

### EQUATIONS (Koch, 1986)

\*Drawdown around constant flow line sink

$$\Delta H(x', y') = \left( \frac{Q}{2\pi T} \right) \left[ \ln \left[ \frac{b + (c^2 + b^2)^{0.5}}{c} \right] - \cosh^{-1} \left[ \frac{H(x', y')}{H} \right] \right]$$

where

$\Delta H(x', y')$  feet drawdown at point  $x', y'$

Q cfd discharge

T ft<sup>2</sup>/day Transmissivity

b feet radius of influence, drawdown is zero at this external ellipse minor semiaxis length

c feet one half length of line sink (one half length of mine cut)

$x'$  feet one component of vector from middle of line sink to point of interest

$y'$  feet one component of vector from middle of line sink to point of interest

H feet Head function at  $x', y'$

\*Approximation of radius of influence

$$b = 2[(Tt)/S]^{0.5}$$

where

b feet radius of influence

T ft<sup>2</sup>/day Transmissivity

t day time

S unitless Storativity

Storativity generally ranges between 0.00005 and 0.005 in confined aquifers

#### INPUT

##### CONSTANTS

T	100	ft <sup>2</sup> /day
S	0.0001	unitless
Q	24992.922	cfm
c	2500	feet
$x'$	0	feet
t (days)	365	days

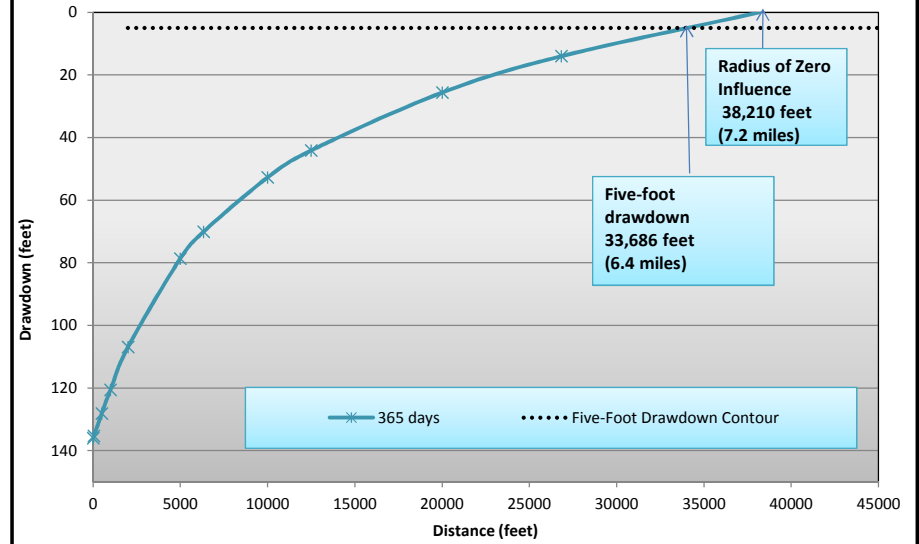
##### VARIABLES

$y'$ (feet)	H	H <sup>2</sup>
5	1.000002	1.000004
50	1.0002	1.0004
500	1.019804	1.04
1000	1.077033	1.16
2000	1.280625	1.64
5000	2.236068	5
6324.6	2.720311	7.40009
10000	4.123106	17
12500	5.09902	26
20000	8.062258	65
26833	10.77968	116.2016
38210	15.31668	234.6007

#### OUTPUT

t(days)	365
b (feet)	38210
$x'=0,$ $y'$ (feet)	$\Delta H(x', y')$ feet
5	136.0
50	135.3
500	128.2
1000	120.6
2000	106.9
5000	78.7
6324.6	70.1
10000	52.8
12500	44.1
20000	25.6
26833	14.0
38210	0.0

### Projected Distance-Drawdown Plot for Line Sink in Knobloch Coal Caused by Mine Cut Dewatering



### Projected Discharge to Knobloch Coal Mine Cut During Dewatering

