

THE A-Z OF BRITANNIA MINES

A sneak peek into the fascinating world of the people, places, events and objects that shaped the Britannia Mine

PAST • PRESENT • FUTURE

Acid Rock Drainage

Acid Rock Drainage (ARD) is a natural process that happens to sulphide minerals, such as the pyrite (iron sulphide) and chalcopyrite (copper iron sulphide) found at the mine. Water and oxygen from rain and air react with the minerals, dissolving the metals and forming sulphuric acid – dissolved copper is toxic to marine life. ARD has happened here for as long as there have been sulphide minerals exposed at the surface. But the digging of 210 km of tunnels created a much larger surface area for this chemical reaction to take place. With an open pit mine at the top of the mountain above the tunnels and shafts, water was continually flowing through the mine, becoming polluted and therefore contaminating the ground water and flowing into Howe Sound. Fortunately, since 2005, the ARD has been treated by the EPCOR Britannia Mine Water Treatment Plant. It captures the water as it leaves the mine, neutralizing the acidity and removing the dissolved metals.

Bunkhouses

There were bunkhouses in each of the nine camps and in the two townsites. These were home to the single men and to the married men forced to leave their families



The men did their best to make their bunkhouse quarters feel like home.

behind as they went in search of work. The men slept in a bunkhouse, ate in a cookhouse and enjoyed their free time in a clubhouse. It was definitely close quarters in the bunkhouses as it was two men to a room. In 1950, room and board cost \$2.30 a day. For many years the men had to supply their own blankets. It was a bit of an isolated existence, especially in the camps. Even though there were many dances and parties at the 'Beach' and 'the Townsite' (Britannia Beach and Mount Sheer), the bunkhouse guys did not feel welcome. The family men often saw them as a threat to their marriages! Instead, on their days off, the single men were quick to get away to the lures of the city. The ski cabin in the mountains above was another popular getaway.



NATIONAL HISTORIC SITE

BRITANNIA
MINE MUSEUM



The Company Store was the largest non-industrial building in town.

Company Town

Britannia Beach was a company town, meaning that everyone who worked there was employed by the mining company, including cooks, teachers, nurses and shop workers. This included those at Mount Sheer (see 'M') too. Therefore, when the mine was prosperous, all was good. But in the darker days, such as during the Great Depression, or when Mill 2 burnt down (see 'D'), times were hard on all and the community had to pull together to get through it. In its seventy-year history, there were only two owners – the Howe Sound Company (and its subsidiary the Britannia Mining & Smelting Company) and Anaconda Britannia Mines. But the nature of life in a company town was more influenced by the General Manager of the day. For example, J. W. D. Moodie sacked any worker found to be buying goods that were not from the Company Store.

Disasters

For its size, the Britannia Mine's community had more than its fair share of disasters,

including Canada's second worst landslide. At midnight on March 1, 1915, a large rock and snow slide engulfed the Jane Camp, high on the mountain. Tragically, 56 lives were lost – many of the bodies were never recovered. After this loss, most of the living and working quarters were based further down the mountain – this became Mount Sheer (see 'M'). But 1921 was perhaps the community's darkest year. A mysterious fire engulfed Mill 2 – the ore processing plant – destroying it, though thankfully no one was killed. However, later in the year, a natural dam high up on the Britannia Creek burst, sending a torrential flood of water, logs and boulders towards Britannia Beach. Fifty homes were destroyed, 15 residents were injured and sadly 36 lives were lost. Yet, through these disasters, the people of the community rallied round, overcoming the greatest of obstacles thrown at them.

Ethnic Diversity

Workers at the Britannia Mine came from far and wide. It was recorded that people from over 50 nationalities came to work here. Most of those came from Canada and Europe – for example in 1948, 48% of workers were Canadian, 47% were European, 2% were classed as 'Oriental' and 1% was American. Of course, before the mine ever existed, the Howe Sound area was inhabited by the Squamish Nation, descendants of the Coast Salish aboriginal peoples. They traded with the early explorers and settlers from the outset, when Captain George Vancouver sailed into Howe Sound in 1792. As for diversity of religions, the predominant religions at the mine were protestant and catholic. In fact, Britannia can boast the first ecumenical church in Canada – with both protestant and catholic faiths having a space in the same building.



