and the expectations of environmental protection and northern participation - also high for those days - set the tone for a mine of which we have been very proud. Owned and operated by COGEMA Resources Inc., Cluff began production in 1980 and has since produced over 60 million pounds of yellowcake from open pit and underground mines.

In August 1998, we announced that Cluff would close at the end of the year 2000, however higher grades and increased productivity have kept the mine operating for an extra two years. Unfortunately, our reserves are now depleted. Cluff, being the first post-Bayda Commission mine, will also be the first mine to meet the new expectations with respect to decommissioning.

Cluff Lake has always been at the heart of COGEMA Resources. Its roads seem a little smoother, its rooms a bit more comfortable and its food better than at other mines. I have been told many times that the family atmosphere at the mine makes the start of a week-long shift almost like going home, at least partially compensating for being away from our families at this remote site.

This is where I worked during the summer as a student when the mine was being constructed and where, in 2001, I had the pleasure of presenting long service awards to people I have worked with over the past 22 years.

This book is a tribute to the many people who have contributed to the success of the Cluff Lake project. I thank you for your good service. May the words "Cluff Lake" stir within you a sense of pride and accomplishment.

Tim Gitzel, President and CEO COGEMA Resources Inc.



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Piezometer installation for decommission testing on the Claude waste rock pile.

# A BRIEF HISTORY OF CLUFF LAKE MINE

#### Introduction

In 2002, the Cluff Lake mine and mill reached the end of its uranium production. For over a quarter of a century, the operation was an integral part of northern Saskatchewan of its economy, its everyday life, and soon its history and mythology. It was alternately praised and criticized, studied and discussed. It has undoubtedly served its original purpose and more. The only surprise was just how long Cluff Lake kept producing, considering it only had a predicted life span of twelve years.

Cluff Lake is located within the western part of the Athabasca Basin in northern Saskatchewan, south of Lake Athabasca and close to the Alberta border. Deep in the boreal forest of the Canadian Shield, it is 700 kilometres as the crow flies from Saskatoon, and 920 kilometres by road. The operation is in a unique geological phenomenon known as the Carswell Structure, a circular upheaval of metamorphic rock that was thrust to the surface of the earth some 400 million years ago, possibly the result of a meteorite impact. This plug, 40 kilometres in diameter, contained commercially viable veins of uranium mineralization on its margins or near the faulted contact with the surrounding Athabasca sandstone.

The term "Athabasca" first entered the written record in 1778, when explorer Peter Pond of the Nor-West Company passed through the area via the Methye Portage and Clearwater River. He established a short-lived trading post on the Athabasca River. Fort Chipewyan was established as a permanent post in 1788. Several First Nations and Metis localities started as collection depots for the fur trade - the area's first industry. That purpose slowly faded after World War I.

#### **Corporate Changes**

There have been a number of corporate names associated with Cluff Lake over the years. MOKTA Canada Ltd., exploring in the region since 1964, discovered the Cluff deposits. AMOK Ltd. was created to develop and operate the project. It consisted of two private sector groups: Compagnie Française des Minerais d'Uranium and Compagnie Française de MOKTA; and two public sector companies: CEA (Commissariat a l'Energie Atomique) and Pechiney-Ugine Kuhlmann, both owned by the Government of France. In June 1979, AMOK Ltd. reached an agreement with the crown corporation Saskatchewan Mining & Development Corporation to form the Cluff Mining Partnership (80%-20%).

In 1984, COGEMA Canada Ltd. appeared on the scene. It actually had been founded back in 1973 as SERU (Societe d'Etudes et de Recherches d'Uranium) and three years later bought out MOKTA's shares in AMOK Ltd. It relocated its head office to Saskatoon in 1991. Another name change followed in 1993, when the company became COGEMA Resources Inc. With the final purchase of Pechiney and SMDC shares, it became the sole owner of AMOK Ltd. and Cluff Lake. COGEMA Resources is a major player in Canadian uranium production, also being the operator and 70% owner of the McClean Lake mine, operator of the Midwest project, as well as holding interests in the Cigar Lake, McArthur River and Key Lake projects. More recently, the COGEMA Group, COGEMA Resources' parent company, became part of the international AREVA Group, which is involved in the full nuclear fuel cycle as well as high technology fields.



Trapper Alex Flett demonstrates how to set a trap.



DJU mine entrance, DJX pit, Claude pit and airstrip.



Cluff Lake Camp, May 1975.

#### Exploration

Uranium had been discovered on the north shore of Lake Athabasca as far back as 1936. By the 1950s, sixteen mines were operating in the area, but this activity was just the tip of the iceberg. The 1950s and 1960s saw the development of an industrial infrastructure for the peaceful use of uranium. Atomic Energy of Canada was established, uranium began to be used in reactors to produce man-made isotopes for medical diagnosis and treatment, the first domestic nuclear power reactor was opened, and, in 1964, the federal government initiated a policy of exporting Canadian uranium for peaceful purposes.

The production of man-made isotopes led to the end of the use of radium, a naturally radioactive element also present in uranium ore, for medical and industrial purposes. The mining operations of Eldorado Nuclear and its processing plant at Port Hope, Ontario focussed on uranium from the early 1950s onwards. Realizing the possible benefits to the province, the Government of Saskatchewan encouraged indepth exploration for the valuable uranium resource during the 1960s. Also bringing uranium to the forefront of public perception was the large and growing demand for alternative to fossil fuel energy sources for industrial nations. The province's exceptional uranium reserves helped to meet this demand. Indeed, Saskatchewan is sometimes tagged as the "Saudi Arabia of the uranium industry."

