Results of . . .

Phase IV - B
Hydrogeological Investigation

for . . .

Canada

General Motors Corporation
CPC Group
Grand Rapids, Michigan

July, 1988

20775

EDI Engineering & Science
Environmental Engineering, Geology, Biology and Chemistry
Grand Rapids MI (616) 942-0970

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SOURCE AREA GROUNDWATER REPORT PHASE IV-B

1.0 INTRODUCTION

Previous work in the former degreaser area at Column T-27 has delineated the extent of groundwater contamination from trichloroethylene (TCE) (See EDI report "Phase III-A Hydrogeological Investigation" dated March, 1987). The current phase of work was undertaken to assess the potential for removal of TCE from the groundwater and the control of groundwater flow in the source area to lessen the impact of the TCE source on the groundwater.

2.0 SCOPE OF WORK

The original scope of work included the development and an aquifer test of well 87-5 with monitoring of the nearby wells (Figure 1).

The scope of work was modified because of the poor yield of well 87-5 even after considerable development. The pumping test of well 87-5 was abandoned. Instead, mini-pump tests of wells 86-2, 87-1, 87-4, and 87-5 were conducted to determine the formation characteristics in those locations and to determine if adequate source area groundwater recovery and control was possible using these existing wells.

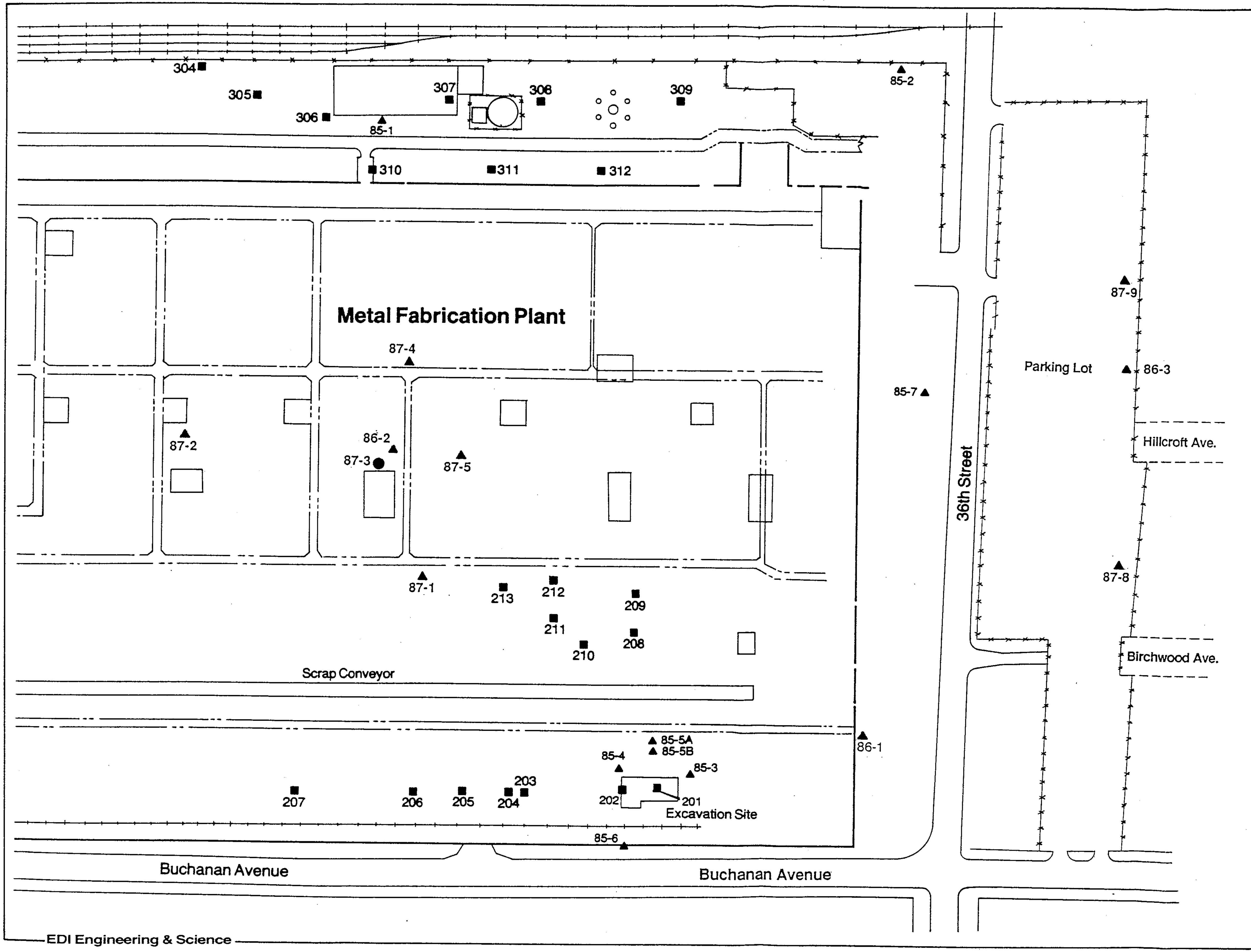
3. METHODS

The development work on well 87-5 was completed using CME 45 drilling equipment. Water levels were measured with a wetted tape. The development techniques are more fully described in the development section below and in Appendix A.

The mini-pump tests were conducted using an air-driven Isco bladder pump and *In-situ* Hermit data logger for recording groundwater levels. A wetted steel tape was used to reference the data logger. The groundwater recovered was pumped to barrels temporarily and transferred to the sanitary sewer at the steam-clean booth at column O-27.

The model of the influence of well 86-2 was constructed using a two-dimensional finite element numerical computer program.[1]

([1]Townley, Lloyd R. and John L. Wilson, Description and User's Manual for a Finite Element Aquifer Flow Model Aquifer-1, Technology Adaptation Program Report No. 79-3, Massachusetts Institute of Technology, 1980.)



Legend

▲ Existing Monitoring Wells

● Soil Vapor Well

■ Soil Boring Drilled By Soils and Materials Engineers March, 1985

0 100 150 200 300
Scale in Feet
N

Figure 1

Well Locations

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4.0 DEVELOPMENT OF WELL 87-5

4.1 PREVIOUS WORK

