

Open Perforation Estimates

Perf Condition	Approximate Open Perforations	References
Overbalance in Mud – moderate pressure well, no surge afterward	20%	Downhole camera pictures, general well behavior of Mobile bay and Opon well perforating
Overbalance in Mud – high pressure well, surge and flow after perforating	30%	SPE 16894
Overbalance in brine – no surge	35%	SPE 15816
Overbalance in brine, surged	40%	15816, 16212
Overbalanced in acid, surge or no surge	45%	Amoco Canadian Experiments
Extreme Overbalanced Perforating, $k < 1$ md, $P > 1.4$ psi/ft with pumping after firing	60%	Marathon Experiments and TerraTek tests (Dees, et.al.)
Extreme Overbalanced Perforating, $k > 1$ md, $P > 1.4$ psi/ft with no pumping	45%	Amoco Canada experiments, Arco experiments
Underbalanced perfs, no flow	40%	Downhole camera work, 14321, 16212,
Underbalanced perf, surge and flow > 4 gal/perf, $k > 1$ md, $h < 50$ ft	50%	14,321, 16212, GOM experience (Bonomo and Young's Amoco work)
Underbalanced perf, surge and flow > 4 gal/perf, $k > 1$ md, $h > 50$ ft	40%	Anschutz Ranch Experience, 14321, 16212,
Underbalanced perf, surged and washed	75%	16212, Bonomo and Young's Amoco work
Sand Abrasive Methods	80%	55044, downhole camera work from Canada
Bullet perforating, brittle formations such as coal – some water wells	45%	Coal well work, Mounds experiments (Amoco), Water well performance data
Bullet perforating, all other formations	25%	Downhole camera work, well performance data