APPDENDIX F:

2D MODFLOW Model

PRG – Coal Creek POD

Wall Coal Seam, Direct Impacts from PRG's Proposed Action

Modeling Conducted by: John Metesh, MBMG, Butte, MT

Compiled by: Andrew Bobst, BLM, Miles City, MT

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Wall coal bed modeling
Model input summary
MODFLOW
GroundWater Vistas (Version 4)
Single layer, confined, 55 feet thick (Wall coal bed)
Grid spacing varies from 100 feet in the well field to about 1300 feet at edges of model grid; the model has 267 rows and 311 columns - (see attachment **wall4_grd.wmf**).

K= 1.1 ft/day

Transient simulation (pumping)
storage coefficient = 9.0E-04
45 time steps; period length varies from 1 to 42 days

Transient simulation (recovery)
constant heads used in pumping simulation eliminated in recovery simulation; no other changes made saved heads from pumping simulation (180 days) used as starting heads to calculate recovery

Boundary conditions:
constant head on all four sides of the grid; gradient from southwest to northeast
starting heads: 115 feet above bottom of layer (60 feet above top of 55 foot thick coal bed)

well field simulated by 9 constant head cells as shown, based on proposed well locations (map provided by BLM)

Proposed Action
Drawdown in the Wall Coal Seam

(9 wells pumping to within 5' of the top of coal)

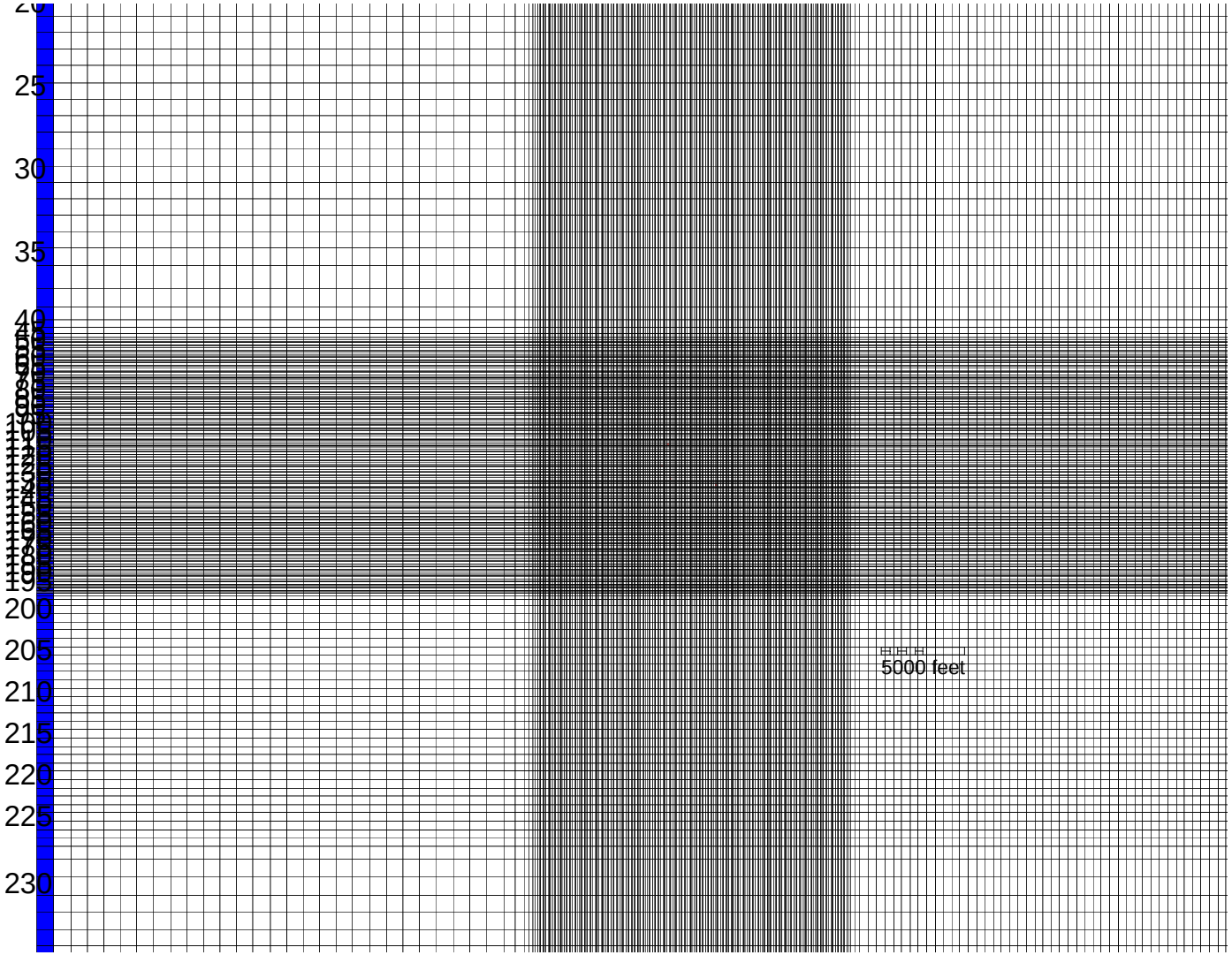
(initial head = 60' above top of coal per CBM02-4WC)

Time (days)	Radius of 20' Drawdown Contour from the edge of the Well Field (ft)
42	990
84	1530
126	2000
168	2250
180	2490
252	2900