NATIONAL HISTORIC SITE

BRITANNIA
MINE MUSEUM

Froth Flotation

Froth flotation is a technique used globally to extract ore from waste rock. It was developed first in 1869 and used at Britannia from the beginning. The ore/rock is ground finely, mixed with water and a 'frothing agent' (e.g. pine oil) and 'collectors' (e.g. potassium xanthate), then air is gently blown into the mixture. The ore particles join with the 'collectors' and stick to the bubbles as they rise, whereas the waste particles sink. The ore-laden froth is skimmed off and the ore is separated. At Britannia, this was done in the Mill. They were very pioneering here. They were one of the first companies in North America to install flotation machines in 1912, and continued to be at the forefront of flotation experimentation. They also developed the 'Britannia Deep Cell' system in the 1920s/1930s, which gave them a recovery rate of over 90%, which was excellent for the time.



Froth flotation forms a bubbly mix of valuable ore minerals.

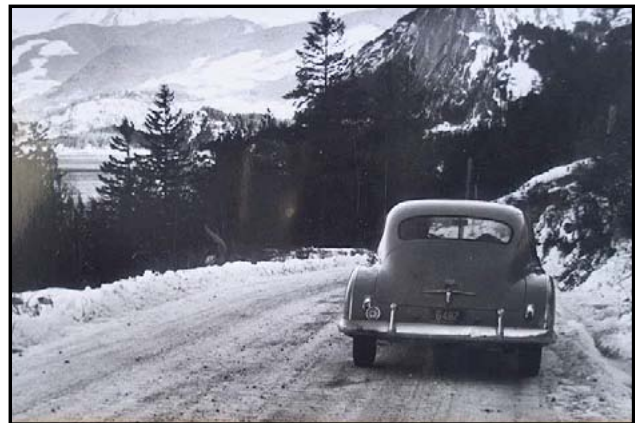
Gold

Although mainly a copper mine, Britannia did produce gold too. It was mined as 'native', or 'free' gold – gold that is found as metal in the rock, unlike the copper that was found as a copper sulphide. Silver was mined here in the same way. Both were removed in the Mill – on and off from 1925. After the ore had been processed by froth flotation (see 'F'), the 'tailings' (i.e. what was left) were passed over long troughs containing blankets. The heavier particles of free gold became trapped in the blanket fibres whereas the lighter waste minerals were washed over them. On a daily to weekly basis,

the blankets were washed down to remove the gold. It generally only took one trusted worker to operate the gold plant, and the other workers were reportedly forbidden to be in this area. In all, the mine extracted 500,000 ounces of gold – roughly the same weight as two large elephants.

Highway

Despite its closeness to Vancouver, life at Britannia was very isolated for much of its history. Until the coming of the railway in 1956 and the highway in 1958, the only way in and out was by Steamship. A road to Squamish was built in 1947, and the road between the Beach and Mount Sheer was completed in 1953. Before this, the isolation felt by the residents was strong, which led to the forging of very strong community bonds. Many former residents say the coming of the highway was the beginning of the end for community life at Britannia. It happened at a time when the mine had closed down for a few months, and even though it reopened partially, the lure of the big city and the new ease of travel, meant that the community never fully regained its former strength. Fifty years later, this beautiful Sea to Sky Highway has been upgraded as part of the 2010 Winter Olympic Games route.



The highway on route to Squamish, with the Squamish Chief in the background.

NATIONAL HISTORIC SITE

BRITANNIA
MINE MUSEUM



The Japanese workers in town all had surface jobs, such as trackmen.

Incline Railway

A cable-fed Incline Railway, affectionately known as the 'Skip' was for many years the lifeline between Britannia Beach and Mount Sheer (see 'M') – it was even a tourist attraction! After a gruelling 347 steps uphill from the Beach to the Skip base, passengers climbed aboard. They climbed an elevation of 1400 feet at 7½ miles an hour, before offloading; a narrow gauge railway travelled the rest of the journey. The Skip actually began life as an ore carrier, taking the ore to the Mill. When a 'raise' (sloped tunnel) was dug underground to gravity feed ore to the Mill, the redundant Skip started carrying passengers. Only once was there a serious accident. In 1939, ore cars being lowered on the rails got out of control and crashed into the upper Mill level. There was thankfully only one minor injury, but it made a real mess of the Mill housing.

