

71: Loewen electrostatic sluice – 2000s research in Alberta

Electrostatics has been found to be useful in assisting gravitational recovery of placer gold for over a century by means of drywashers and related waterless equipment. Little has been published on the gold recovery achieved, other than generalised comments that dry methods usually recover less than wet.

Electrostatics has received little attention in water-based gravitational recovery of gold. Yet there is a significant amount of anecdotal evidence that electrostatics are helpful, particularly in wet recovery of fine placer gold. Two examples are noted below.

'Differential Charging Recovery Systems' (DCRS) were invented by Robert Barefoot of Calgary and patented in 1990 (US #4,975,182). DCRS turning screened pay gravel into watery slurry in which a positive electrostatic charge was induced in the water droplets and gold particles by subjecting the slurry to high-velocity spinning in a cyclone-like surge tank. Then the positively charged gold particles encounter negatively charged surfaces and are forced to settle by the strong force of electrical attraction and the relatively weaker force of gravity. The patent claimed "highly efficient recovery of the invisible gold (less than 320 mesh)" using a 180 tons/day mobile test unit.

DCRS is somewhat dauntingly complicated and one version depends on mercury amalgamation. The system failed to be commercialised for many reasons, and some are noted at www.barefootscureamerica.com.

The Loewen electrostatic sluice was invented by Wayne W. Loewen of Alberta and patented in 2006 (US #7,012,209) and is refreshingly simple. Gold is recovered in a wet sluice lined by ribbed plastic (e.g. polyvinyl chloride PVC) than is positively electrostatic when immersed in water, and therefore catches negatively electrostatic fine gold particles by a combination of electrostatic attraction and gravitational settling.

Operation

This text is based on the Loewen electrostatic sluice as presented in US patent #7,012,209.

Placer pay gravel is first screened to say 15mm and gold recovered by sluices, jigs or similar gravitational devices. Tailings are screened <1mm and fed into the feed hopper of the Loewen electrostatic sluice.

Alternatively milled hardrock ore is screened <1mm and fed directly into the feed hopper of the Loewen electrostatic sluice.

The device consists of a simple inclined gravitational sluice, typically "ten feet in length and is four inches wide with one-and-one-half-inch high sides."

The inclined sluice is lined with "a material which incurs a positive charge when immersed in water, especially water having a pH value between 4 and 8."

The patent suggests vinyl (PVC) to be a suitable material. The material has transverse ribs that serve as riffles and the gold is trapped in the intervening grooves.

Water is added to the feed to make it very thin slurry, "a good ratio would be nine parts water to one part [screened feed]."

Feeding the sluice too quickly with slurry would cause the grooves to plug. The patent does not specify the preferred flow rate at which "the gold can be observed settling out during the process, as most of the gold will settle out in the first three feet of the sluice."

After the batch feed has been exhausted, the sluice is allowed to run clean. Then the contents are flushed into a 'clean-up pail' and its contents are allowed to settle and the water decanted to leave a rich gold concentrate.

Adoption by placer gold miners

The Loewen electrostatic sluice is very new and has yet to be marketed to placer gold miners.

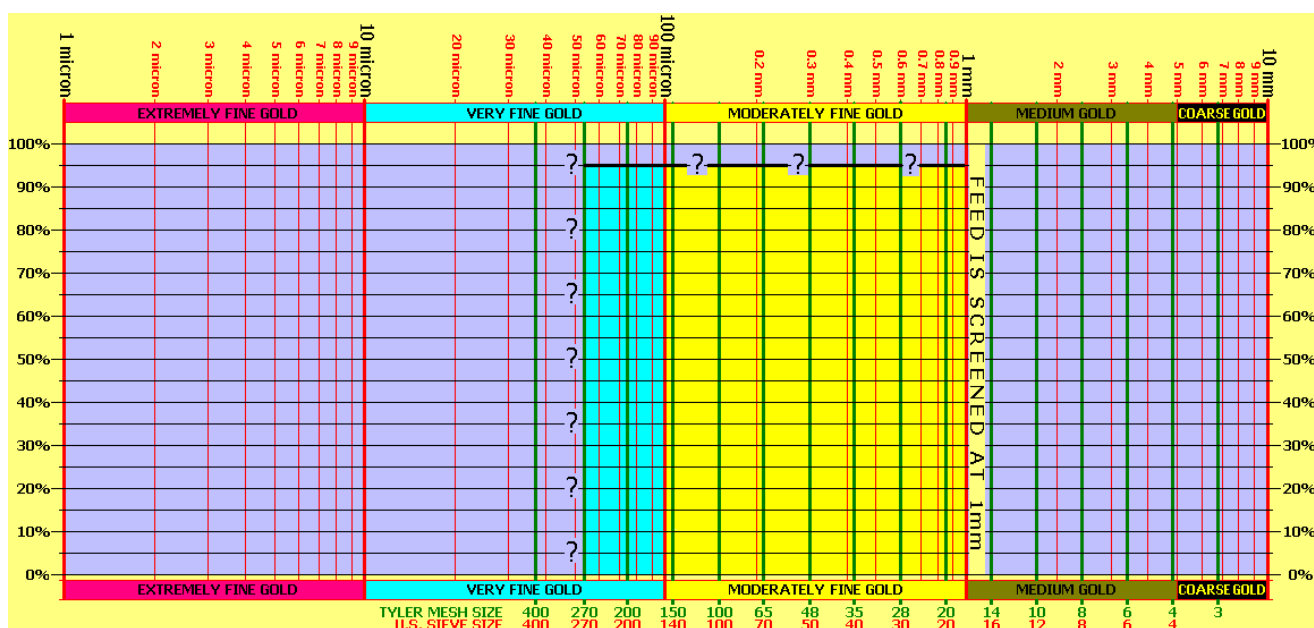


Figure 145. GOLD RECOVERY BY LOEWEN'S ELECTROSTATIC SLUICE Recovery of placer gold by Loewen electrostatic sluice according to the patent and diverse assumptions. (compiler: Robin Grayson)