METALS, NATURE + MAN : BRITANNIA MINE

AN ANCIENT ORIGIN OF THE ORES

The Britannia orebody within Britannia Mountain is a naturally occurring concentration of over 40 million tons of iron sulphide-rich rock containing x% copper, x% zinc, and other metals such as silver and gold. This metal deposit occurs within volcanic rocks that erupted on a seafloor over 100 million years ago. Geologists interpret the deposit to be the result of venting of metal-rich hot spring waters on the volcanic seafloor.

THE MINE: LONG LIVE ECONOMIC ENGINE

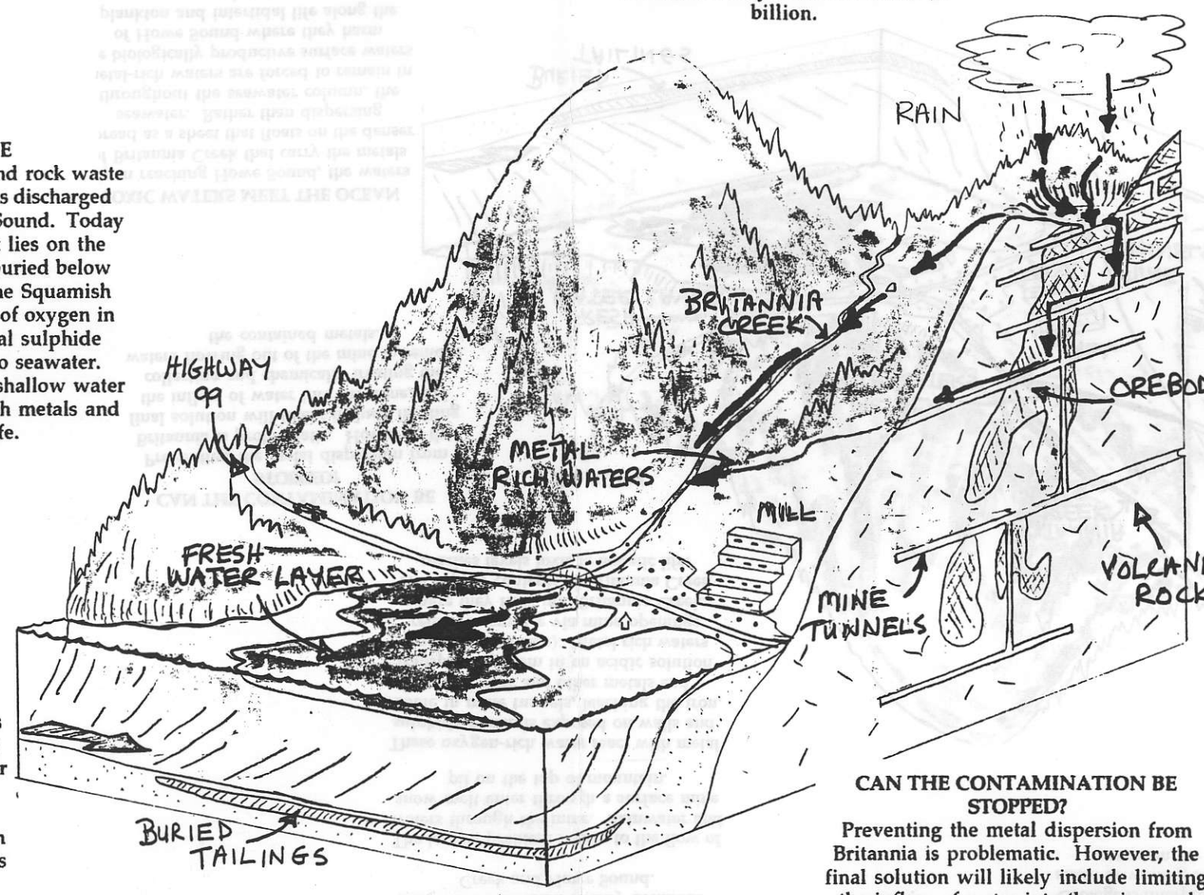
From 1905 to 1974, operation of the Britannia mine extracted the profitable parts of the metal-rich rock (ore). The mine complex included over 80 km of tunnels, surface pits, a mill to grind the rock to separate the copper and other metals from the volcanic rock, and two villages to house mine staff and families. For over 50 years, the mine employed an average of __ people, supported a broad array of service industries and produced metal that today would be worth $x billion.

METALS BEFORE MINING?

Although the mining activity has greatly accelerated the leaching of metals and spread in the surface environment, some metal leaching predated mining. The metal sulphide deposit was naturally exposed on a cliff face a hundred feet high on the upper part of the mountain; it was these oxidized natural exposures (gossan) that were discovered by the by early prospectors. Some metal leaching was occuring naturally prior to mining. The Squamish peoples traditional name for Britannia Creek "No Fish Creek" may reflect this natural leaching of copper. However, the mining operation has greatly increased metal leaching by vast expansion of the surface area of metal rich rock in contact with flowing waters that resulted from the building of mine tunnels, waste rock piles, surface pits and mill waste.

A BURIED FATE

During mining, finely ground rock waste from the mill (tailings) was discharged directly by pipe into Howe Sound. Today some metal rich sediment lies on the seafloor and is shallowly buried below younger sediment from the Squamish River. Because of the lack of oxygen in these sediments, the metal sulphide minerals do not leach into seawater. However, some tailings in shallow water near shore continue to leach metals and harm seafloor life.