MOKTA, the original company to show an interest in the Cluff Lake area, started exploring for uranium in 1964. It concentrated initially on the Beaver Lodge and Uranium City areas. By 1967, MOKTA was conducting airborne radiometric surveys of three locations within the Athabasca Basin. Following a systematic survey in the vicinity of the Carswell structure, a number of radiometric anomalies were discovered near Cluff Lake in 1967. A year later, after the follow-up ground evaluation, the company staked thirteen sections amounting to some 48,600 hectares of the future Cluff Lake site. Further geophysical, geochemical and drilling surveys revealed numerous promising deposits known as "elephants". The "D" body containing ore with grades as high as 70 per cent uranium was announced in 1971. The members of the early exploration team included Rene Chouteau, Jacques Dardel, Jean Francois, Daniel Alonso, Jean Juteau and Jean-Pierre Slama (who would later become CEO of AMOK/Cluff Mining from 1981 to 1987).

At this time the area was virtually uninhabited, although it was the site of isolated hunting and trapping. Only one building existed on the site - a seasonal log cabin belonging to Alex Flett. Originally from Fort Chipewyan, he had started a trap line in 1958. With so many years spent walking across the site before the "Frenchmen" came, Flett joked, "If I'd known about the uranium, I could be a rich man today." Flett became the first Cluff Lake employee when he was hired to cut lines through the bush for the MOKTA surveyors. He would later be part of the discovery team that determined the location of three of the open pit mines, and was the all around site handyman until he retired.

Starting in 1971, the site was developed as an exploration camp with a few tents and trailers. Warehouses, garages for heavy equipment and several log cabins were added. Convinced the site was worth exploiting, AMOK started in-depth planning of the mine and mill operation in 1975. To accompany this, although it was not required at that time, AMOK commissioned Stearns-Rogers Canada to do a ground-breaking detailed environmental assessment and safety report on projected operations. With this in hand, AMOK filed for a surface lease agreement and mining permit in November 1976.



SASKATCHEWAN

#### Geologists, c. 1975, Cluff Lake.

Top, left to right: Arnie Lau, "Buffalo" Bob Smith, Kristo Tapaninen, Guy Roy, "Spot" Shaw, Curt Andrews, Erwin "Dutch" Koning, "Hawkeye" Art Slingsby. Bottom, left to right: Bob "The Bomber" Santo, J.P. Loiselle, "Dirty" Jean François, Michel Vachon, "Filthy" Frank Racicot, "Gringo" Denis Yachuk, B. Laporte.







top left and bottom left: Aerial view of the mill looking north-west, and the mill at ground level.

below: Cluff Lake at sunrise.

#### The Cluff Lake Inquiry

In the early years, uranium mining was a controversial and politically charged issue in Saskatchewan. It had strong, vocal proponents and opponents. The general public, however, did not know a great deal about it. Thus, prior to construction and beginning of mine operations, the Cluff Lake project was made the subject of a provincial public inquiry headed by Justice E.D. Bayda. Over eighteen months, through both formal and local town hall hearings, it received submissions and examined the possible environmental, health, safety, social and economic effects of large scale uranium mining.

Even though the Cluff Lake project received a conditional permit in 1977, AMOK temporarily suspended any further expenditure pending the outcome of the inquiry. In its June 1978 conclusions, the Bayda Commission recommended that the Cluff Lake mine proceed, as it would benefit both the provincial and northern economies, would contribute to orderly development of the north and, if managed wisely, would not affect the environment. From this point on, uranium mining developed within a stringent regulatory climate with high expectations for northern employment and other northern economic and social benefits.

#### **Operations Begin**

One of the earliest construction projects was an airstrip near the mine, which would be served over time by charter flights of Miksoo Airlines Ltd., Pacific Western, Norcanair, Highline Airways, La Loche Airways, Canadian Airlines, Time Air, WestWind and other carriers. Even with all this air transportation, the emphasis on aviation safety has helped ensure a spotless safety record. COGEMA Resources and its predecessors have not experienced a single serious accident or injury in 25 years of flying its people to any of its operations, including Cluff Lake.

The airstrip, possibly still the best gravel strip in the north, featured prominently in the development of Cluff Lake. Initially, with only a January to March winter road, everything was transported by air for 9 months of the year. During peak construction, 400 people were moved per week, with the weekends spent moving freight. Later, freight was trucked to Fort McMurray and then flown to Cluff. During the short winter road season, it was not unusual to ship 1500 to 2000 truck loads. Later, the mine site was connected to the rest of the province by Highway #955, an all-season road, the cost of which was shared by the provincial government and AMOK.

Construction of the Cluff Lake mine infrastructure was started in the fall of 1978. Mining began in May 1980 and milling in October of that year. Saskatchewan's Lieutenant Governor C. Irwin McIntosh officially opened the Cluff Lake operation on April 2, 1981. Managing Director, Marcel Tabouret, and Cluff's first Mine Manager, Nick Robb, hosted some 120 government and industry officials, including the French ambassador to Canada, Pierre Mallard. Guests were flown in for a tour, banquet and ceremonies. Alex Flett was an honoured invitee.

Over the twenty years Cluff Lake has operated, several distinct ore bodies have been exploited by open pit or underground mining methods. They are the original "D" Pit (1980 to 1983), Claude Pit (1983 to 1988), Dominique-Peter (underground 1983 to 1999), Dominique-Janine (pit 1989 to 1991), Dominique-Janine Extension (pit 1994 to 1997), Dominique-Janine Extension Pods (1996 test mining) and Dominique-Janine Underground (1994 to 2002). Most of these deposits were named after the wives, girlfriends or children of the earliest French mine officials. Operations at these sites were affected over the years by world demand for uranium, changing regulatory requirements, and the relative quality of the various ore bodies, none of which matched the high grades of that first "D" ore body.