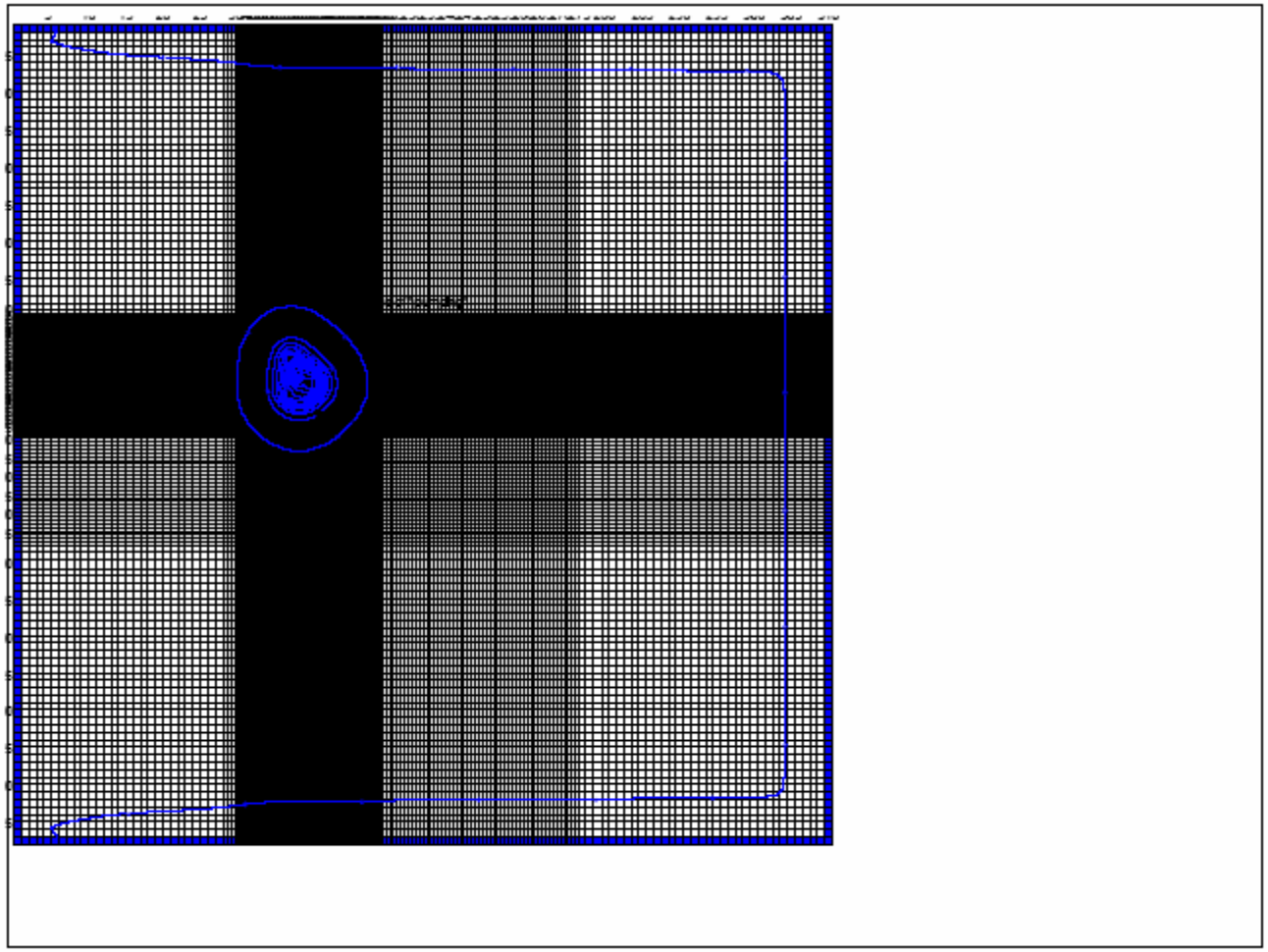
radius depends on what is taken as the edge of the well field.
these values were determined from the easternmost well

