BLAST DESIGN RULES OF THUMB

(Given: Hole depth, Rock type, and Distance to structure)

HOLE DIAMETER (d) = hole depth (H) divided by 5 to 10.

d(in) = H(ft) / (5 to 10) (Typically 7)

BURDEN (B) = 2 to 3 times the diameter.

B(ft) = (2 to 3) X d (Typically 2.5 X d)

SPACING (S) = 1 to 2 times the burden.

S(ft) = (1 to 2) X B (Typically 1.5 X B)

STEMMING (T) = 0.5 to 1.0 times the burden.

T(ft) = (0.5 to 1.0) X B (Typically 0.7 X B)

POWDER COLUMN (PC) = hole depth minus stemming (T), backfill (F) and decking (T_d).

$PC(ft) = H - T - F(ft) - T_d(ft)$

LOADING DENSITY (LD) = 0.3405 times the explosive density (ρ) times the hole diameter squared.

$LD(lb/ft) = 0.3405 \times \rho\ (g/cc) \times d^2$ (or Mfg design guide)

CHARGE WEIGHT (CW) = powder column times the loading density.

CW(lb) = PC X LD

POWDER FACTOR (PF) = powder per hole divided by rock volume per hole.

$PF(lb/yd^3) = CW / (B \times S \times H / 27)$

SCALED DISTANCE (SD) = Distance to structure divided by square root of the charge weight.

$SD(ft/lb^{1/2}) = Distance(ft) / CW^{1/2}$ (Greater than 55)

PEAK PARTICLE VELOCITY (PPV) = 438 times scaled distance to the -1.52 power.

$PPV(in/s) = 438 \times (SD)^{-1.52}$ (Maximum expected)

Electric Circuit Formulas

RESISTANCE OF SERIES

Total Cap Resistance = $R_1+R_2+R_3+\ldots R_n$
Total Cap Resistance = Resistance of one cap X number of caps in circuit (if all caps are the same)

RESISTANCE OF PARALLEL CIRCUIT

$$\text{Total Cap Resistance} = \frac{\text{Resistance of one cap}}{\text{Number of caps in circuit}}$$

RESISTANCE OF SERIES PARALLEL

$$\text{Total Cap Resistance} = \frac{\text{Resistance of series}}{\text{Number of series}}$$

RESISTANCE OF WIRE

$$\text{Wire Resistance} = \frac{\text{length of wire (ft) X Resistance from table}}{1000 \text{ ft}}$$

TOTAL RESISTANCE OF CIRCUIT

Total Circuit Resistance = Cap Resistance + Wire Resistance

OHM'S LAW

$$\text{Current} = \frac{\text{Voltage}}{\text{Resistance}} \quad \textbf{or} \quad \text{Voltage} = \text{Current} \times \text{Resistance} \quad \textbf{or} \quad \text{Resistance} = \frac{\text{Voltage}}{\text{Current}}$$

Nominal resistance of EB caps with copper leg wires

Wire length (ft)	Resistance (ohms)	Wire length (ft)	Resistance (ohms)
4	1.4	24	2.3
6	1.6	28	2.4
8	1.7	30	2.2
10	1.8	40	2.3
12	1.8	50	2.6
16	1.9	60	2.8
20	2.1	80	3.3

Resistance of copper wire per 1000' @ 68 degrees (ohms)

Gauge	6	8	10	12	14	16	18	20	22
Resistance	.395	.628	.999	1.59	2.53	4.02	6.39	10.15	16.1