

36: Angle-iron (Hungarian) riffles – 1980s research in Canada



Figure 74. ANGLE-IRON RIFFLES
 A set of 1-inch riffled sluices being made 'on the spot' at the Sharin Gol mine of Polymet Potala Ltd in Mongolia. The welder has ensured each riffle has a 15° tilt. (photo: Robin Grayson)

The origin of the term 'Hungarian riffles' is unclear and predates World War II. By the time of the Yukon tests [8] the term had become synonymous with 'angle iron riffles' set across the width of a sluice-box.

1980s tests in British Columbia and Yukon, Canada

Lab tests using gold tracer in the University of British Columbia by James Hamilton and George Poling [7] showed angle-iron riffles if on unbacked Nomad™ matting can recover >90% of >0.3mm gold, and 85% of 150µm gold, subject to control of the feed and the riffle size, angle and spacing.

Tests in the Yukon by Randy Clarkson and Owen Peer [8] confirmed the findings, and included gold tracers, gold radiotracers, flume observation tanks and testing performance of sluice-boxes of placer mines [86-90].

Operation

To comply with the Yukon tests, the sluice-box is tilted at 1-m fall per 4-m length of sluice to ensure the angle iron riffles can generate large distinct vortices.

First a roll of unbacked Nomad™ matting is cut to size and unrolled on the floor of the sluice box. If several pieces of matting are used then their ends are closely butted together to avoid a 'step'. Instinctively the Nomad™ matting is laid with its smooth side downwards, but there is recent anecdotal evidence that putting the smooth side uppermost either makes no difference or is slightly better (source – Zooka of Alaska Gold Forum).

About 6-20 riffles are welded to side bars to create a 'riffle set'. For best results, the angle-iron riffles are 1-inch high with a ½ to 1-inch wide lip, tilted 15° upstream, and spaced 2 inches apart. Each riffle set is slotted in the sluice-box and pressed down on the Nomad™ matting. The riffle sets are secured by metal or wooden chocks.

The angle iron is positioned with one of its flat sides uppermost to act as a short slick plate and splitter to guide the bottom flow into the vortex. Its other flat side obstructs the flow to retain the vortex and trap heavies.

Slurry is fed at 48.8m³/hour per metre width. A very large concentration ratio is possible (i.e. vast amounts of black sand are shed to produce a gold concentrate).

The Yukon tests showed angle iron riffles maintain the captured black sand in a loose state for a long time, so continuing to be able to recover gold. This enables clean-ups to be needed only once every 24 hours.

Adoption by placer gold miners

Angle-iron riffles are the norm in North America and common in most of the world but not everywhere. In Siberia and Mongolia, inclined flat bar riffles is the norm. Many artisanal miners use basic 'Hungarian' riffles of wood.