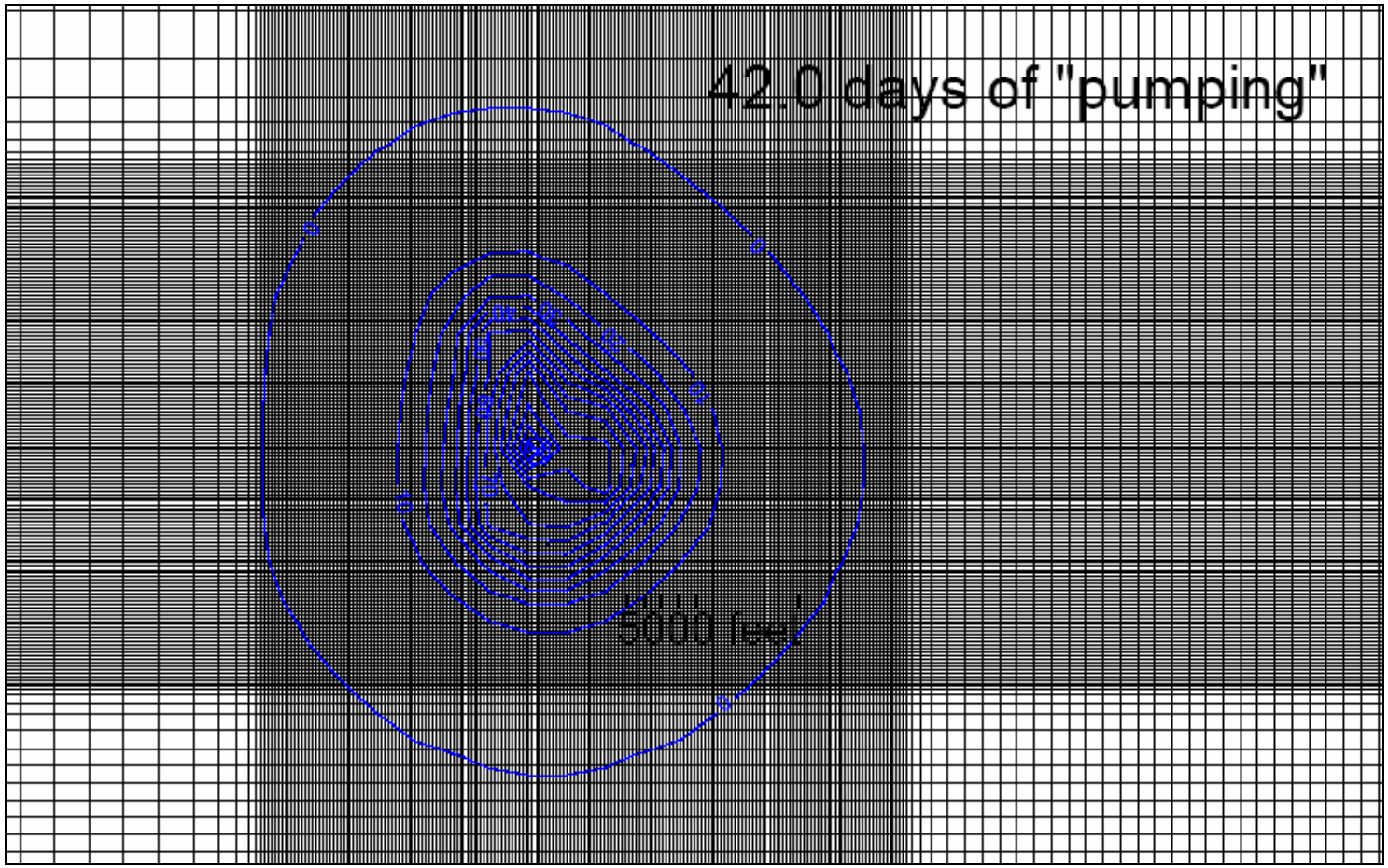
Time required for coal seam to recover within the field to within 20' of initial heads 160 days

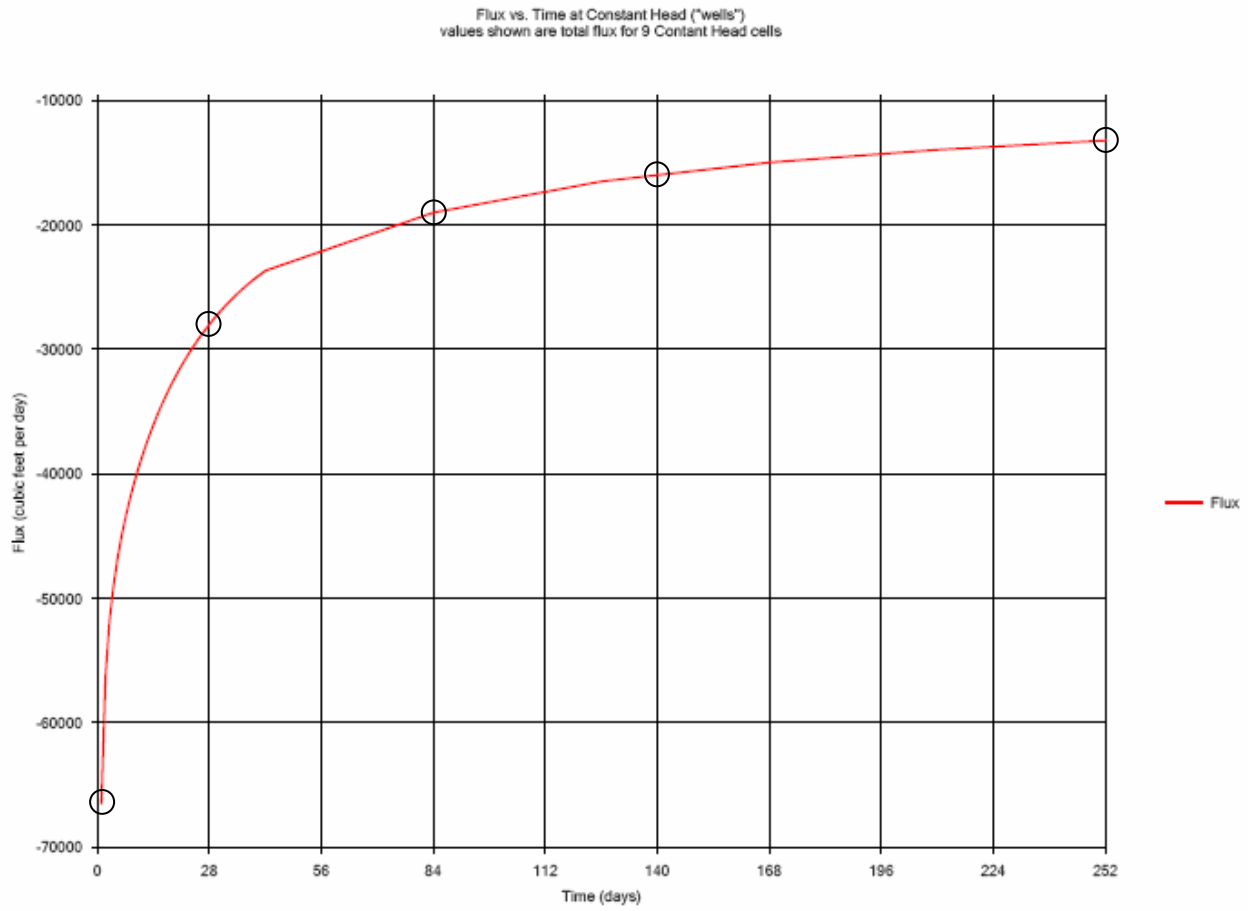
Recovery is calculated after 180 days of pumping.