The product of all this activity was uranium, almost all of which was sold to international customers, chiefly France, for the nuclear generation of electricity. By mid-2002, Cluff Lake had produced 60 million pounds of uranium concentrate.

The Carswell exploration camp was constructed in the late 1970's at the same time as the mill construction. The camp, with trailers, bunkhouses, kitchen, recreation hall and tennis court, was best known for its 12 cedar log cabins built on a hill overlooking Carswell Lake. Exploration staff and



sometimes their families used these furnished, selfcontained cabins in the summer, earning the camp the nickname "Cluff Med". Varying with the season, employee numbers reached as high as 100 in the summer. With the exploration operation moving to the Cluff Lake site in the mid-80's, the Carswell Lake site was dismantled and reclaimed. Employees continued to use the site for fishing and still talk fondly of Cluff Med.

At first, the project's camp, administration and other support facilities were at "Cluff Centre" at the northeast shore of Cluff Lake. Later, administration moved to the mill area and a permanent camp was developed at the south end of Cluff Lake near Germaine Lake. Various departments set up in the main mill administration building, which became known as "City Hall." The central powerhouse/generating plant and maintenance shops were built in 1980. The mill, opened in 1980, housed the processes that turned raw ore from the mines into saleable "yellowcake" or magnesium diuranate. It carried this out in eight specific processes:

1. Crushing, initially with a jaw crusher and then with a cone crusher operating together with a vibrating screen, to the consistency of gravel.

2. Grinding to a sand-like consistency in a water slurry in the rod mill and then in the ball mill.

 Leaching in a tank with sulfuric acid and sodium chlorate, dissolving the uranium from the ground ore.
 Washing the uranium bearing solution from the solids in the counter current decantation (CCD) circuit, following which the sand-like solids (tailings) were



removed, treated, neutralized and deposited in the tailings management area (TMA).

5. Filtering the uranium solution.

6. Extracting the uranium concentrate in the solvent extraction circuit (SX), first into an organic solvent solution and then into a salt solution to concentrate the uranium further. 7. Precipitating the solution with milk of magnesia, which forms magnesium diuranate (yellowcake).

8. Thickening and drying the yellowcake, which is then passed through a quality control inspection and sealed in standard 45-gallon drums for transport.

Altogether, the milling process required nine chemicals: the three mentioned above, as well as lime, sodium carbonate, sodium chloride, barium chloride, alcohol and kerosene. This required a regular supply from trucks coming to the mill year round. During the 1980s, the mill ran continuously. After 1990, except for about 2 years, it ran 24 hours a day for 7 days, then was shut down for maintenance for the next 7 days. For the first several years before its major upgrading (Phase 1), the mill could produce about 4 million pounds of yellowcake annually. After the 1984 upgrade (Phase 2), its annual capacity was increased to over 6 million pounds, with the highest annual production being 5.1 million pounds in 1997. The 50 millionth pound of  $U_3O_8$  was produced in 1999; the 60 millionth in 2002.

A gold extraction circuit was added in 1987 to recover the relatively high concentration of gold in the Phase 1 tailings. These were stored after the initial uranium extraction process, since they still had a value of their own. The semi-

solid tailings were first pumped through an additional grinding step and then through a series of leach tanks for 72 hours. The resulting solution was then carbon-absorbed and acidified. The gold-bearing solution was electroplated onto stainless steel wool strips. The two years of operation to process the Phase 1 tailings resulted in the recovery of about 8,000 troy ounces of gold and about 800 of silver. The tailings from the gold extraction plant were then blended into the Phase 2 ore slurry and fed to the uranium leach circuit to recover residual uranium content. top right and bottom right: Camp and recreation facilities near Germaine Lake.

below: The road between mill and camp.









360° view of Cluff mill yellowcake loading area.

#### Life at the Mine

Impressed both by the concern shown and the recommendations made at the Bayda Commission, AMOK was determined to make Cluff Lake a model project in every way. The number of employees varied from 120 to 300. Some were permanent, some contracted. Although the company originally considered building a town, it ultimately decided a camp arrangement was preferable for employees, whether living southern or northern "traditional" lifestyles. Most workers followed a schedule of seven days on site and seven days at home. Air transportation for workers was provided free of charge to and from several locations in northern Saskatchewan's "West Side", as well as from Saskatoon.

Project administration was made up of seven on-site departments, all playing vital roles. These included Exploration, Geology, Safety and Environment (consisting of four units - Health, Safety, Radiation Protection and Environmental Protection), Mill Operations (including the lab, metallurgy and maintenance functions), Personnel, Accounting and, of course, Mining.

The largest department, General Mining, had under its umbrella Pit Operations (which mined, hauled and fed ore to the mill), Project Engineering, Camp Services (which cleaned up the site, painted buildings, kept roads and airstrip clear and kept the bears out of the kitchen) and Underground Mining. Almost all of the workers who went below the surface were contractors from Mudjatik Thyssen Mining Construction Ltd. Cluff Lake did not have any underground miners as permanent employees. Heavy Duty Maintenance, which kept all underground and hauling equipment in top shape as well as doing all repairs and retooling, appeared to have had the best sense of humour. The names by which their members were known include Clean Up, The Boss, Long Term, The Modifier, Mobileman, Boot Checker, Mr. Perfect, Sparkie, Runs Like A Ford, The Lubeman, I Didn't Do It, Drain Plug and No Parts.

