

A Brief History of Giant Mine

Special points of interest:

- The origins of Giant Mine
- Giant Mine and the Yellowknives Dene
- Gold mining and arsenic
- The 1970s Health Controversy
- Toward the frozen block method

Giant Mine History

The Origins of Giant Mine

In 1934 Johnny Baker staked the first gold claims at Burwash Landing, across the bay from the present site of the City of Yellowknife, where a very small gold mine lasted until 1936. News of the find at Burwash resulted in more miners and prospectors coming to the area, eventually resulting in the establishment of large mines such as Con (1938) and Negus (1939), and the founding of the town of Yellowknife.

Giant Mine was slower to come on stream. In 1935 Baker discovered gold bearing rock at the present-day site but a commercial ore body was not found until 1944.

The mine finally opened in 1948 and remained in operation until 2004, a fairly long life for a mining operation. The mine had many owners: Giant Yellowknife Mines, Ltd., (a subsidiary of Falconbridge – 1948-86), Pamour (1986-1990), Royal Oak Mines (1990- 1999) and Miramar (1999-2004). Giant Mine generated a lot of wealth: over 7 million ounces of gold worth (just over \$2.7 billion in 2002 dollars). While much of wealth flowed out of the Northwest Territories, the mine provided jobs and property taxes to support Yellowknife, a cornerstone of growth for the city for over half a century.



Headframe at Giant Mine (J. Sandlos)

Giant Mine and the Yellowknives Dene

The impact of the mine was much more adverse for the Yellowknives Dene First Nation (YKDFN). Although today most Yellowknives Dene live in Dettah and Ndilo, prior to the mining era they lived in smaller settlements surrounding Yellowknife Bay, often moving seasonally to take advantage of fish runs or caribou migration. The Yellowknives subsisted through

hunting and trapping, though they were somewhat distant from major fur trading centres such as Fort Resolution. Although there had been contact with European traders and explorers dating back to Franklin in the early 19th century, it was only with the advent of mining that substantial numbers of non-Native Canadians entered the Yellowknife Bay area.



Akaitcho Headframe,
Giant Mine (J. Sandlos)

***“One byproduct
of ore roasting
was arsenic
trioxide dust”***



Giant Mine Head-
frame (J. Sandlos)

Giant Mine and the Yellowknives Dene Cont'd

Many YKDFN elders have recounted that the prospecting rush of the 1930s brought large numbers of outsiders to their traditional territory for the first time. To some the sound of blasting was disconcerting, and they asked the prospectors to leave. Although some Yellowknives found work in the mines, or made money selling firewood to the new mining camps, Native employment at the Yellowknife gold mines always remained small. To highlight the lack of economic benefits from the mines, many Yellowknives recall that it was an old woman

from their community, Liza Crookedhand, who showed early prospectors where to find the gold. For this, Crookedhand was given a new stovepipe. In addition to the lack of jobs and monetary benefits, the Yellowknives also remember that the development of Giant Mine and the city of Yellowknife impacted one of their best hunting, fishing, and berrying areas. The Baker Creek Valley in particular, was rich in blueberries and the river full of fish, food sources that are either gone or cannot be accessed because of the mine.

Gold Mining and Arsenic

The effects of arsenic pollution from Giant Mine were severe. Almost all of the gold ore at Giant Mine was contained in arsenopyrite formations, which meant it had to be roasted at high temperatures to separate the gold from the surrounding rock. One byproduct of ore roasting was arsenic trioxide dust (the most toxic form of arsenic, which billowed up from the roaster stack at Giant beginning in 1949). Arsenic also entered the water as it seeped out of tailings ponds and waste rock piles on the surface areas of the mine. Although Con Mine did contribute to the arsenic problem beginning in 1948, the lion's share of the pollution came from Giant Mine. One report estimates that Giant Mine produced 16,500 lbs. of the 22,000 lbs. of arsenic that were being sent into the local atmosphere every day in the late 1940s.