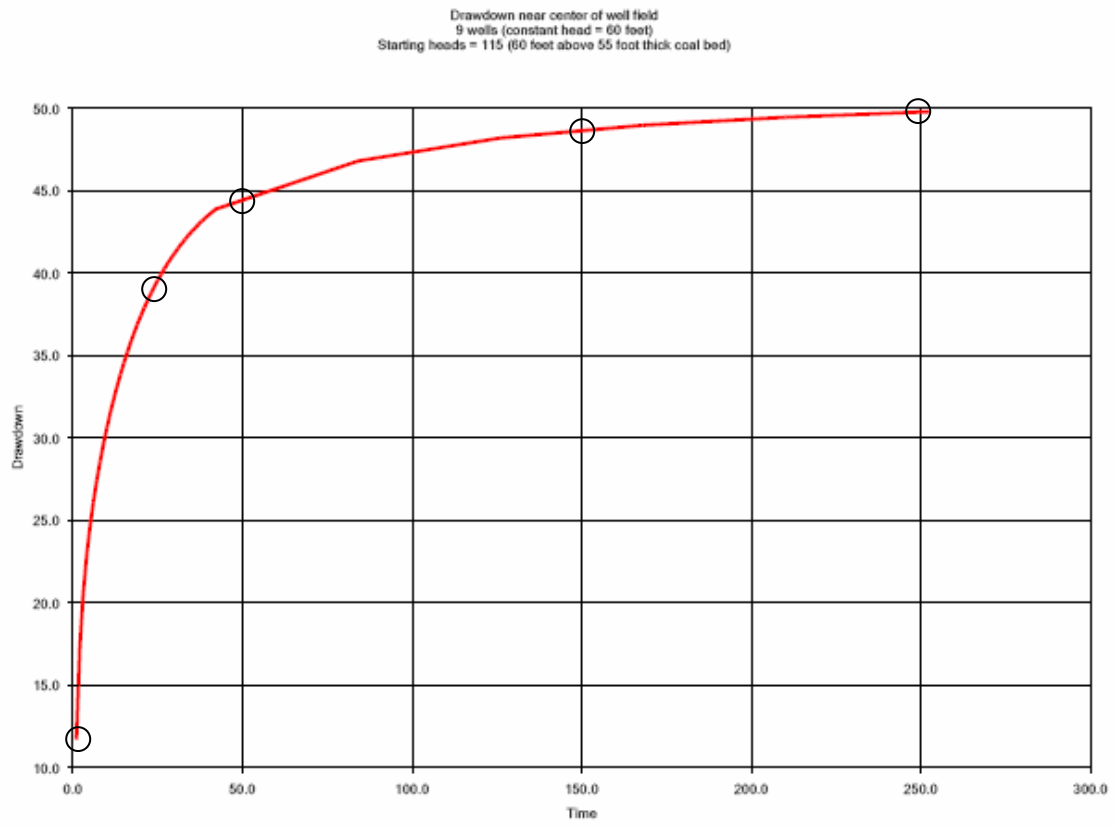


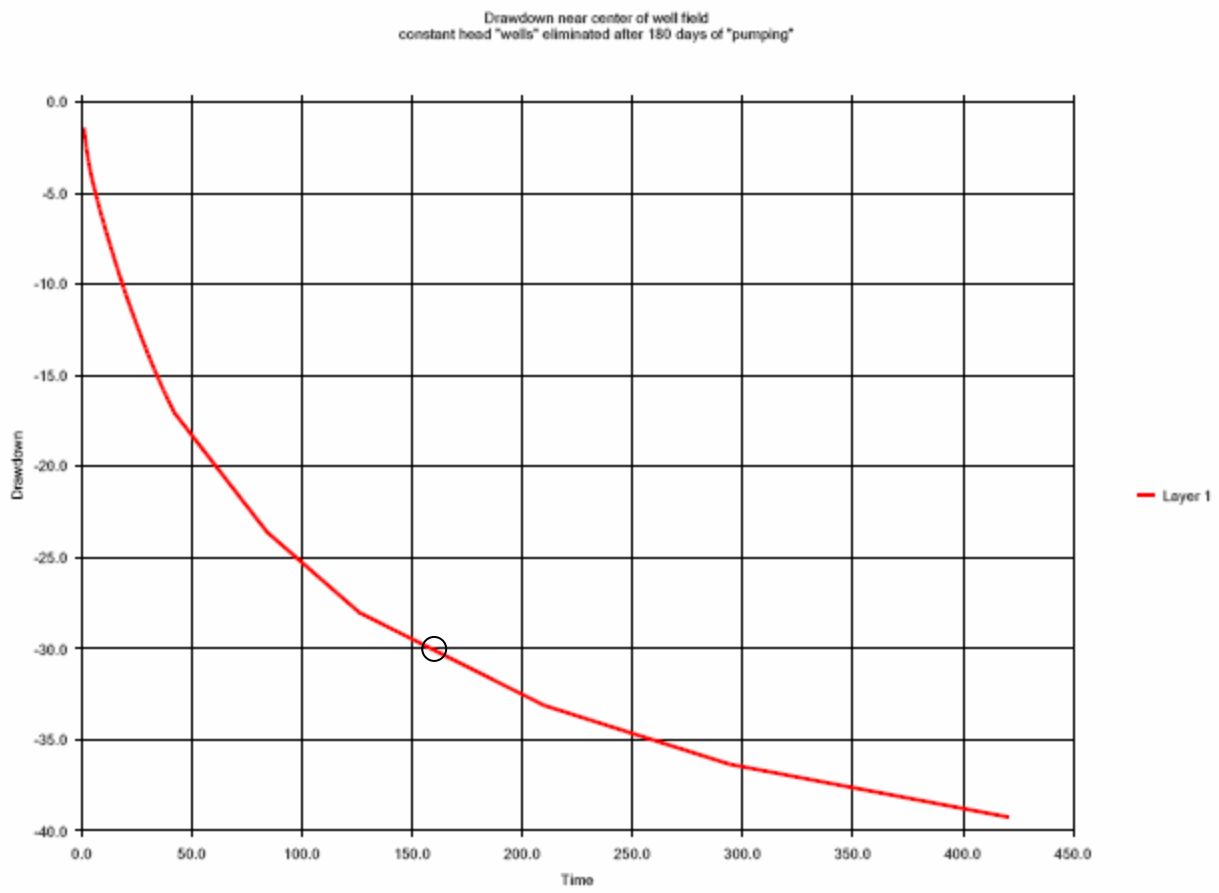
Grid used for the MODFLOW model (wall4_grd.wmf)