While there was no need for a town site as such, the company made a tremendous effort to have a healthy and comfortable living environment for workers at the camp. Residences with free room and board were constructed at the south end of Cluff Lake near Germaine Lake in 1980. The "camp" was purposely located several kilometres from the mines and mill complex, so as to be away from the industrial activity. The residences were constructed as modules in Ile-a-la-Crosse and assembled on site to make condo-style buildings. Germaine contained the "kitchen", recreation facilities and even a bar - rare for a mine site (The Raven's Nest). Shortly thereafter, a skating rink and recreation/gymnasium complex (1981), curling rink (1983) and even a golf driving range were added.

Recreation was key to enjoying life at the mine. Traditionally, the biggest problem at isolated mine sites is post-shift

Septic Tank Races, Bastille Day, 1974.



Riley Jones.



Soccer on Cluff Lake, early spring 1975.

boredom. Miners tend to get tired wasting hours in the bunkhouse "reading, talking and drinking." AMOK thus set up a Recreation Department to encourage and organize community activities. Physical contests were immensely popular. The Grand Prix des Voyageur (consisting of canoeing, running and packing), a slowpitch league (starring the Pit Power Hitters, the Oh! Peelers, the Warriors, the Shop Dodgers, the Flyswatters, the Ding Bats, the Pit Bulls, and the Ball Busters), a sailing club, The Tuff Enuff Curling Bonspiel, spring and fall volleyball (with the Spare Parts, the Lucky 7's and the No Names), and the infamous floor hockey league (starring the Yellowcake Dusters, the Deviants, the Black Hole, Radon Daughters, the Firebusters, the Chargers and the Teepee Creepers) kept many employees happy and fit. Employees had access to fishing and water skiing boats, canoes and even paddle boats on Carswell Lake, Cluff Lake and Germaine Lake.

There were annual tournaments in water skiing, badminton, horseshoes, snooker, hockey, archery ("Robin Hood in Cluff Forest?"), a polar bear club wherein strange people would jump into Cluff Lake as soon as the last of the winter ice had melted, and a yearly "Ring Around The Lake" - a 16 kilometre run around Cluff Lake. There were annual fishing derbies and Thanksgiving Turkey Shoots (the turkeys were already plucked and frozen). There were even a number of one-off treats, including trips to see Edmonton Oiler hockey games and the First Casino of the North. The Recreation Committee brought in occasional lecturers such as professional photographers and fastball, water-skiing and golf pros.

There was also a photo club, computer club, music club and firearm safety classes. The mine paid for spouses to join employees whose shift fell over Christmas week. The community even had its own newsletter, "The Cluff Scanner", which kept employees up to date on the mine and recreational activities, gave birth, marriage and death announcements, profiled nearby communities and dispensed advice on topics of interest, such as taxes, R.R.S.P.'s, drinking, your ideal weight, coping with stress and first aid. Together, these activities won the Saskatchewan Recreation Society Employer Award for AMOK in 1985.

Cluff welder, John Forster, quotes a contract miner as saying, "I've worked in every mine in Canada, Finland and South America, and Cluff Lake had the friendliest people, best camp and best food." Employees remarked that "working at Cluff was like belonging to one big family", showing the overall success of life at the mine.

#### **Cluff Memories**

In the end, it is the memories that stay with employees. Mill superintendent Ernie Doell remembers his first day in May 1980 as the "most outstanding and foremost." The mine was facing an out-of-control forest fire and his brief orientation quickly became his turn on fire watch. Mill shift supervisor Clarence Morin recalls the close friendships developed with co-workers. In the area in 1980 as a firefighter, he began working at Cluff Lake in 1981 and remembers working his way up in the mill through on-the-job training, including learning from his co-workers and supervisors.

Curtis Andrews, who started in 1974 as a geologist in the exploration department, remembers living in tents, the Bayda Commission, the 1970's uranium boom and Bastille Day celebrations. To celebrate the French national holiday,

Cluff staff would have a parade and feast, in addition to testing their prowess at events such as pie throwing and septic tank racing. Mostly Curt remembers the people - like his wife Katia, whom he met on one exploration project - and his co-workers. "People at Cluff were able to work together as a team so that no matter what questions were asked or problems encountered, we were able to find a solution." In his opinion, that is why so many people were on staff for such a long period of time.

Any community is the sum of its personalities and Cluff Lake has had more than its share of interesting citizens. Hugh Jones, who administered the exploration camps at Cluff and Carswell Lakes from 1973 until his retirement twelve years later, is fondly remembered as a raconteur and for his sense of humour and dog Riley Jones. In



Black bear at Cluff Lake.

Leonard Mineault taking a water sample by Snake Lake adjacent to the Cluff TMA, 2001.





recognition of his stature within the community, he was known as the "mayor of Cluff Lake."

Nick Robb, the first and longest-serving resident mine manager, was an extraordinarily devoted employee. From 1978 to 1988, he did not miss a single day of work. The same can be said for Human Resources Manager Clare Gitzel who, along with Nick and President Bernard Michel,

successfully managed the start-up and growth of the mine during the 1980s. Nick said his somewhat misshapen nose was from a "lousy night" during his navy boxing career in WWII. Jim Duff was yet another long-term Cluffer. A Scotsman with a wicked sense of humour, he was also a writer. Not only did he regularly contribute to the Cluff Scanner ("As the Crankshaft Turns"), he was also an unorthodox poet ("Ode To A Troll"). In his honour, there is now an annual Jim Duff Memorial Golf Tournament.

