

Addendum to: Section 5.3.7.4 Infill shooting

Section 5.3.7.4 in Vermeer (2012) does not mention some relevant developments in the approach to infill shooting. These developments started with the paper by Day and Rekdal (2005) that describes the use of geophysical criteria for the specification of infill rules.

Using representative synthetic data Day and Rekdal (2005) derive the effect of missing data on reflection amplitude and time. If the amplitude effect is less than, say, 1 dB or reflection-time change due to missing data is less than, say, 0.5 ms, the data are still acceptable, else infill shooting is needed to remedy the situation. The authors present the results of the analyses in graphs of “Coverage in hole” versus “Hole size” (“hole” is not a range of empty bins, but is just meant to be a range of crossline bins).

Strand et al. (2008) and Strand et al. (2010) expand the analysis to two graphs, one for a strict criterion and one for a relaxed criterion. Figure 1 shows such coverage requirement graphs for near offsets (left) and for far offsets (right). The green curves describe the strict boundary (1 dB amplitude change) and the red curves the relaxed boundary (2 dB amplitude change). The analysis shows that much smaller coverage is required for long offsets than for short offsets to satisfy the two criteria. The curves of Figure 1 may be used to generate acceptability maps or traffic light maps for the actually acquired data. In the traffic light maps green signifies acceptable (all measurements to the left and above the green curves), red unacceptable (all measurements to the right and below the red curves), and yellow questionable (all measurements between the red and green curves).

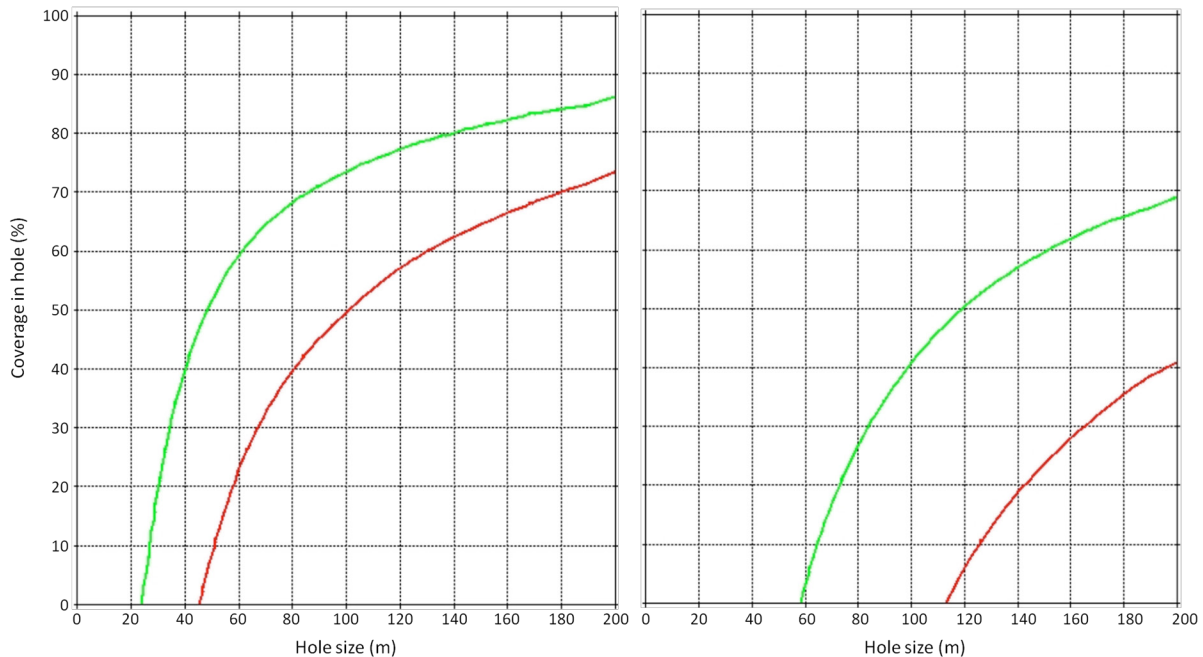


Figure 1. Coverage requirement as function of hole size for near (left) and far (right) offset intervals. The green and red curves represent 1 dB and 2 dB amplitude variations, respectively. Note that for the same amplitude variation the coverage hole can be much larger for the far-offset interval than for the short-offset interval (after Strand et al., 2008).

Capelle and Matthews (2009) introduce the use of fanned streamers, which is another way of exploiting relaxed requirements for long offsets. These offsets only contribute to deeper targets, have lost the highest frequencies and can afford to be sampled more coarsely than the near-offset data. Fanned streamers decrease the size of coverage holes for long offsets; hence, reduce required infill shooting.

Noteworthy as well is Manning et al. (2013) who combine coverage criteria of Day and Rekdal (2005) and fanned streamers as proposed by Capelle and Matthews (2009) with an extra wide streamer swath (12 x 120 m). Such a wide streamer may be acceptable for exploration purposes, but the data must suffer from the extremely large crossline roll (720 m) of this acquisition geometry.

References

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