Well 87-5 was set with 4 inch casing during the Phase III-A Investigation in anticipation that it was in the right place to intercept water from the source area, if necessary. The aquifer was sampled throughout its thickness with temporary wells set through 6-inch OD hollow stem augers. The augers were extended into the confining clay beneath the aquifer to confirm aquifer thickness. The permanent 4-inch well was set at its intended depth through the same boring using 10-inch OD hollow stem augers. The well was not developed when it was set because special procedures were required due to an additional upper screen set in the unsaturated soils. When the well was purged and sampled, the apparent yield of the well was less than 1 GPM. The expected pumping rate was 30 to 50 GPM. Our initial assessment of the low yield was that clay dragged upward by the augers coated the walls of the borehole.

4.2 *CURRENT WORK*

A considerable effort was made during the current phase of work to develop well 87-5 as a significant purge well for groundwater control of the source area. A summary and the field notes are included in Appendix A. The well was developed using several techniques.

In the first method, tri-sodium phosphate (TSP) was introduced to the well and allowed to react to disperse clay particles. Then, a rod pump was installed to remove water, clay and fine sand. The sequence of steps was repeated several times.

In the second method, TSP was again introduced to the well and allowed to react. Then surge blocks were installed in the well to push water through the screen in both directions. Finally, a submersible pump was used to remove water, clay, and fine sand. The sequence was repeated several times.

In the third method, completed later during the mini-pump tests, sulfamic acid was introduced to the well, allowed to react for two hours, and the well pumped with a bladder pump.

During the first two development sessions, significant clay and fine sand was recovered from the well. Clay and fine sand equivalent to 20% of the borehole volume adjacent to the screen was removed. The sustainable pumping rate increased only to 2 GPM. By the end of the second session, the groundwater recovered no longer contained significant quantities of clay. Further development would not change the yield of the well. The acid treatment of the well caused additional fine sand to be remove via the bladder pump. However, the sustainable pumping rate did not significantly improve.

The lack of significant increase in specific yield of the well during development despite removal of significant quantities of clay and fine sand indicates that the formation surrounding the well is less permeable than would be estimated from the original log. Continued development of the well is not warranted. A small increase in yield is all that could be expected and would not provide a significant recovery well for purging contaminated groundwater and for control of the groundwater flow in the source area.