The list of personalities and characters who established a name at the mine is long and varied: Daniel Alonso and his wife Judy, who was Cluff's first nurse; drillers Popeye and Mario Raymond,

who were noted for their "colourful" language, (known as Val D'Or French, comprehensible only to people from that region of Quebec). Helicopter pilot Loi Van Tran was a veteran of the Vietnam War who always flew into Cluff at tree top level looking for snipers. There was Joe Bryshun, the joke-telling bartender, and general managers Richard Dionne, Fern Lambert, Martin Quick and Steve Grinius.

MTM miner Billy Kalmakoff worked long enough at Cluff to open and close both underground mines, spent up to 5 months at site without a holiday, jogged every day whatever the weather and, despite his kind smile and being in his 60s, was known as "the toughest guy at Cluff". Charlie Burger and Gordon Gardiner helped construct the first site roads in the '70s; early prospector Claude Vachon (Claude Pit); Finnish exploration manager Kristo Tapaninen; mining superintendent Mike Mracek; metallurgist Trung Nguyen; the first female warehouse supervisor, Julie Hoeft; recreation assistant Phyllis Gibney; accounting clerk Alma Montgrand; and camp services foreman Rod Gardiner (Cluff Lake's own bear trainer).

Ed Choumont was named the "peanut butter sandwich champion"; camera-shy but well-respected John Case led the union local for a number of years; Dave Laliberte survived



Trapper Alex Flett with his old cabin (above and opposite page), and new cabin (right).

an attack by a squirrel; geologist Erwin Koning; personnel assistants Joe Whitehawk, Dave Greyeyes and Larry Buckley; electronics specialist Christian Rouillion invented overhead truck scanners to determine the grade of ore in the truck; chemist Alan Shane; surveyor Alan Roy, whose artwork base on the theme of "Indian Power and Heritage" hung in the Raven's Nest and the administration building; and safety and environment superintendent Liz Quarshie. Frank Goodwin started his Cluff career in 1975 by overhauling brakes on old army trucks that had previously used rocks and trees to be stopped; Ambrose Wolverine was the floor hockey whiz; geophysicist Brian Powell invented and patented a radon tube sampler; maintenance foreman Don Sly, who was no mean curler; and metallurgist Oscar Westerlund, runner of a 4.5 km. jog in his steel-toed shoes and known for his famous Swedish beverage "glug".

Heavy equipment operator John Frazier; François, the French chef whose brief bear-training career ended when he snared a bear with a rope as it grabbed a steak (the chef was holding onto the other end of the rope); geologist Ken Wheatley ("Wheats" to his friends); helicopter pilot Brian Arsenault, who allegedly flew a 'copter through the mill when it was under construction; equipment operator Frisco Morin; geologist Susan McNamara; mill laboratory worker Dan Douglas,

> known for his fishing obsession (occasionally out of season); Sharon Taylor, who has worked in the office for twenty years with no lost-time accidents; recreation organizer Dave Wudrick; maintenance planner Fred Alexander (with his classic and antique car obsession); mill construction superintendent Mike Stoner (a purveyor of fine cigars who filled his office with blue smoke and had one of the Germaine residences named after him); pit foremen Charlie Clarke and Norm Jewett; French expatriates and exploration managers Frédéric Tona, Roger Lainé, and

Tony Durand; and finally, vice-president and later president Bernard Michel, who became the first President and CEO of Cameco Corporation.

#### **Environment, Health and Safety**

From the very beginning, a major thrust at the Cluff Lake mine was management's commitment to safety, both for the workers and the environment. The mining of uranium possesses hazards not normally associated with other types of mines. Innate to the mining of uranium ore bodies is the potential exposure to alpha, beta and gamma radiation, as well as radiation emanating from radon gas. Accordingly, safety at a uranium mine includes the protection of workers from radiation exposure and other potential hazards. The EH&S (Environment, Health and Safety) department established the environment section in 1980 to monitor nearby lakes, streams and forests, to confirm that they were being protected during mining and milling operations. The environment section also ensured compliance with all applicable rules and regulations from SERM (Saskatchewan Environment and Resource Management) and the AECB (Atomic Energy Control Board), the predecessor of the CNSC (Canadian Nuclear Safety Commission).

Cluff Lake environment staff engaged in regular water sampling, lake sediment, soil and vegetation sampling, as well as measurement of radon and airborne dust. Regulated by both federal and provincial governments, uranium mining is subject to levels of oversight and review that are common to the nuclear industry and well beyond the requirements expected of other players in the mining industry. The high levels of environmental protection demonstrated by the Cluff lake mine prove its ability to meet and even better these intensive requirements. The environment group also maintained oversight of a selected reclamation and re-vegetation program.

To address radiation protection issues, Cluff Lake devised and implemented a Code of Practice that was approved by the regulators. Through training, awareness and spot inspections, staff ensured that employees used and understood the reason for personal dosimeters, which record their accumulated exposure to radiation. New initiatives were devised and implemented to reduce exposure. For example, dosimeters "beeped" when a high level of potential exposure was encountered. As well, new mining methods and equipment were devised by Cluff Lake workers that minimized exposure by protecting the worker behind a steel shield. Mechanization replaced hand-held equipment to give workers distance and shielding from potential exposure to

radiation. To further shield workers, an extensive shotcrete (a concrete mixture) program was instituted underground whereby shotcrete was sprayed on rock faces. Radiation protection training was provided to all employees, full time and part time, at the time of employment and periodically throughout their employment. Again, innovative means were used to keep the awareness level high. Cluff Lake even utilized interactive computerized training courses so that workers could work at their own pace and sharpen their computer skills while learning about radiation protection.