Japanese Workers

The story of the Japanese residents at Britannia is thought provoking, telling the wider tale of discrimination in BC. Japanese men had worked at Britannia since the early years, though the government legislation of the day did not permit them to work underground. Instead, they worked as labourers and trackmen. They worked hard, yet were paid less than 'white' workers and had segregated living conditions. Following a strike in 1931, they achieved better working conditions, though not equal pay. Individual friendships were of course forged, but discrimination was common. The darkest time followed the Pearl Harbour attack in 1941. Despite most of BC's Japanese residents being born and raised in Canada, the Province waged war against those within a 100 miles of the coast. Families were uprooted at once and sent to BC's Interior to live in squalid conditions – their homes, businesses and possessions being sold off by the government. Being coastal, the Japanese Canadians in Britannia were sadly not spared this indecency and trauma. It was not until 1949 that Japanese Canadians were once again able to live and work where they chose to.

Kilowatts

Whilst other parts of the early 20th century world were using coal to make electricity, Britannia was making use of BC's steep mountains and plentiful supply of water to create hydroelectric power. Three dams – called Utopia, Park Lane and Tunnel – were built high in the mountains to collect the rain water and melted snow runoff. Each dam channelled the water down to the powerhouses at Mount Sheer and the Beach. The electricity was generated through the use of Pelton water wheels – very efficient water



turbines. The Mount Sheer powerhouse also generated the compressed air used to feed the mine ventilation system. The plentiful self-sufficient supply of electricity here meant that all the homes could easily be supplied with energy, and so the residents – who all rented their homes from the Company – gained from cheap electricity prices



The Mount Sheer Townsite nestled in the valley above Britannia Beach

Launders

The launders were a system designed to remove copper from the mine's waters, so that the metal could be sold. The ARD (see 'A') at Britannia generated vast volumes of water containing dissolved copper. As the water flowed from the main mine portals, it was channelled into a series of concrete troughs, each containing iron and tin scraps. A chemical reaction happened naturally, where the copper and iron swapped places – iron dissolved in the water, and the copper precipitated out, coating the scraps with metal. The scraps were then agitated, causing the copper to flake off for collection. Although done for economic reasons, the launders helped reduce the ARD by removing the dissolved copper (unlike copper, iron is non-toxic to marine life), though it did nothing to reduce the acidity of the water. The Beach launders continued to operate after the mine closed, but only until 1979.

Mount Sheer

Nestled in the valley above Britannia Beach was the community of Mount Sheer, fondly known as the Townsite. It was only called Mount Sheer after the Post Office insisted it be given a name. This was where the mining took place.

Britannia Beach was where the ore processing took place. 'The Townsite' was where that the underground workers and their families lived in the shadow of the mountains, in isolation and in harmony. Life there could be tough. The town sat at a height of 600 metres and 4.5km inland from Britannia Beach. The shadow of the steep mountains above made winters harsh and sunless. When the sun's rays returned to the valley floor in spring, it was a time to celebrate. Before a road was built to 'the Beach' in 1953, travel to Vancouver took hours! This was a fully functioning town with everything from a hospital to a high school. They also had a ball field, billiard room, ski slope, tennis courts, library, bandstand and even an outdoor heated swimming pool. This isolation forged an incredibly strong community spirit between the residents. The town was abandoned in 1958 when the Mine temporarily closed. In the 1960s, the buildings that had not been crushed by snow were bulldozed and burned. Today, little remains as nature has taken back the land.



NATIONAL HISTORIC SITE



Mill 3 in 1923 - the building that earned the status of National Historic Site.

National Historic Site

Britannia's Mill 3 – also known as the Concentrator – was designated a National Historic Site in 1988. National Historic Sites are selected by the Federal Government through Parks Canada in recognition of their “profound importance to Canada”. In awarding this honour to Mill 3, the Historic Sites and Monuments Board of Canada recognized that the Britannia Mines had made a substantial contribution to the Canadian economy in producing vast quantities of copper ore for almost seventy years. The Board also designated Mill 3 as a building of historic and architectural importance. Built in 1923, this gravity - fed mill was highly innovative, particularly in its use of bulk froth flotation. Following the mine closure in 1974, the Mill began to deteriorate, sadly becoming a blight on the local landscape. Following a \$5 million facelift, completed in 2007, the Mill once again is the beacon of Britannia Beach. To find out more, visit www.theconcentrator.ca.