5.0 MINI PUMP TESTS

The water elevations resulting from pumping well 86-2 with an air-driven bladder pump are listed in Appendix B. Figure 2 is a graph of the water elevation versus time. The surging characteristic of the bladder pump is evident from the graph. The overall trend, however, showed the water level stabilizing very quickly in the well. Comparison of the drawdown curve with the recovery curve plotted in Figure 3 shows a very similar and rapid response to the change in water level. The hydraulic conductivity of the aquifer at well 86-2 had been previously calculated to be K=30 feet/day. Comparison in Figure 4 of the rate of stabilization for the conductivity test and the recovery from the pump test shows the recovery of the pump test to be slower. The well had not been pumped previous to the mini-pump test during the last year. Tests of hydraulic conductivity for non-pumping wells sometimes show a decrease in hydraulic conductivity over time. When these wells are pumped or redeveloped the response rate will recover at least partially.

The well was pumped at 3/4 GPM for two hours to determine if the pumping rate is sustainable. The water level stabilized and within the accuracy allowed by the bladder pump surge shows a slight trend upward in water level during the test. The slight upward trend may indicate the well was regaining some of its response rate. The drawdown created by the 3/4 GPM pumping rate was .45 ft as measured near the beginning of the pump test before the upward trend in water level is apparent. The conservatively calculated specific capacity of Well 86-2 is thus 1.67 GPM/ft. The top of the well screen is set 5.5 feet below the water table and the screen extends an additional five feet into the groundwater. The maximum long term pumping rate is that obtainable by pulling the