Almost from the beginning, the underground mine used the 5-point safety system to give visibility and methodology to its safety program. Most recently in 2001, Cluff expanded this 5-point safety system to include most other departments at the site. The IRS (Internal Responsibility System) was also implemented. The IRS put forth the concept that all employees are responsible for safety and that every



individual has a role to play in achieving good safety results. Cluff Lake participated in mine rescue competitions and made the entire organization very proud by bringing home numerous trophies, plaques and acknowledgements of proficiency. All of these initiatives and activities combined to create a strong safety culture and a work environment of safety consciousness and awareness. Even while winding down operations, Cluff Lake has continued to operate in a vigilant and responsible manner. The "Status of the Environment" report, released in the year 2000, assessed the physical, chemical and biological status of the aquatic environment downstream from the mine/mill site. The study concluded that after twenty years of operation, there was a "minimal impact" as a result of mining and milling. To maintain that excellent track record, a routine environmental monitoring program will continue for the first few years after decommissioning is complete. The pro-

> gram will then ease into a yearly assessment until the success of decommissioning has been confirmed. It is somewhat ironic that while the underground mine was nearing the end, the ore grades were getting higher. In spite of that, radiation exposure levels were kept low. Even after 22 years of operations and despite mining higher grades of ore than expected, the collective radiation dose for all workers, per tonne of uranium mined, was reduced by two-thirds over the last three years of operation.

> The strong health and safety culture and focus at Cluff Lake has been acknowledged numerous times. In 1990, Cluff Lake operated the entire year without a lost time accident to any COGEMA staff. In May 1992, Cluff Lake celebrated another milestone - 1000 accident free days. In October 1993, a joint federal/provincial environmental assessment panel reviewing the proposal for the Dominique-Janine extension, acknowledged Cluff Lake for its mine management practices. The panel stated that they were favourably impressed with safety at COGEMA and with the efforts to train workers regarding health and safety hazards. In May 1999, Cluff Lake was awarded the John T. Ryan trophy for its 1998 safety performance,

having achieved the lowest ever accident rate (zero) at that time in its category. In 2002 Cluff was given a regional John T. Ryan award. The award included COGEMA staff and its mining contractor. Even with the mine and most of the jobs winding down, the continued improvement of quality, safety and productivity demonstrated the pride of Cluff Lake employees and contractors.





top: Rock is loaded into a truck in an open-pit mine.

middle: Clarence Morin inspects yellowcake in the mill.

bottom: Cluff Centre (bottom left) and (clockwise) Claude Lake, Claude Pit, Claude rock piles, concrete batch plant, airstrip and DP/OP site, 2001.



#### **Cluff's Neighbours**

Many of the Cluff Lake employees came from nearby "West Side" communities (meaning the west side of the northern part of the province), including La Loche, Green Lake, Michel/Dillon, Patuanak, Ile-a-La-Crosse, Cole Bay, Jans Bay, Turnor Lake, Beauval and Buffalo Narrows. These "impact communities" or settlements closest to the mine were rightly given preferential treatment with regards to employment and business opportunities. They are home to people from many cultures, including Dené, Cree and Métis.

In 1979, the Buffalo Narrows office was opened with John Montgrand, the first Native Coordinator. John worked closely with Lyle Bear and Clare Gitzel in the Saskatoon office, Human Resources Department, to maximize the number of aboriginal and northern employees and businesses benefiting from Cluff Lake. An example of their success is the 50 per cent northern employment level that was quickly reached at Cluff, later climbing as high as 60 per cent. Much of the success was due to having people familiar with the north finding and providing support for northern employees. After 1991, Joe Whitehawk carried on the tradition of active northern recruitment.

COGEMA Resources went out of its way to use northern Saskatchewan and aboriginal suppliers and vendors wherever possible. From the beginning, Cluff Lake contracted with northern companies for such needs as construction (Ile-a-La-Crosse Industries and Northland Development Corporation), transportation (Northern Resource Trucking, owned by the Kitsaki Development Corporation and Trimac), food (Beaver Foods/Clearwater Catering - all employees past and present insist Cluff Lake has the best food they ever had at a mine site), janitorial (Sakitawak Development Corporation) and security (Prince Albert Development Corporation - owned by the 12 bands of the Prince Albert Grand Council). Other goods and services obtained from northern companies include lumber and wood products, furniture and fixtures, communications, plumbing and heating, fuel, hardware, signage, clothing, publishing, automobiles, pharmaceuticals and even potatoes.

Not only did many existing businesses expand, but many new companies came into being to respond to the mine's needs. For example, in 1995, Cluff spent close to \$65 million on the purchase of goods and services from northern Saskatchewan companies. Due to the fact that both mine employees and local business owners from these impact communities are in possession of more disposable income than ever before, the local economies are larger, more diversified and more advanced.

COGEMA has always felt a closeness to the region near Cluff Lake. It has supported various community development programs over the years, and in 1996 saw a significantly increased focus on supporting community health projects. Since then, COGEMA Resources has donated \$100,000 to the construction of the La Ronge Health Centre, \$100,000 to the La Loche Health Centre, \$100,000 to the Clearwater River Dene Nation Treatment Centre and a similar amount to the Athabasca Health Facility as part of the Athabasca Working Group. The mine also contributed significantly through royalties, fees and taxes to the Saskatchewan economy as a whole.

Most of the Cluff Lake staff were represented by the Energy Chemical Workers Union, now the Communications, Energy and Paperworkers Union Local 48-S, which also agreed to preferential hiring, promotion, training and job security for northerners.