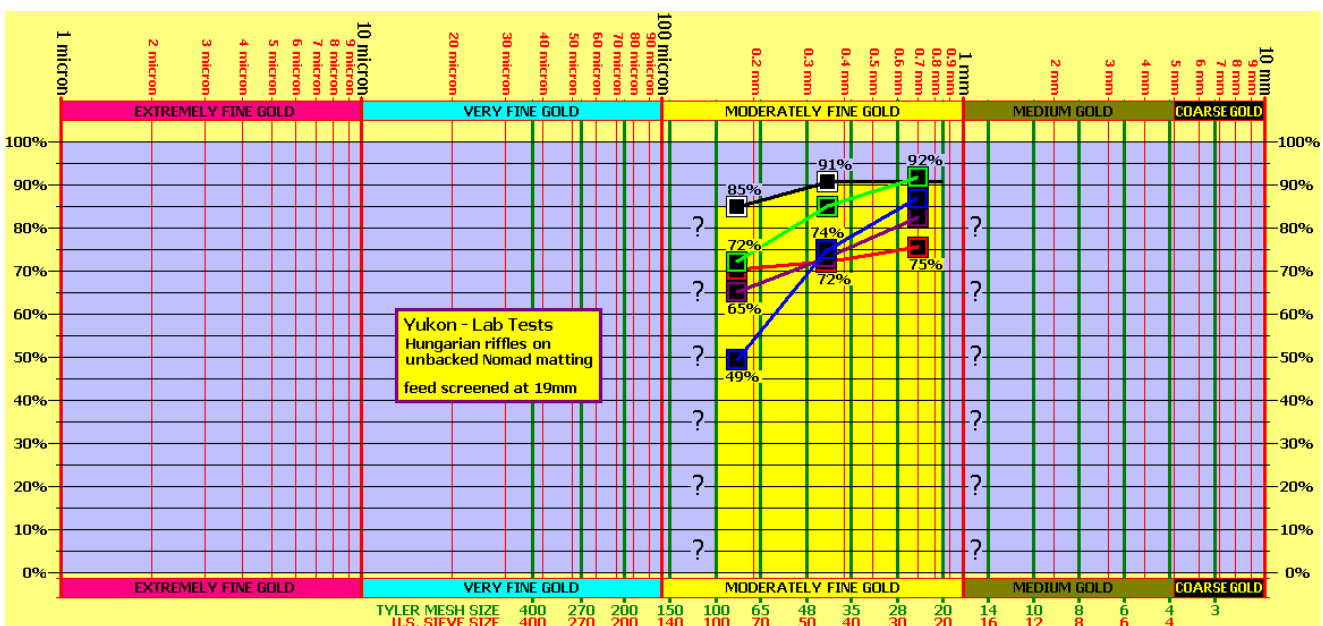


Figure 75. GOLD RECOVERY BY ANGLE-IRON RIFFLES ON UNBACKED NOMAD MATTING – British Columbia tests
 Recovery of placer gold in lab tests by James Hamilton and George Poling [7] (compiler: Robin Grayson)

36 continued: Angle-iron (Hungarian) riffles – 1980s research in Canada

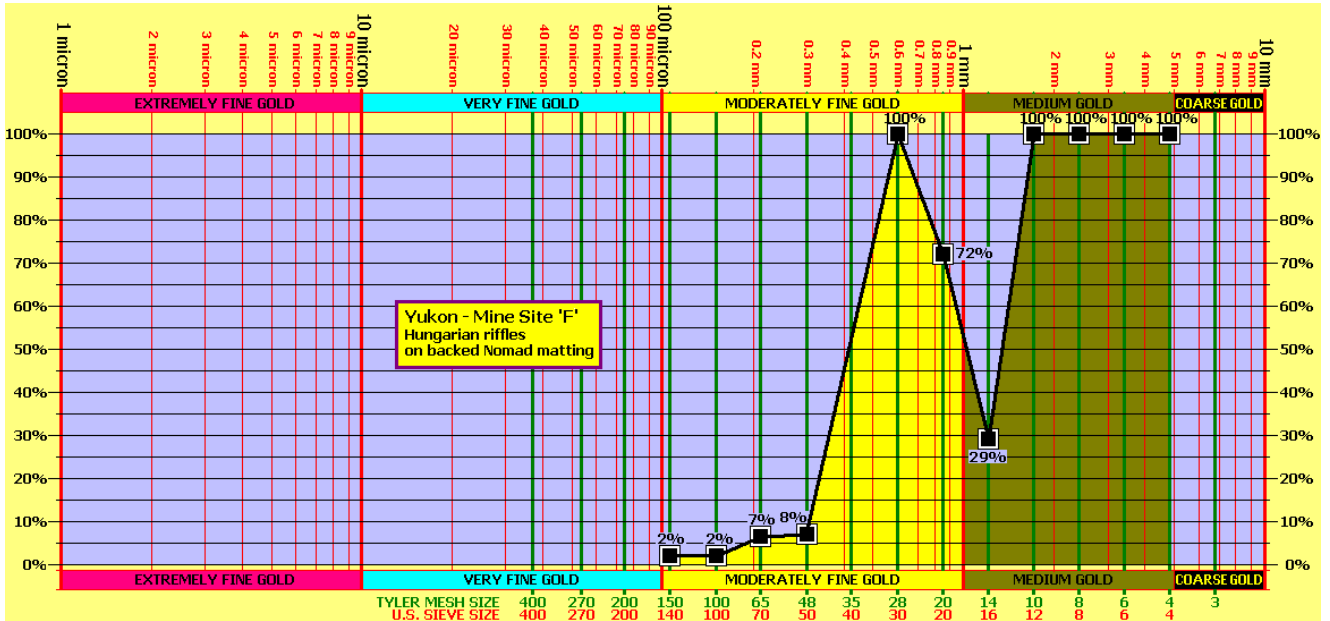


Figure 76. ANGLE-IRON RIFFLES ON BACKED NOMAD MATTING – Yukon field tests
Recovery of placer gold by 2x2-inch angle-iron riffles @ 4-inch spacing, on backed Nomad™ matting [86]. (compiler: Robin Grayson)