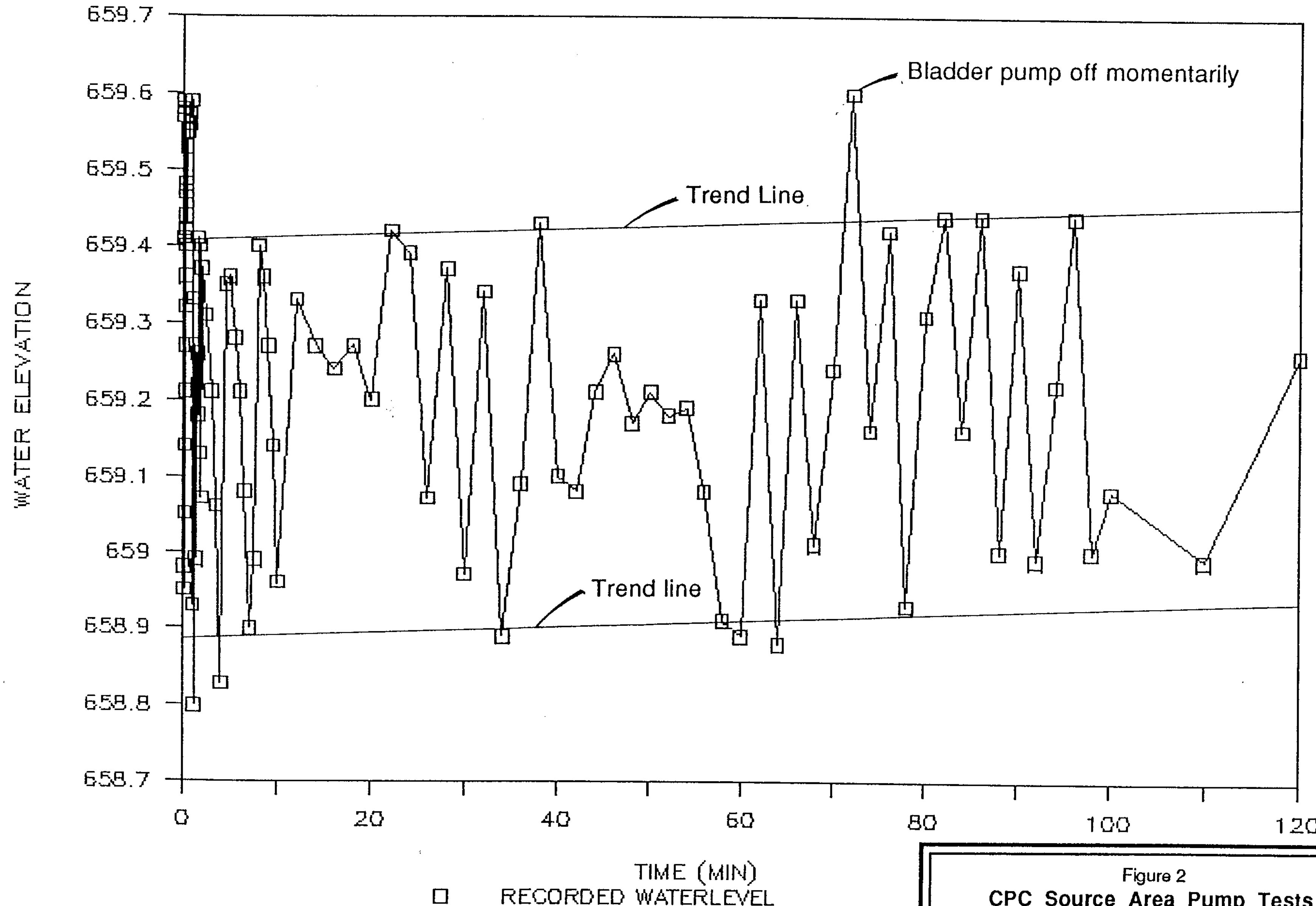

Figure 2
CPC Source Area Pump Tests
Well 86-2 9/23/87 3/4 GPM
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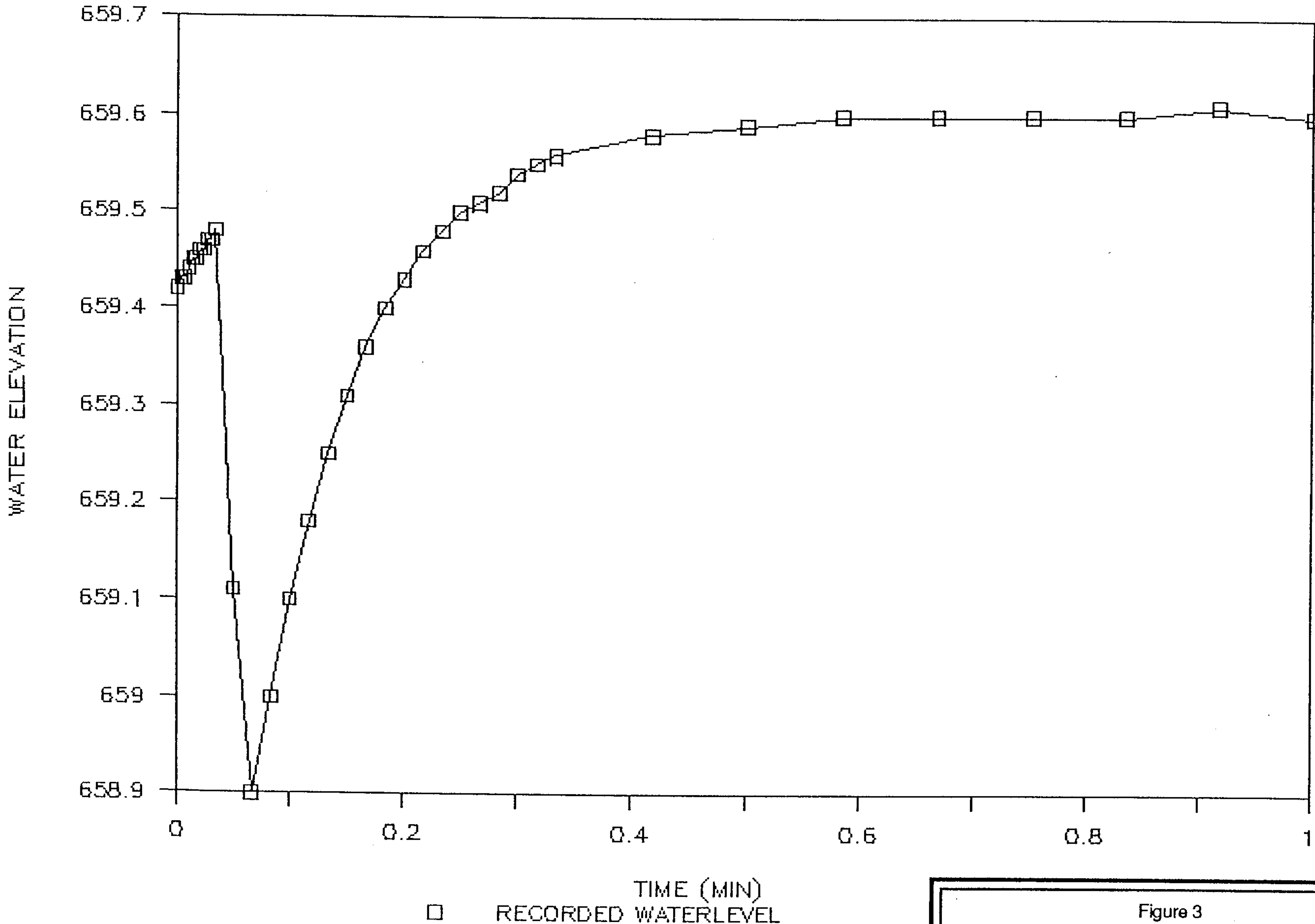

