BLAST DESIGN RULES OF THUMB - Coal
(Given: Hole depth, Rock type, and Distance to structure)

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

\[ d(\text{in}) = H(\text{ft}) / 5 \text{ to } H(\text{ft}) / 10 \]  
(Typically \( H/7 \))

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

\[ B(\text{ft}) = 2 \times d(\text{in}) \text{ to } 3 \times d(\text{in}) \]  
(Typically \( 2.5 \times d \))

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

\[ S(\text{ft}) = 1 \times B(\text{ft}) \text{ to } 2 \times B(\text{ft}) \]  
(Typically \( 1.5 \times B \))

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

\[ T(\text{ft}) = 0.5 \times B(\text{ft}) \text{ to } 1.0 \times B(\text{ft}) \]  
(Typically \( 0.7 \times B \))

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

\[ PC(\text{ft}) = H(\text{ft}) - T(\text{ft}) - F(\text{ft}) - Td(\text{ft}) \]

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

\[ LD(\text{lb/ft}) = 0.3405 \times \text{density(gm/cc)} \times d^2(\text{in}) \]  
(or Mfg design guide)

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

\[ CW(\text{lb}) = PC(\text{ft}) \times LD(\text{lb/ft}) \]

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

\[ PF(\text{lb/yd}^3) = CW(\text{lb}) / (B(\text{ft}) \times S(\text{ft}) \times H(\text{ft}) / 27) \]

SCALED DISTANCE \( (SD^2) \) = Distance to structure divided by square root of the charge weight.

\[ SD^2(\text{ft/lb}^{1/2}) = \text{distance(ft)} / CW^{1/2}(\text{lb}^{1/2}) \]  
(Greater than 55)

PEAK PARTICLE VELOCITY \( (PPV) \) = 119 or 438 times scaled distance to the \(-1.52\) power.

\[ PPV(\text{in/s}) = 438 \times (SD^2)^{-1.52} \]  
(Compliance)
\[ PPV(\text{in/s}) = 119 \times (SD^2)^{-1.52} \]  
(Expected)

Reference: Atlas, Explosives and Rock Blasting