Ore

Clearly, ore was what Britannia was all about. Copper, zinc, lead, cadmium, gold and silver were all extracted here. The different types of ore were drilled, blasted and extracted from a very rich deposit in the Britannia Mountains. Once extracted, the ore had to be taken to Britannia Beach to be processed in the Mill. With around 210 km of tunnels and 1750 metres of vertical height, it was a huge mine to transport the ore through. In most cases, locomotives took ore cars through the tunnels. Ore was also dropped

down chutes to the next level. Until the mid 1950's the first stage of ore crushing took place underground, breaking the ore into manageable chunks. Once at the Mill, the ore was taken through a series of crushers and grinders, before going through froth flotation (see 'F'). By the time the ore left Britannia Beach for the smelter, it was a finely ground mass of only the valuable minerals, called 'concentrate'.

Pandemic

Shortly after the end of World War I in 1918, as men tried to return to life as normal, the global and tragic 'Spanish Flu' pandemic brought daily life to a grinding halt. The effect on the Mine and community was momentous. So many people succumbed to this deadly virus. In the close quarters of the bunkhouses, men dropped like flies. For two months, work at the Mine stopped as those who were well had only one thing to do – look after the sick and dying. There was no treatment for this flu. The best the doctor could recommend was whisky and soup. Local Yip Bing became a hero as he spent day after day delivering pots of soup to households. At night, the aerial tramway - that carried ore down from the mine - became a makeshift hearse. As many as a dozen bodies at a time were brought down to await the steamship for Vancouver.

(Copper) Queens

Many queens spent time at Britannia over the years. But these were Britannia Beach's own queens – copper queens! Each year in May, between 1926 and 1966, as part of the community's rich social calendar of events, the Beach community club arranged the crowning of the Copper Queen. The queen was elected by the school students, and a grand ceremony was held that brought the whole community together for a time of celebration - it was the highlight of the year. Her crown was made from locally produced copper, and there was a throne for the ceremony too. Her acceptance speech was well prepared, and the next year, the reigning queen would graciously pass on to the new queen. Community events like this were held throughout the year, from Christmas parties to first aid competitions and Miners' Days.

NATIONAL HISTORIC SITE

BRITANNIA
MINE MUSEUM



All the fun and games usually took place right at the heart of the community - in front of the Mill.

Recreation

If there was one thing the locals made the most of, it was their free time. The list of facilities at the Mine was long - swimming pools, tennis courts, a roller rink, movie theatres, a bandstand, billiard halls, ball fields and more. In winter, they could while away the hours on the small ski slope or hike to the ski cabin, and in summer, the nearby lakes were a magnet to all. A chock-a-block social calendar included parties, dances, plays and concerts. The two main highlights were the annual Copper Queen ceremony and the Miners Day competitions. Hardly a commemorative day went by without some kind of celebration - any excuse for a party! The Company made sure there were plenty recreational facilities and events in order to attract workers and their families to come to this isolated Mine. The Community Club