(Note Time Scale Change from Figure 2)

Figure 3
CPC Source Area Pump Tests
Well 86-2 9/23/87 Recovery
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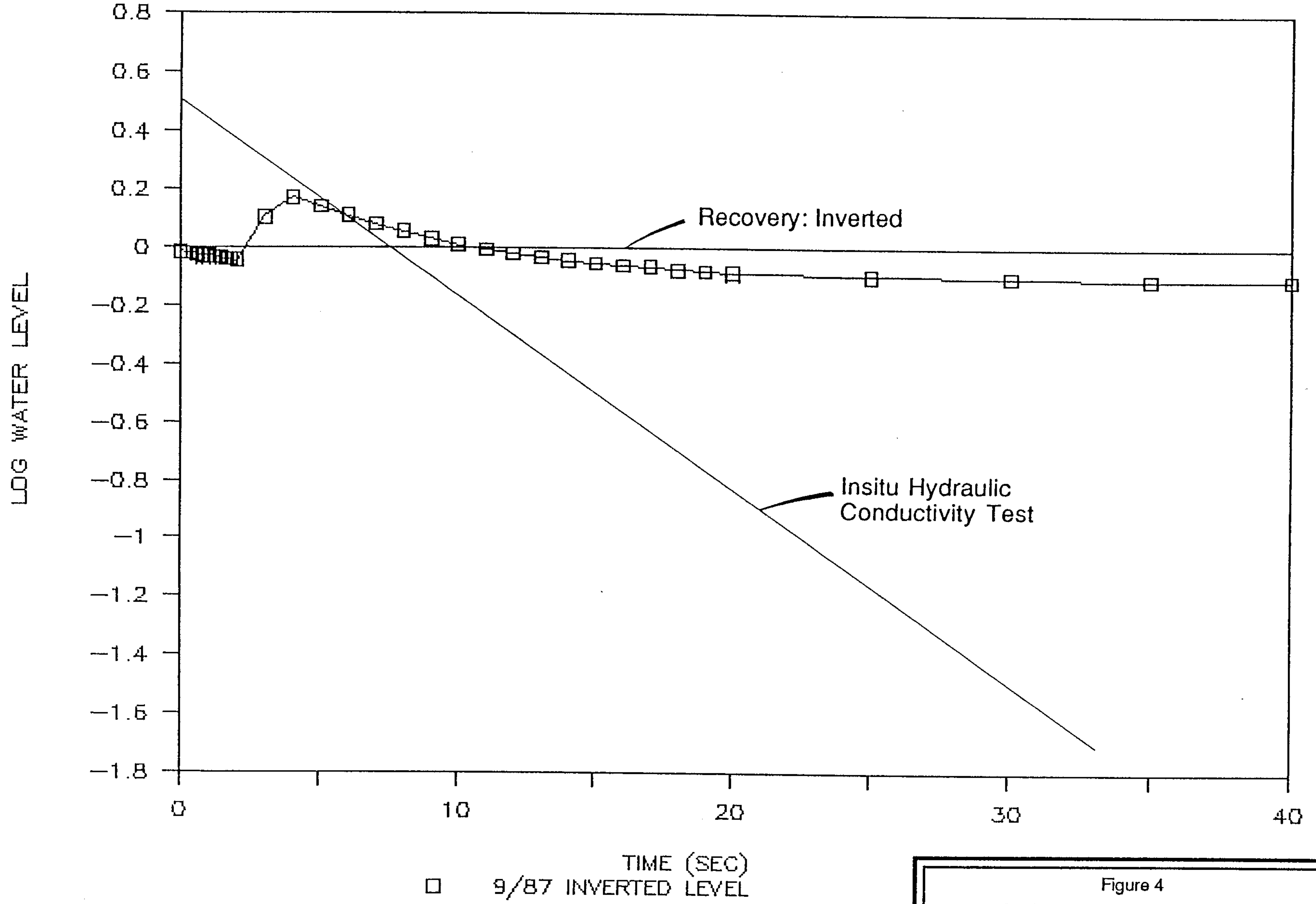