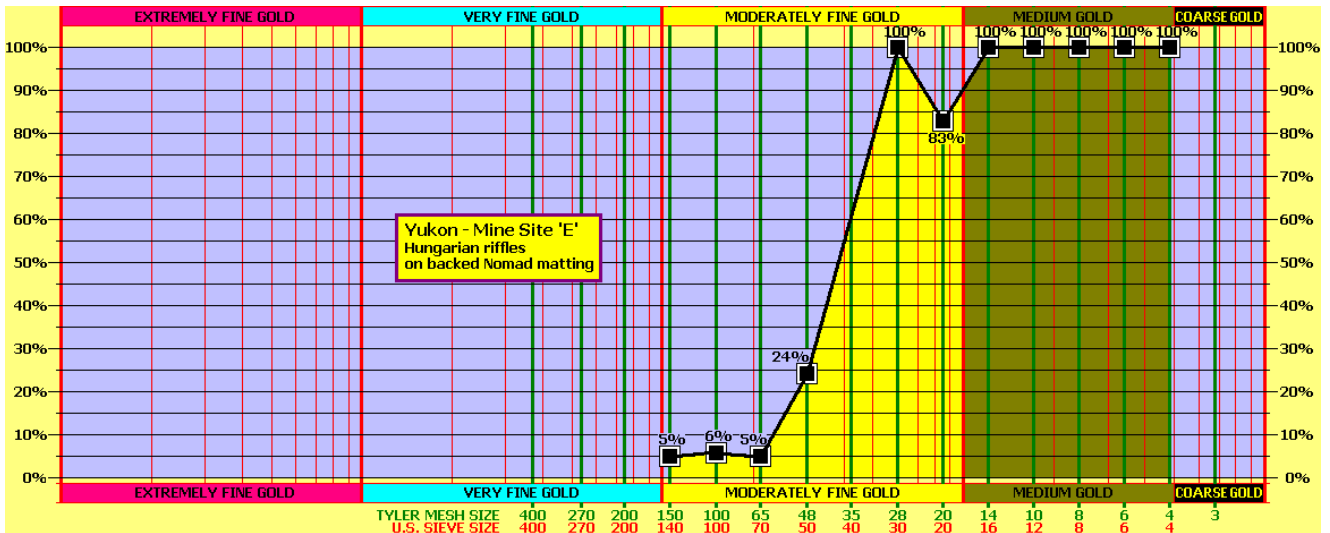


Figure 77. ANGLE-IRON RIFFLES ON BACKED NOMAD MATTING – Yukon field tests
Recovery of placer gold by 3x3-inch angle-iron riffles @ 6-inch spacing, on backed Nomad™ matting [86]. (compiler: Robin Grayson)

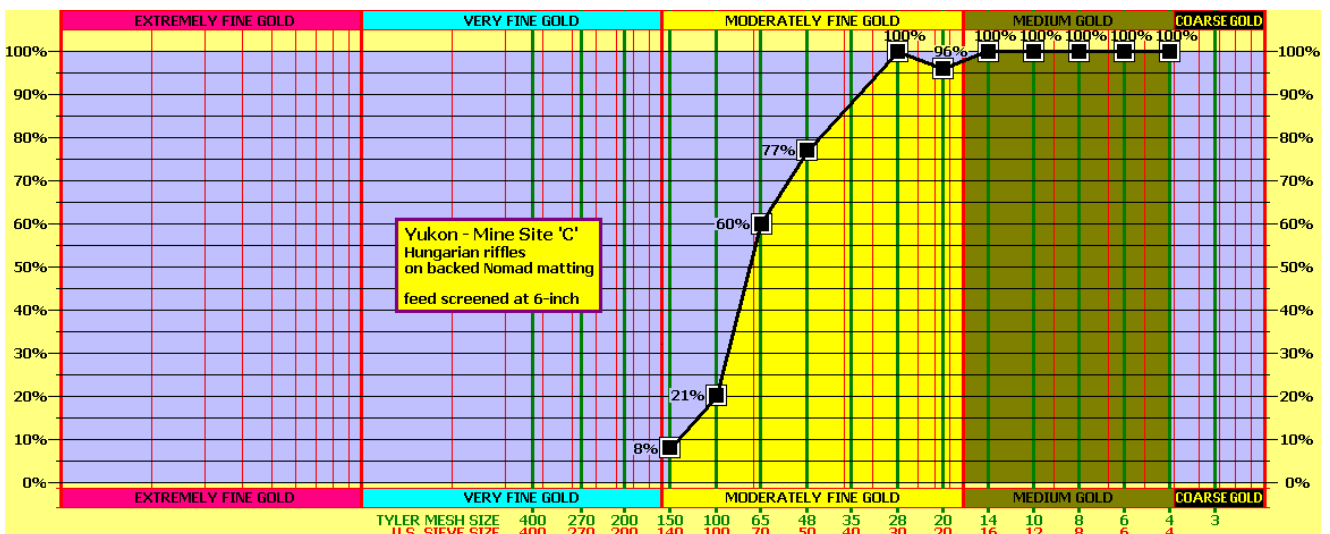


Figure 78. ANGLE-IRON RIFFLES ON BACKED NOMAD MATTING – Yukon field tests
Recovery of placer gold by 1½x2-inch angle-iron riffles @ 4-inch spacing on backed Nomad™ matting [86]. (compiler: Robin Grayson)