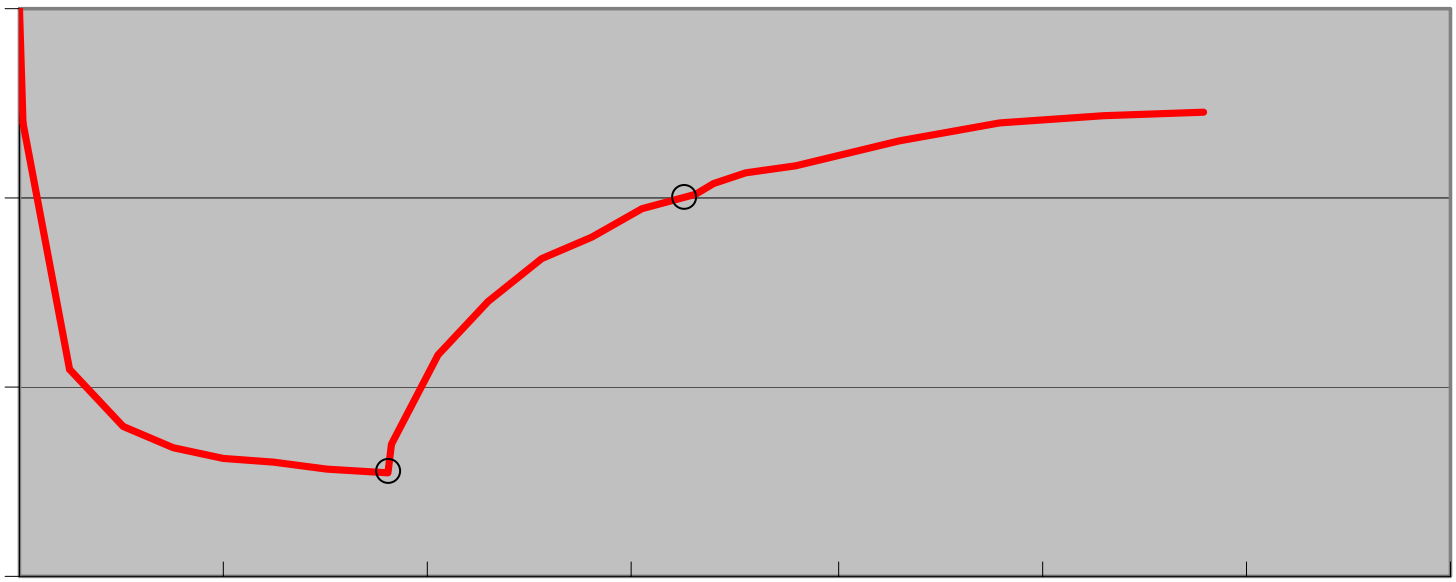



42.0 days of "pumping"
5000 feet

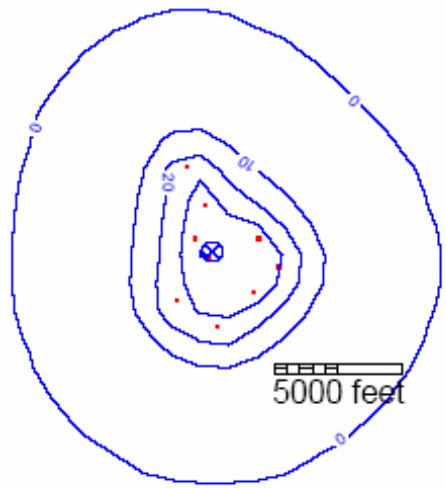

Flux vs. Time at Constant Head ("wells")
values shown are total flux for 9 Contant Head cells
-10000
-20000
-30000
-40000
-50000
-60000
-70000
Flux (cubic feet per day)
0
28
56
84
112
140
168
196
224
252
Time (days)
Flux


Drawdown near center of well field
9 wells (constant head = 60 feet)
Starting heads = 115 (60 feet above 55 foot thick coal bed)
Drawdown
Time
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0