Figure 4
CPC Well 86-2 Comparison
9/87 Recovery VS 5/86 Conductivity
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water level at the well down to the top of the screen. The calculated sustainable pumping rate of the well would be 1.67 GPM/ft X 5.5ft= 9 GPM. For long term operating purposes, the pumping rate should be considered as 8 GPM. If the pumping of the well enhances the redevelopment of the well, the ultimate rate of sustainable pumping may be 10 GPM.

Well 86-2 is located immediately adjacent to the suspected source area, so the pumping of the well will pull groundwater through the most contaminated zone of the aquifer. The pumping of well 86-2 will create a cone of depression in the groundwater around the well. Since the source area is located centrally within the plant, the normal rainfall recharge to this water table aquifer will not be present in the source area. Recharge to the groundwater in the source area is only available through the movement of water along the flow gradient in the aquifer. A numerical model was constructed of the drawdown created by the pumping of well 86-2 within the normal gradient of the aquifer beneath the plant. The normal gradient beneath the plant was simulated in this simplified model by fixing the water levels on the north and south sides of the model area with an appropriate elevation difference for the gradient. The distributions of water levels around the well were calculated using a range of hydraulic conductivity from 3 ft/day to 30 ft/day and pumping rates bracketing 8 GPM. Pumping rates were adjusted for the maintenance of five feet of drawdown in some trials. The resulting cone of depression of the well is on the order of 100ft to 200ft radius. Figure 5 shows the estimated cone of depression and areal influence of well 86-2. The areal influence of the well is that area from which groundwater flows into the well. It extends upgradient far beyond the source in the shape of a parabola with the focus at the well. Representative graphs of the model runs are includes in Appendix C.

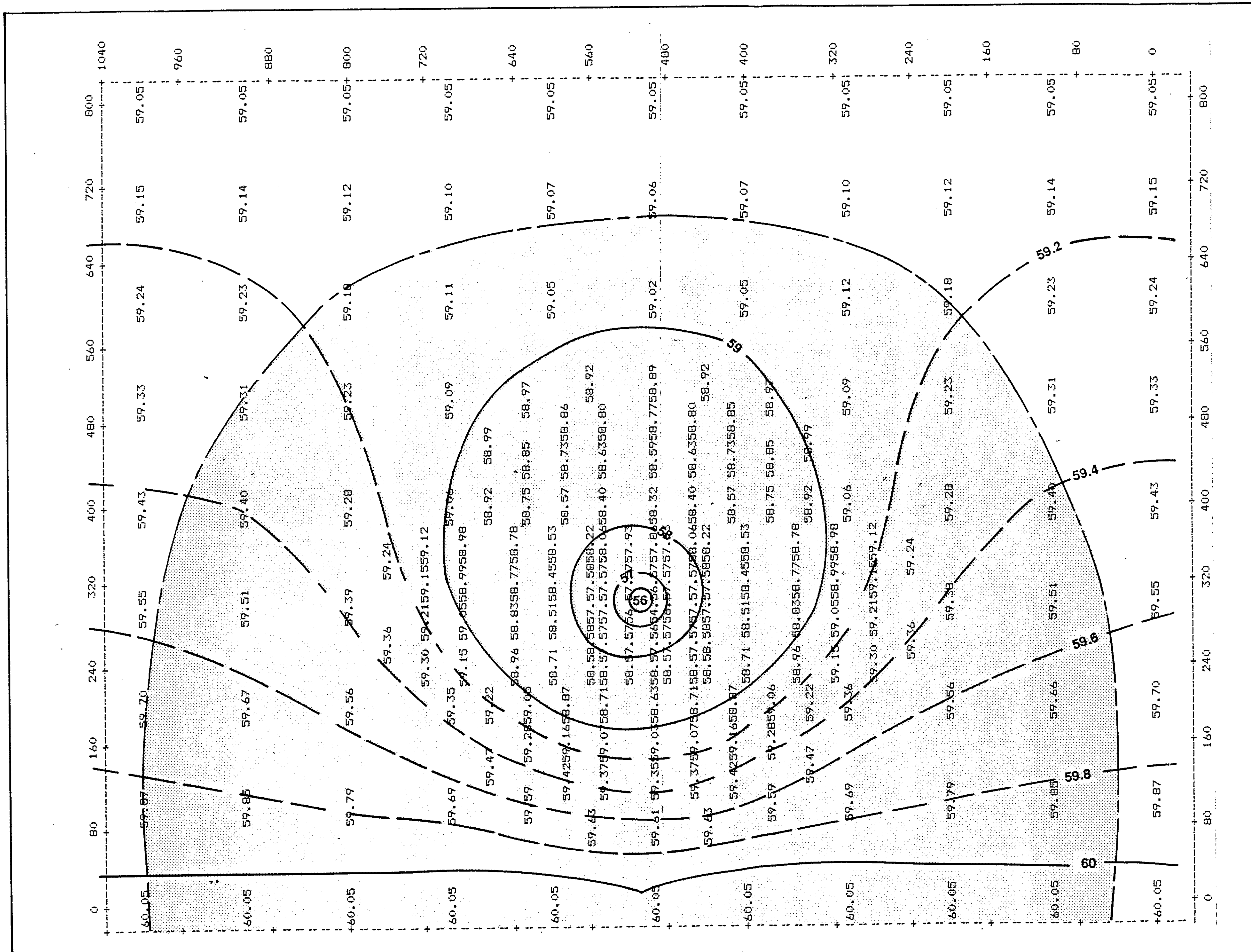
The other locations on site where hydraulic conductivity has been measured are a significant distance from the source area to the northeast, north, and northwest. The other locations all have higher values of hydraulic conductivity than does the source area. If the hydraulic conductivity of the aquifer in the source area increases rapidly away from well 86-2, the cone of depression of well 86-2 would be significantly reduced. The available information does not provide a definitive answer. Monitoring of the water levels in the plant wells and particularly the four wells around the source area will define the areal extent of the cone of depression if it extends at least 100 feet. If the cone is not defined at the nearby existing wells, two additional monitor wells nearer to well 86-2 would be useful for determining its area of influence.