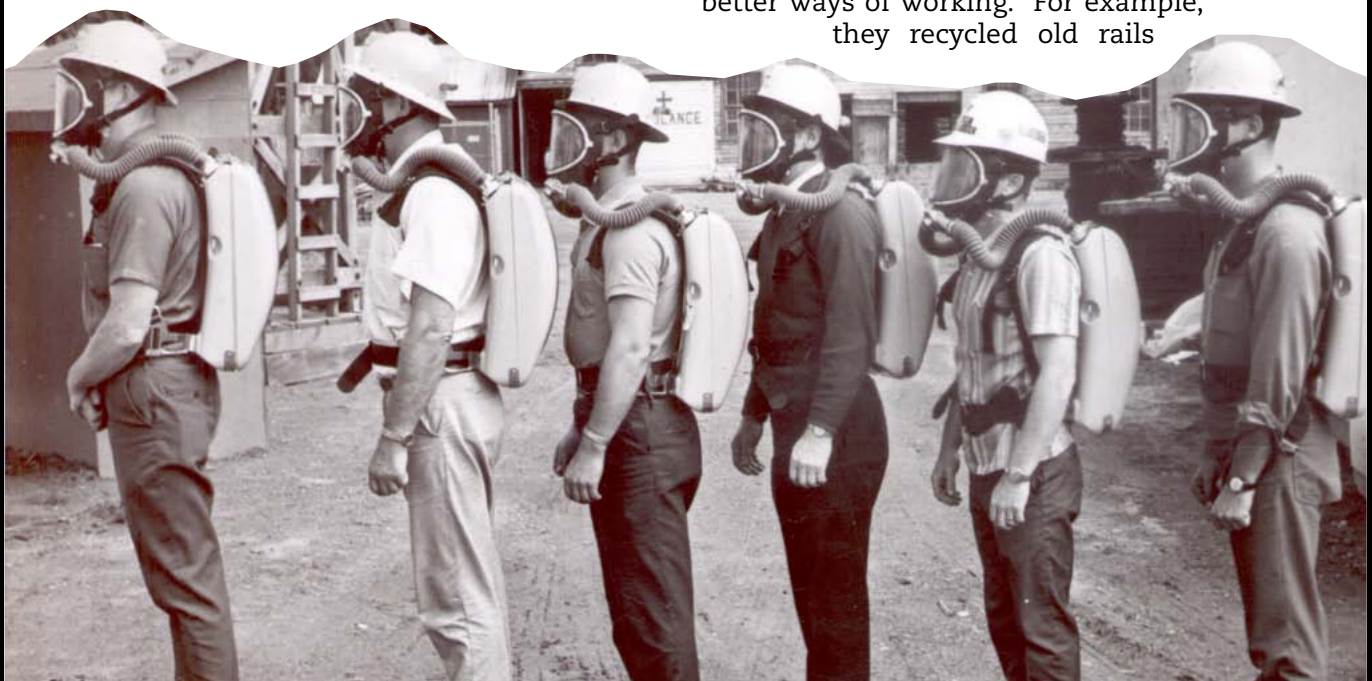
also organized many events and competitions. Rivalry with nearby Squamish and Woodfibre was fierce, as was the rivalry between 'the Townsite' and 'the Beach'. In fact, workers were often hired based on their sporting prowess as well as their work skills.

Safety

In Canadian mines today, safety is paramount. But it was not always that way. The Britannia Mine once had a poor safety record. Accidents were common. By the 1920s and 1930s managers were trying hard to get workers to take safety more seriously. They tried first aid courses and competitions, safety bonuses for shift bosses and sweepstakes for workers. It did not work though. Part of the problem was a high turnover of staff, many inexperienced. Another part of the problem was unsafe conditions. It took time, but slowly safety started to improve. After the formation of the Union in 1943 things really got much better. In fact, safety improved so much that in 1956 the Mine was honored for the greatest safety improvement of any mine in Canada by the National Safety Council.

Technology

In the field of mining and ore processing engineering, the Britannia Mine was well known for its pioneering technology. They were both innovative and quick to adopt cutting edge technologies. Their innovation came from their self-reliance caused by isolation. To keep their costs down, they were always trying to develop better ways of working. For example, they recycled old rails





Britannia Beach lies on the shore and Mount Sheer lies tucked into the valley above.

to make grinding balls for the Mill. The ball manufacturing equipment was soon adopted at other mines. Ore processing was another area of expertise. They were constantly fine tuning the milling process, never afraid to experiment with new ideas. Their Deep-Cell flotation system helped triple the capacity and yield of Mill 3. They were also quick to embrace new technologies from elsewhere. The investment did not stop with mining. Their office equipment was also state of the art. They used IBM punch cards for time keeping as early as 1929. Improvements like these helped the Mine to become one of the most successful copper mines in Canada.

