Winter Placer Gold Mining Using Borehole Hydraulic Jetting in Permafrost

Infinity Turbine LLC

[TEL] 1-608-238-6001

[Email] greg@infinityturbine.com

https://www.infinityturbine.com/winter-placer-mining-using-innovative-borehole-hydraulic-jetting-for-gold-mining-operations-by-infinity-turbine.html

An engineering assessment of a winter placer gold mining concept using borehole hydraulic jetting and hot water circulation to recover bedrock gold without stripping frozen overburden in Alaska and the Yukon.

This webpage QR code

PDF Version of the webpage (maximum 10 pages)

Winter Placer Gold Mining Using Borehole Hydraulic Jetting in Permafrost

Placer gold mining in Alaska and the Yukon is traditionally limited to short summer seasons due to frozen ground and permafrost. This article examines a novel winter mining concept that uses drilled wells, hot water hydraulic jets, and closed loop slurry circulation to recover gold directly from bedrock while leaving frozen overburden in place.

Introduction

Placer gold deposits in Alaska and the Yukon are commonly controlled by bedrock geometry, with the majority of recoverable gold concentrated in a thin zone at or immediately above bedrock. Conventional mining methods require large scale removal of frozen overburden, thawing of muck, and extensive material handling, all of which limit operations to a brief summer window.

This article evaluates a winter mining concept that applies borehole hydraulic jetting to access bedrock pay zones through a drilled well. The approach uses hot water or steam to locally thaw and mobilize material at the bedrock interface, pumps the resulting slurry to surface gold recovery equipment, and reinjects the process water back into the well in a closed loop. The permafrost remains intact above the working zone, acting as a structural roof and eliminating the need for stripping.

Concept Overview

The proposed system consists of the following core elements:

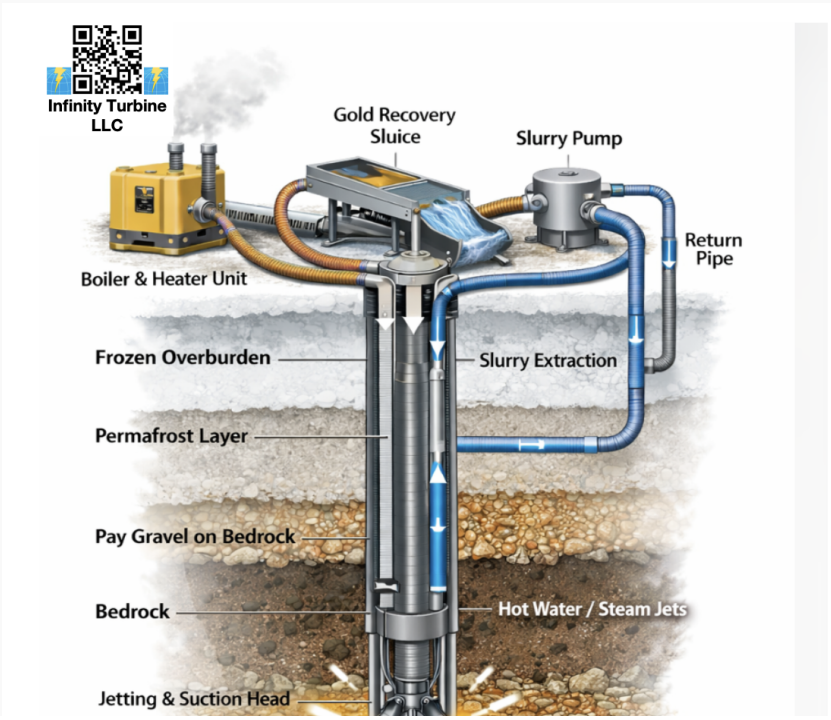
A vertical well drilled through frozen overburden to bedrock
Steel casing cemented through the permafrost interval
An open or screened interval at the bedrock contact
High pressure hydraulic jets delivering hot water or steam downward
A suction intake lifting slurry to surface
Surface gold recovery equipment
A reheating and reinjection loop

At bedrock, the hot water jets disaggregate gravel, thaw ice cement, and wash gold from bedrock irregularities. The mobilized slurry is lifted through a return pipe to surface recovery equipment, after which the water is reheated and reinjected. Overburden remains frozen and undisturbed.

Geological Applicability

This method is best suited to placer deposits with the following characteristics:

Gold strongly concentrated on or within the top 10 to 60 centimeters of bedrock
Limited large boulders at the bedrock interface
Moderate clay content that does not dominate slurry behavior


Infinity Turbine LLC
Gold Recovery Sluice
Slurry Pump
Return Pipe
Boiler & Heater Unit
Frozen Overburden
Slurry Extraction
Permafrost Layer
Pay Gravel on Bedrock
Bedrock
Hot Water / Steam Jets
Jetting & Suction Head

INFINITY TURBINE	Steam Turbine Hydraulic Mining	20260106	Infrastructure and component Patent US7726331B1 Valid until 2029
	Copyright 20260106- Infinity Turbine LLC		