The pumping of well 86-2 will flush the groundwater in the source area within its capture zone . The capture zone of the well is that area defined by both the areal influence of the well and the source area contamination. Approximately 20,000 square feet are in the capture zone. The volume of water in the aquifer in the capture zone would be the area in the capture zone X aquifer thickness X aquifer porosity = 20,000 sq ft X 25 ft X .25 = 125,000 cu ft. The well will remove 1540 cu ft/day at 8 gpm, so removal of one capture zone volume of water will take approximately 80 days.

The concentration of TCE measured in well 86-2 previously was 90 mg/l. Calculation of the rate of removal of TCE at 8 GPM yields .35 lb/hr or 8.4 lb/day. If the pumping of well 86-2 removes the volume of the capture zone in approximately 80 days, then the concentration of TCE would decrease over a time period of a few months (three volumes of the capture zone) to approximately half its previously measured concentration. Because of the likely circumstance that residual TCE liquids are in the soils below the water table, the concentration of TCE in the groundwater reaching well 86-2 should stabilize until the residuals are depleted. The removal rate of TCE should still be on the order of 4 lb/day. Operation of a pumping system in well 86-2 will remove a significant amount of TCE from the source area.

Wells 87-1 and 87-4 are two inch wells set east and west of the source area respectively. These wells were constructed with an upper screen in the soils above the water table for use with the soil vapor removal system. Because of the upper screens, the use of these wells for pumping of groundwater has to be approached in a different manner. The bladder pump could not be lowered completely through the upper screen. The lower portion of the bladder pump was submerged in the groundwater and the pump was operated at 1/2 GPM for a period of 1-1/2 hours on each well. The water level was not lowered below the level of the pump in either well during the test period. The top of the well screen is two feet below the surface of the groundwater in both wells 87-1 and 87-4. We estimate that 2 GPM is the maximum sustainable pumping rate for each well.

Well 87-5 was pumped with the bladder pump to determine its specific capacity following treatment with acid. Figure 5 is the drawdown caused by pumping at 1 GPM, and Figure 6 is the recovery of the well. The estimated specific capacity of the well is 0.10 GPM/ft. With approximately 20 feet of drawdown available to the top of the well screen, the sustainable pumping rate would be 2 GPM.