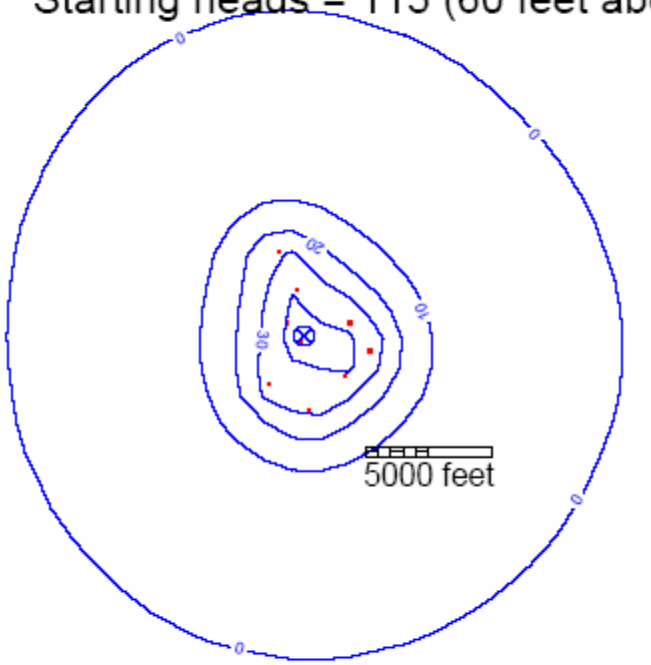

Drawdown near center of well field
constant head "wells" eliminated after 180 days of "pumping"
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
Drawdown
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
Time
Layer 1