#### **The Final Years**

While the mine was originally scheduled to close in 2000, it kept operating for another two years based on high productivity and high ore grades. With the ore reserves running out, production ceases at the end of 2002. The CNSC operating licence was, however, renewed to April 2004. Decommissioning will start in 2003. Cluff Lake, being the first post-Bayda Commission mine, also turned out to be the first of the current generation of Saskatchewan uranium mines to enter the decommissioning process. COGEMA Resources planned for a gradual phased shutdown for Cluff Lake. The environmental assessment of the proposed site decommissioning plan, including predictions for both short term and long term, was provided in the Cluff Lake Comprehensive Study. In parallel, site clean up and reclamation activities had been ongoing, which is normal for a mining operation, as some activities cease and others start. These included dismantling of redundant buildings, re-vegetation of previously used areas and placement of an initial one-metre depth soil layer to promote consolidation of part of the tailings area.

The Cluff Lake Comprehensive Study incorporated an extensive public consultation process by COGEMA Resources. It was subject to a regulatory review, coordinated by the CNSC, prior to submission to the Canadian Environmental Assessment Agency to complete the public review process. COGEMA Resources looks forward to adding Cluff Lake to the COGEMA Group's other nine successful decommissioning projects in France, Gabon and the United States.

With the end of production in 2002, some of the Cluff Lake workforce have moved on to other operations, including the Rabbit Lake mine and the developing Cigar Lake mine. Others have retired or left the field of mining altogether. Once decommissioning is completed, the silence of the north will again enfold the Carswell Dome.

#### The Uniqueness of Cluff Lake

In many ways, the Cluff Lake Mine can be considered a prime example of an employee-oriented venture. From the outset, it showed itself to be an industry leader with respect to northern employment in exploration, mining and construction, and the utilization of northern supplies and services. Over the course of the mine's life, COGEMA consistently engaged between 45 and 60 per cent of its workforce from northern Saskatchewan. In 1979, it opened an office in Buffalo Narrows and created a position of Native Coordinator to listen to First Nations concerns, ease their entry into the workplace, and ensure they were employed in all departments and at all levels. Every year, tours of the mine site were arranged for the West Side Environmental Quality Committee (EQC), Elders and Chiefs, teachers and students, and other northern community organizations. The West Side EQC is an important link between the Cluff Lake mine, government agencies and local communities. As well, COGEMA Resources not only accepted, but actively promoted aboriginal culture and lifestyle at Cluff Lake and, through corporate donations, elsewhere.

The mine has been an excellent training ground for employees at all levels. Most employees are trained at over 20 activities and master a wide range of heavy equipment or mill circuits. A fast tracking program moved some employees from entry level to supervisory levels in less than 5 years. Northern residents accounted for between 28 and 46 per cent of all on-site technical and supervisory positions. The positions were stable and long-term. Overall, Cluff Lake employees made up a well-rounded and knowledgeable corps of Saskatchewan uranium workers. Cluff Lake "alumni" have found themselves much in demand in the mining industry and in other sectors of natural resource extraction.

COGEMA Resources showed its support for the educational development of its workers and their families from the mine's inception. The Human Resources Development Agreement was signed with Saskatchewan Education's Northern Education Services Branch, working with the department on training programs to ensure that northerners could qualify for the various job postings. COGEMA is one of the participants in the Multi-Party Training Agreement (with the federal and provincial governments and other uranium mining companies) that promotes literacy, apprenticeships and technical training. Staff members regularly make presentations to secondary schools and set up booths at career fairs.

Since 1979, the COGEMA Resources scholarship program for northern students has provided over 130 post secondary scholarships worth about \$750,000. These were not necessarily to support studies relating to the field of mining indeed any field or discipline is equal before the company's selection committee. The only stipulation is that the course of study be done at a Saskatchewan institution and potentially benefit the north. top: Rock is broken down in the mill.

middle: Gold recovered from the mill processes.

bottom: Portal of former Dominique-Peter and OP mine with D pit, 2001.







The mine developed into a close-knit community, almost an extended family. When long service awards were instituted in 2001, there were many names on the COGEMA Resources Honour Roll: Iron, Hoge, Yew, Darbyshire, Forster, Aubichon, Flett, Doell, Holst, George, Pfoh, Bouvier, Morin, Fehr, Gardiner, Dunbar, Wall, Dowdall, Mineault, Case, Corrigal, Gauthier, Janvier, Bailey, Joanis, Moore and Morin, as well as others who started at Cluff and were transferred to McClean Lake or the Saskatoon office.

For a number of families, a second generation also worked at Cluff Lake. Four of Alex Flett's children were employed at various times at the mine. The present CEO of COGEMA Resources, Tim Gitzel, was the first Canadian-born to hold the position, and is the son of Clare Gitzel, one of AMOK's first human resources managers.

Due to the low turnover, the Germaine residences were used by the same people for years and have become personalized. In many ways, it has been like a resort with good food, comfortable social interaction, and a sense of purpose. Some, particularly mining and catering staff, did not leave the site for months at a time. Germaine became a second home to many, and more than a few were sad to leave.

Even though the site will have been returned to a stable, natural state following decommissioning, the Cluff Lake mine will have irrevocably altered the lives of many northern Saskatchewanians and will remain a part of them and their communities for generations. Overall, the mine and mill has been a successful venture for all involved: COGEMA Resources, their employees and contractors, the province and especially northern Saskatchewan. In many ways, the quarter century existence of Cluff Lake may be looked back upon as a golden age.

Now in his eighties, Alex Flett hunted, trapped and fished on the site long before the geologists arrived. He helped them live and explore in the area and later, along with four of his eight children, worked at the mine until his retirement from COGEMA Resources. Not really prepared to retire, he returned to hunting, trapping and fishing on the site, and plans to continue well after operations cease. With his old log cabin deteriorating, the mine staff built Alex a new cabin on the shores of Cluff Lake. He is not worried about having no one to talk to - he can go to town for that. When he hears a wolf calling in the bush, he says, then he's glad.