THE PROBLEM: METALS ON THE MOVE

Because the mine operated before the modern era of environmental planning and regulation, the design of the mine and the disposal of mine waste did not consider environmental consequences. As a result, metals from the mine area have contaminated nearby Britannia Creek and Howe Sound.

The largest problem relates to the flow of waters through the mine. Rainwater and snow melt enter through a surface mine pit on the top of mountain.

These oxygen-rich water react with metal sulphide minerals exposed on walls and rubble in mine tunnels, leaching the iron, copper, zinc and other metals and transporting them in an acidic solution (acid rock drainage). Metal rich waters return to surface via mine openings where they flow into Britannia Creek. The copper contents of Britannia Creek reaches levels toxic to aquatic life.

TOXIC WATERS MEET THE OCEAN

Upon reaching Howe Sound, the waters of Britannia Creek that carry the metals spread as a sheet that floats on the denser seawater. Rather than dispersing throughout the seawater column, the metal-rich waters are forced to remain in the biologically productive surface waters of Howe Sound where they harm plankton and intertidal life along the shore.

CAN THE CONTAMINATION BE STOPPED?

Preventing the metal dispersion from Britannia is problematic. However, the final solution will likely include limiting the inflow of water into the mine, and collecting and chemically treating the waters flowing out of the mine to remove the contained metals

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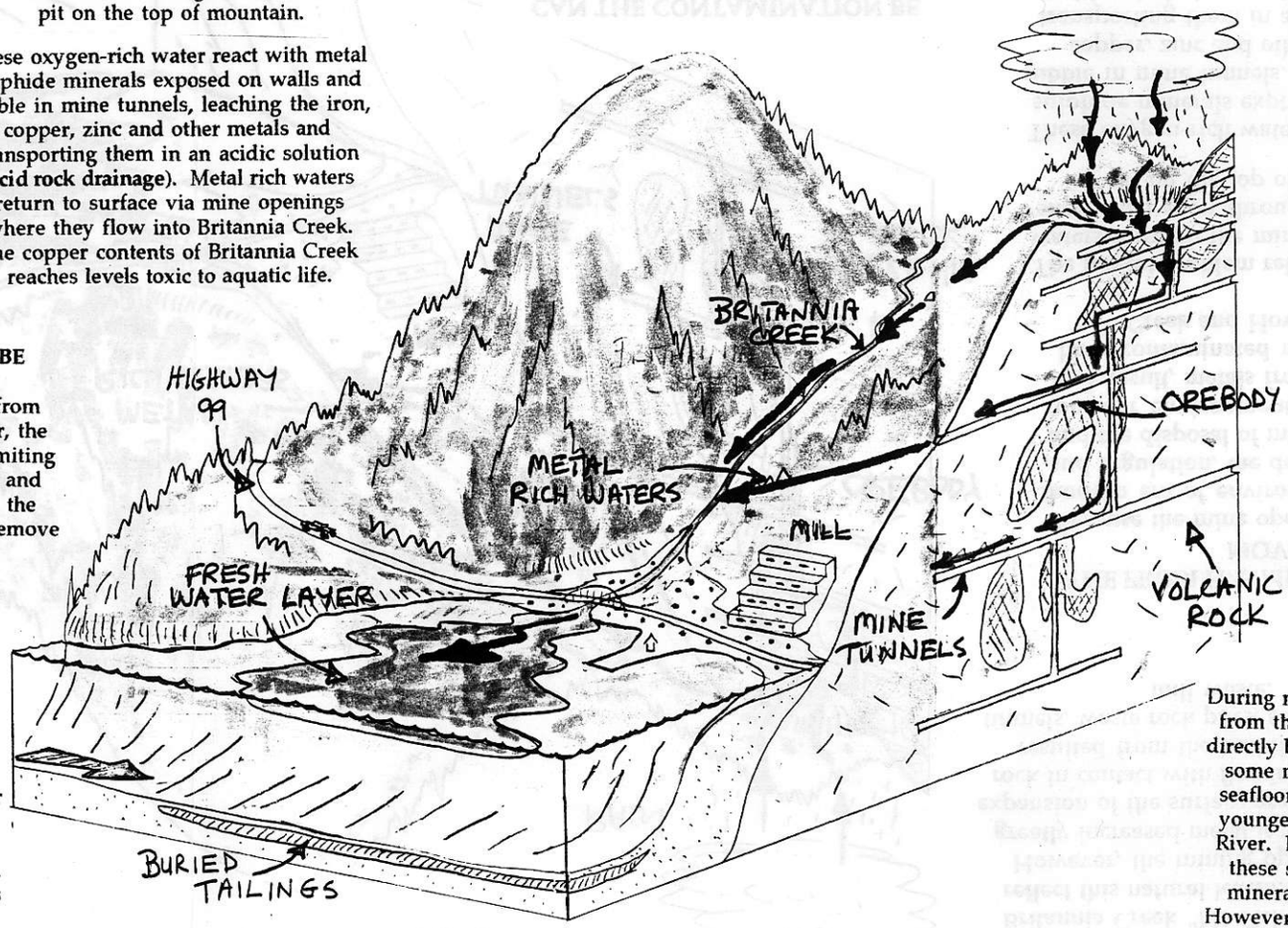

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