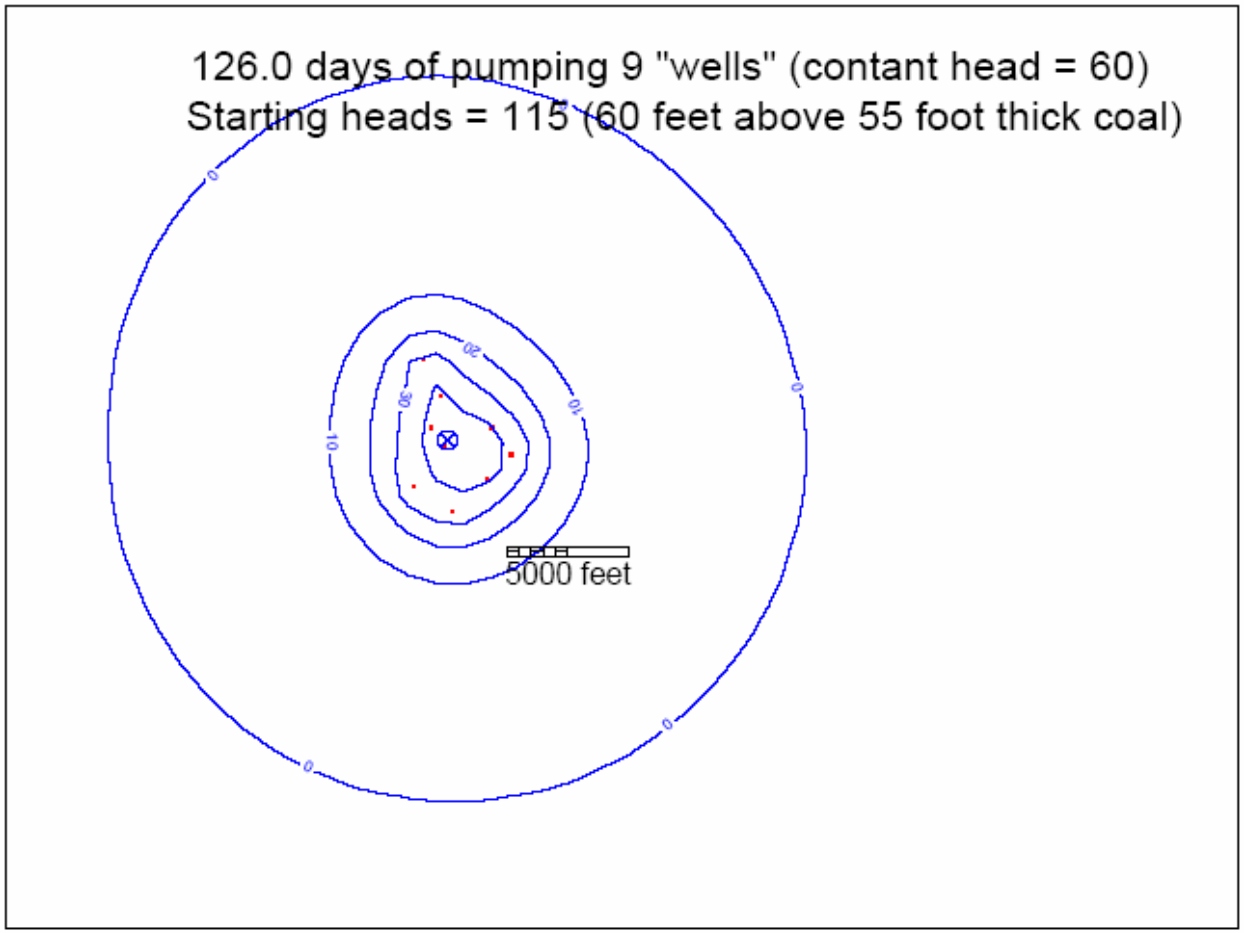


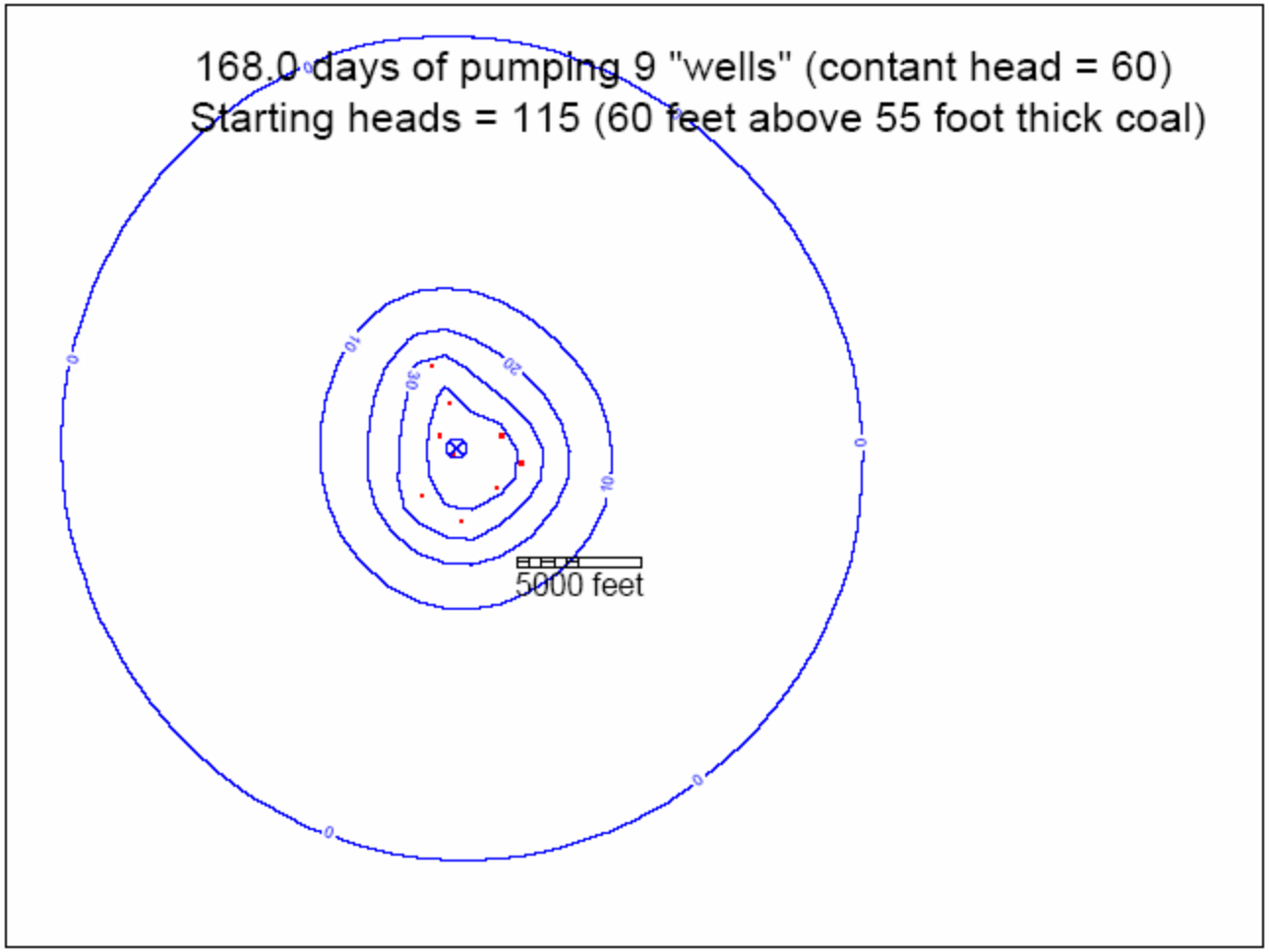
42.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)