## PORTRAIT OF A CANADIAN MINE



| Clarence Morin, Mill Shift Supervisor, COGEMA Resources



Noella Gardiner, Radiation Technician, COGEMA Resources





Dan Douglas, Lab Supervisor, COGEMA Resources



(left) Thomas Elash, | Geologist, COGEMA Resources

(right) Dwayne Cooling, Boart Longyear

Frank Goodwin, Surplus Coordinator, COGEMA Resources

Robert Pfoh, Maintenance General Supervisor, COGEMA Resources



John Forster, Welder, COGEMA Resources



Theresa Gauthier, | Camp Services, Clearwater Catering



Cliff Chanin, Electrician, COGEMA Resources



(l-r) Hans Stegman, | Miner, Mudjatik Thyssen Mining

Leslie Turner, Foreman, Mudjatik Thyssen Mining

Allen Janvier Miner, Mudjatik Thyssen Mining

I standing (I-r): Carmen Gisi, Electrician Terry Hoge, Mill General Supervisor seated (I-r): Cliff Chanin, Electrician Sylvia Iron, Mill Planning Data Entry Clerk Dale Saufert, Instrumentation Technician

COGEMA division leaders in their morning meeting.











Milo Chytil, | Shotcrete Leader, Mudjatik Thyssen Mining



Ernie Doell,

Mill Superintendent, COGEMA Resources



| top (l-r) Alex Adams, miner; Wayne Champaigne, miner.

standing (l-r) Victor Grimsrud, welder; Hans Stegman, miner; Derrick Furlong, mechanic; Milo Chytil, shotcrete leader; Allen Janvier, miner; Pat Novicki, electrician; Leslie Turner, foreman; Kim Laplante, timberman; Paul Lacasse, batch plant operator.

Mudjatik Thyssen Mining crew at the DJ Mine Portal



Ron Bauer, Chef, Clearwater Catering

> Ormond Wall, | Mill Mechanic, COGEMA Resources





Rod Gardiner, Services General Supervisor, COGEMA Resources



Alex Adams, Miner, Mudjatik Thyssen Mining



**Robert Dunbar,** Pipefitter, COGEMA Resources



I Thomas Thompson, Instrumentation Technician, COGEMA Resources

Beau Gardiner, Security, Sakitawak Development Corp.







Billy Kalmakoff, Miner, Mudjatik Thyssen Mining

> Steve Grinius, | Cluff Lake General Manager, COGEMA Resources





Clement Iron,

General Maintenance Operator, COGEMA Resources



Heather Morin, | Mill Operator, COGEMA Resources



Harold Aubichon, | Mine Shift Boss, COGEMA Resources

> Martin Durocher, | Personnel Assistant, COGEMA Resources

Ed Flett, | Equipment Operator, COGEMA Resources







Victor Bailey,

Mill General Supervisor, COGEMA Resources





Sharon Taylor, Office Supervisor, COGEMA Resources





April Dyck, Mine Geologist, COGEMA Resources



Relief Superintendent, Mudjatik Thyssen Mining Erwin Koning, | District Geologist, COGEMA Resources















Bingo night at the Raven's Nest



Name
Frank Goodwin
Clamant Iron
Terry Hoge
Leonard Darbyshire
John Forster
Harold Aubichon
Fugene Yew
Edward Flett
Ernest Doell
Dwavne Holst
Eugene George
Robert Pfoh
Marcel Bouvier
Jerry Morin
Raymond Fehr
Rodney Gardiner
Robert Dunbar
Ormond Wall
Mike Dowdall
Leonard Mineault
John Case
Eugene Corrigal
Ulrich Gauthier
Louis Janvier
Victor Bailey
Leslie Moore
Clarence Morin
Raymond Morin
Cliff Chanin
Edwin Corpus
Sharon Taylor
James Hamilton
Tobie Aubichon
Martin Munsters
Joe Desjardin
Daniel Douglas
Joe Maurice
Thomas Thompson
Clittord Parkinson
Kandy Sanjenko
Dale Sautert
Paul Chometsky
Shawn Katoss

Start Date August 15, 1975 January 31, 1979 February 28, 1979 April 4, 1979 May 10, 1979 June 13, 1979 October 31, 1979 November 11, 1979 May 13, 1980 May 20, 1980 May 28, 1980 June 2, 1980 June 3, 1980 June 3, 1980 July 10, 1980 July 30, 1980 August 5, 1980 September 9, 1980 September 25, 1980 October 21, 1980 November 11, 1980 December 29, 1980 March 23, 1981 April 1, 1981 May 4, 1981 May 18, 1981 September 22, 1981 October 6, 1981 February 22, 1982 March 10, 1982 March 10, 1982 March 19, 1982 May 30, 1983 June 13, 1983 July 6, 1983 July 27, 1983 September 14, 1984 January 11, 1985 February 21, 1986 May 19, 1986 May 23, 1986 June 11, 1986 July 17, 1987

#### Name Philip Kha Murray Backlin April Dyck Aldina Bouvier Brian Bakos Glen Umpherville Art Fee Kelly Daigneault Leif Jepsen Kelly Janson Jason Hood John McDonald Jimmy Wolverine Martin Durocher Shawn Fouhy Antoine Gardiner Lester Janvier Jamel Sgaoula Peter Malbeuf Lloyd Daigneault Tony Iron Lee Reigert Charles Buffin Morley Burke Todd Verbeke Gordon Gardiner Clifford Toulejour David Kowalchuk Heather Morin Trevor Isley Dennis Daigneault

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## Cluff Lake 2001 Long Service Awards Honour Roll

#### Presidents and Managing Directors

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