Although the arsenic pollution would have posed risks to everyone in Yellowknife, the Dene living on Latham Island—present day Ndilo—were particularly vulnerable. Not only did their community sit directly across the bay from the roaster stack and prevailing winds placed them directly in the path of the arsenic fallout, they also relied on local lakes, streams, and snow in winter for drinking water. As arsenic accumulated in the snow through the long periods of sub-zero temperatures

in Yellowknife, meltwater became more polluted. In spring the flush of a winter's worth of arsenic loading in melting snow caused arsenic spikes in local water sources. In April 1951, the local Indian Agent reported widespread sickness due to arsenic poisoning on Latham Island. Tragically, one small child died due to acute arsenic poisoning; the family received \$750 in compensation. The Yellowknives have recounted other deaths of elders and children due to arsenic exposure at various points in the long history of Giant Mine.

The mining company and the federal government responded to the crisis in several ways: posting warning signs in lakes, conducting a health study in the early 1950s, and installing pollution control equipment, a Cottrell Electrostatic Precipitator (ESP), in October 1951 to capture the arsenic dust as it went up the smokestack. The Cottrell ESP only captured just over half the arsenic dust, so approximately 7000 lbs. of arsenic trioxide escaped into the local environment each day between 1954 and 1958. Only with the installation of a second ESP and a baghouse (really just a big bag meant to filter arsenic out of the air) did arsenic emissions fall more significantly to 795 lbs. per day in 1959.

The 1970s Health Controversy

The emission reductions were not enough to quell the public health controversy that emerged in the mid-1970s. In 1975 the CBC radio program *As it Happens* produced a lengthy story for the national network suggesting that a federal study linking arsenic exposure in Yellowknife to cancer had been suppressed. The story also highlighted the fact that many Yellowknives Dene drew water from Back Bay, where a tailings spill had occurred in 1974 and arsenic levels sometimes exceeded drinking water standards at that time. Charges of a government coverup emerged in the media (this was the Watergate era) and the federal government quickly released the once missing public health study and initiated new studies on arsenic levels in the local population. In 1975 the federal government's Department of Health concluded that arsenic levels were safe in the Yellowknife area, though Giant Mine workers in the baghouse were exposed to high levels in the air. In response, the National Indian Brotherhood, United Steelworks of America, and researchers from the

University of Toronto conducted their own study of the Latham Island population (many people today remember having hair samples taken when they were small children) that concluded arsenic levels were quite high in Dene children. The federal government responded to the new controversy, farming out a new study to the independent Canadian Public Health Association, which concluded again in 1977 that high arsenic exposure was confined to those who worked in arsenic hot spots at Giant Mine. While this study did quell the arsenic controversy, today we know that long term exposure to even very small amounts of arsenic, especially in drinking water, can result in various cancers (skin, liver and bladder) and skin conditions (black spots on or hardening of skin), while airborne exposure causes lung cancer. However, it can take decades for these conditions to appear, making it almost impossible to analyze the full impact of long term arsenic trioxide exposure on the Yellowknife population.

Toward the Frozen Block Method

Throughout the 1980s and 1990s, concern began to mount over the large amount of arsenic stored underground at Giant Mine. In 1999, Royal Oak Mines, the owner of Giant Mine, went bankrupt. Another company, Miramar, quickly took over management of the site (with no responsibility for the arsenic), and the mine closed for good in 2004. The huge environmental liabilities associated with arsenic became the responsibility of the federal government. The federal and territorial governments conducted the first studies of what to do with all this poison beginning in 1997, with proposals ranging from shipping it out of the NWT to use as wood preservative to encasing it underground in cement.

In 2003 the federal government decided to freeze the arsenic underground using a passive heat exchange technology (thermosyphons). The "frozen block"

proposal was controversial, because it meant that the underground arsenic would stay in place forever; maintenance of the site (pumping water, replacing thermosyphons, etc.) would be required for all time. Critics suggested it was unlikely that the site could be cared for over thousands and thousands of years. At the end of a six year environmental assessment (2009-14), the Mackenzie Valley Environmental Review Board recommended that the project timeframe be reduced from forever to 100 years, with active research into new technologies that might permanently remove arsenic from the site. It is far from certain if new techniques can be developed to effectively address the arsenic problem at Giant Mine, raising the question of how to communicate with future generations about the dangers and maintenance requirements at the site.

"The frozen block... meant that the underground arsenic would stay in place forever"



Thermosyphons at Giant Mine (passive heat exchange system that keeps underground arsenic frozen (J.Sandlos))