Union

In the early years, Britannia workers had to fight hard for a Union. The General

Manager at the time - J. W. D. Moodie - gave short shrift to the first two attempts in 1913 and 1917. It was not until the fourth attempt in 1943, under the next General Manager's - C. P. Browning - rule that a Union was created. Better working conditions, pay and safety were fought for. Britannia had a poor safety record - blamed by management on inexperienced staff and high turnover, blamed by workers on unsafe conditions. First aid courses and competitions, bonuses and safety sweepstakes were introduced in the 1920s and 1930s, but it was not enough. However, in 1958, the mine was awarded the greatest safety improvement of any mine in Canada by the National Safety Council. Silicosis was another concern for the men, especially early on - caused by the rock dust from drilling. The introduction of water feeds in drills helped reduce the number of cases of this deadly illness.

Vastness

Drive through Britannia Beach today, and you see little clue to the vastness of the former Britannia Mine. Within the mountains above the village lies 210 kilometres of tunnels over a height of 1750 metres. The longest tunnel is 16 kilometres long and the mine extends 600 metres below sea level. Not bad for a mine that closed in 1974! At its peak production, this was the largest copper producer in the British Empire, producing at one time, an amazing 17% of the world's copper! If all the ore taken from the mine was loaded into train cars, the train would stretch more than 4000 kilometres. This was only a tiny fraction of the total rock removed. Just imagine!



Water

Water has always played a critical role in the Britannia story. On land, the steep slopes of the mountains gave power through hydroelectricity – Britannia had three dams and a series of pipelines (see 'K'). Yet the steep slopes and fast-flowing creeks also led to disastrous floods in 1921 and 1991. Britannia Beach too is on the coast. With no road or rail until the 1950s, a natural deep-water harbour was the mine's doorway. Everything came in by Steamship – from food and workers, to diapers and tools, and of course the ore was shipped from here to the smelters, such as in Washington State and Japan. Water has given much to the community, yet, it is sadly the one resource that has been most crippled through the environmental contamination of ARD (see 'A'). The local creeks, groundwater and Howe Sound were badly polluted for decades. But thankfully, since a remediation campaign the water around Britannia Beach has been cleaned.

X-Files

Much of the award-winning science fiction series The X-Files was filmed in and around Vancouver. As an authentic backdrop for the unusual and the mysterious, Britannia Beach's Mill 3 is perfect, and was used as a set for several episodes, including the 'Paper Clip' episode where human DNA was being stored. But it's not just the X-Files that were filmed here. If you've been to the Museum, and watched Scooby Doo Two, you will perhaps recognize the Mill in the film. Site rental to the movie industry is one of the important ways that the Museum brings in operating revenue...and it sure adds to the fascinating story Britannia has to tell. Other movie stars who have been here and the films and series' filmed here including Smallville, 21 Jump Street, Free Willy III, Dark Angel, Henry Winkler, David Hasselhoff, Sharon Stone, Robert DeNiro and many more.

Youth

Many of those who grew up at the Mine remember their childhood with great fondness. There were a lot of children here as many miners brought their wives and children with them to Britannia. Being a kid here was fun. It was a safe community – being an isolated Company Town, there were no strangers here. And so the kids



Drama and music productions were often put on by the children of the communities.

here enjoyed freedom, and lots of it. There was never a shortage of things for them to do. There were dances, a car club and an equestrian club for the teens. The younger kids had organized clubs such as Cubs and Brownies but they also had the freedom to play. The community worked hard to make sure that the kids were safe and well brought up.

Zinc

Zinc was one of the metals produced from the Britannia Mines. The principal ore was chalcopyrite – copper sulphide. The zinc came from sphalerite, with production starting in 1935 when a market for it opened up. The mine also produced 17,000 tons of lead (from galena) and 500 tons of cadmium (an impurity of sphalerite). These metals were extracted at the smelter from their parent minerals which were sulphide minerals, e.g. copper sulphide is chalcopyrite, zinc sulphide is sphalerite. But free gold and silver were also recovered – 6,000,000 ounces of silver and 500,000 ounces of gold. In all, the ore produced metal weighing in at over 800,000 tons, equivalent to the weight of around 4,000 jumbo jets! The mine also recovered pyrite (iron sulphide) which it sold off for the production of sulphuric acid, pig iron and fertilizers.

The Britannia Mine Museum is a self-sufficient, not-for-profit organization. Ticket sales and gift shop purchases help support the Museum.

NATIONAL HISTORIC SITE

BRITANNIA
MINE MUSEUM