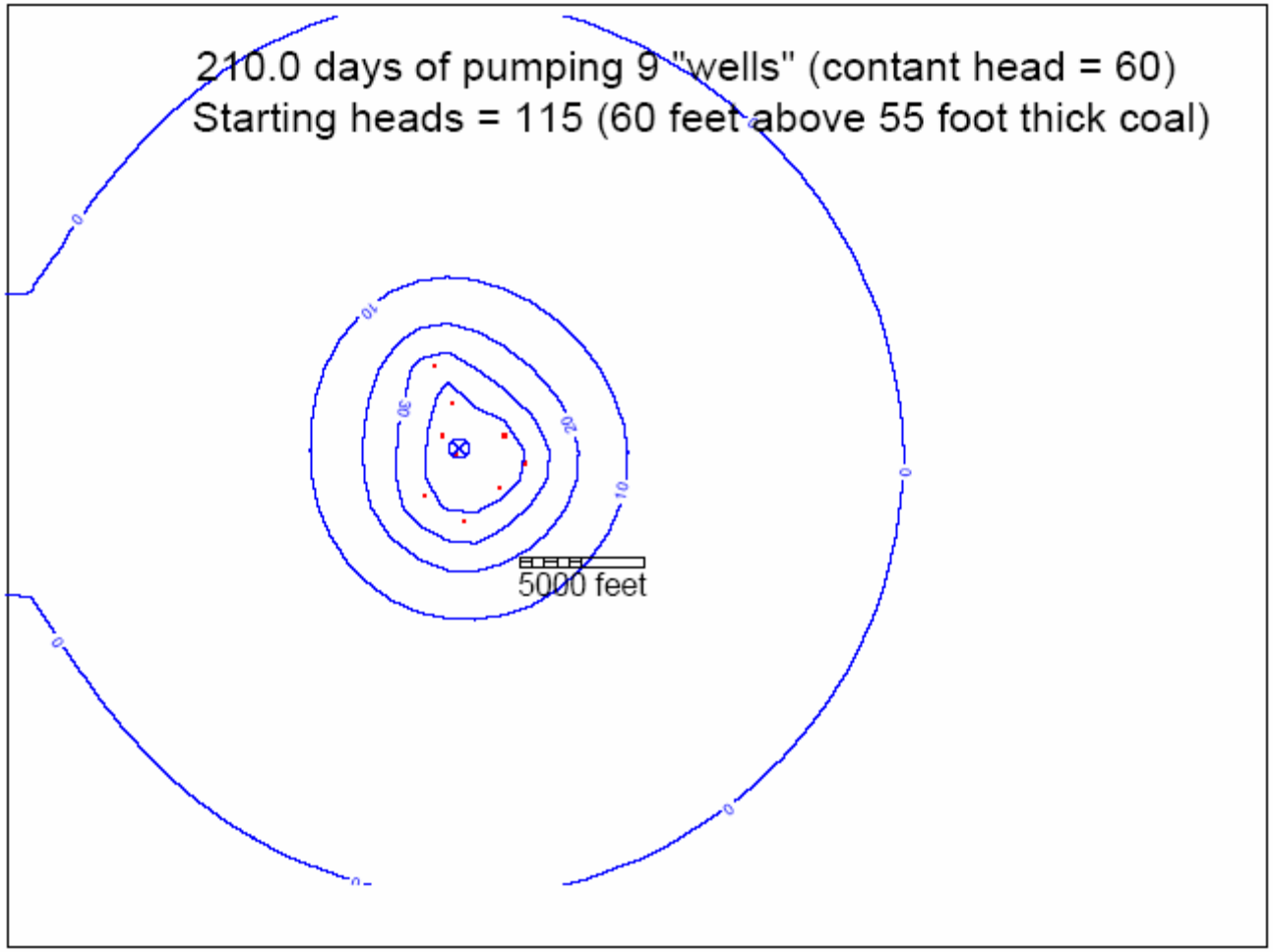


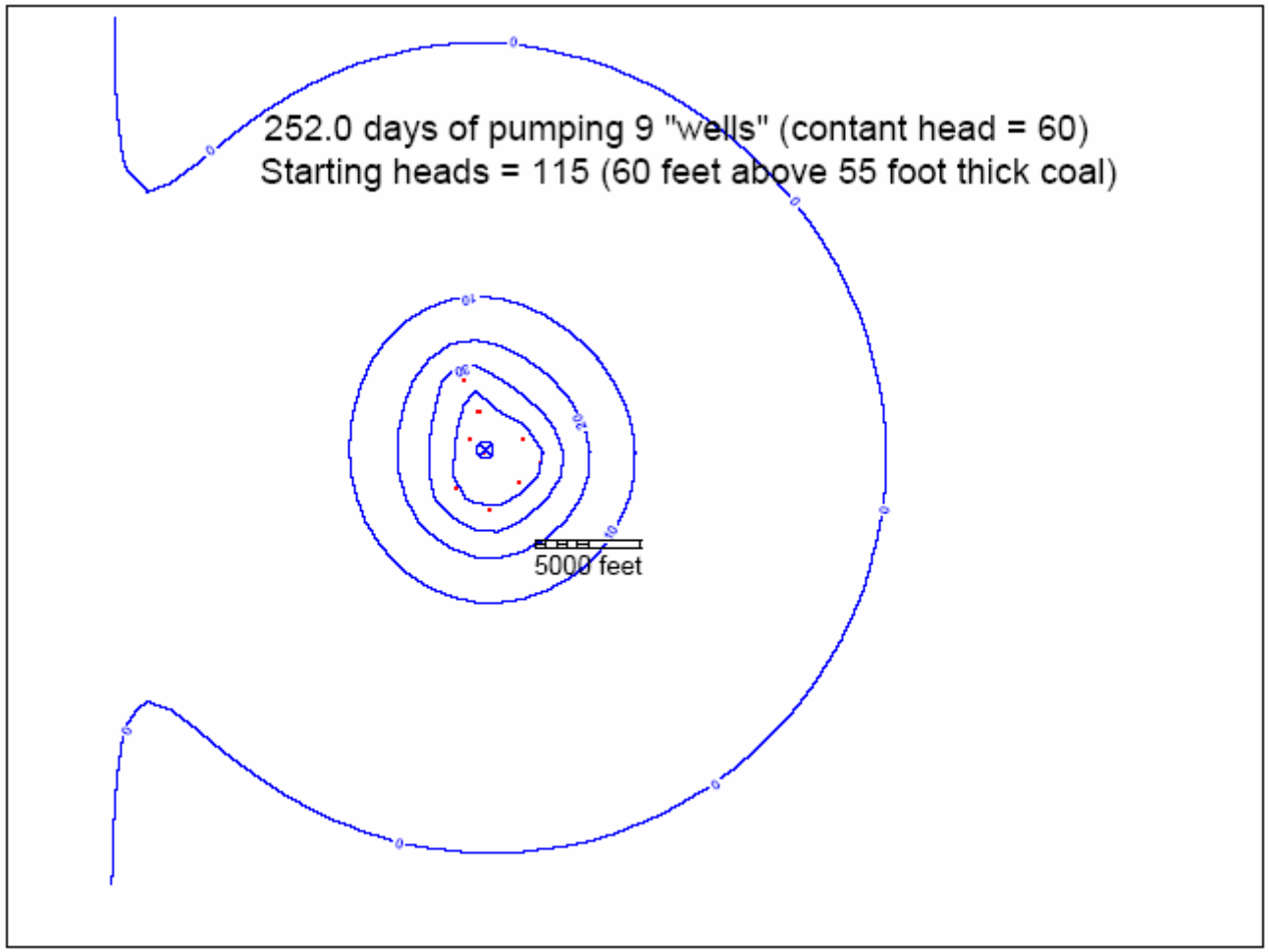
84.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)




126.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)
0
0
0
0
10
10
20
30
5000 feet


168.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)
0
10
20
30
5000 feet


210.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)
0
10
20
30
5000 feet


252.0 days of pumping 9 "wells" (contant head = 60)
Starting heads = 115 (60 feet above 55 foot thick coal)
5000 feet