Legend

— — Water Level Contour Line

— — Zone of Influence

Aquifem Well Drawdown Model:
Pumping well 86-2 at 8gpm K=6

Time = 20.00000

X Coordinates Range from .00 to 800.00

Y Coordinates Range from .00 to1000.00

Scale: 1/3000.

Figure 5

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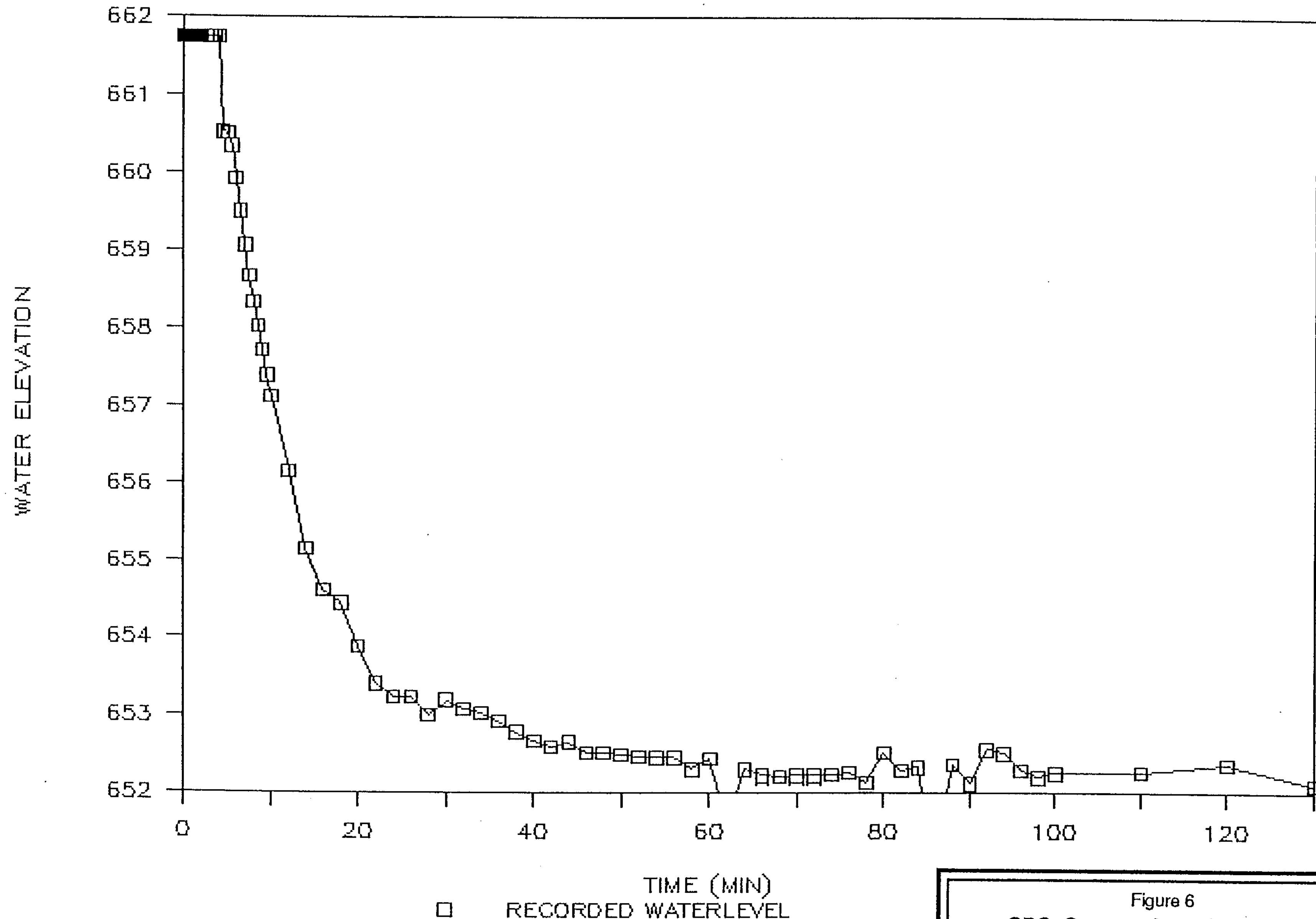

Figure 6

CPC Source Area Pump Tests

Well 87-5 9/24/87 1 GPM

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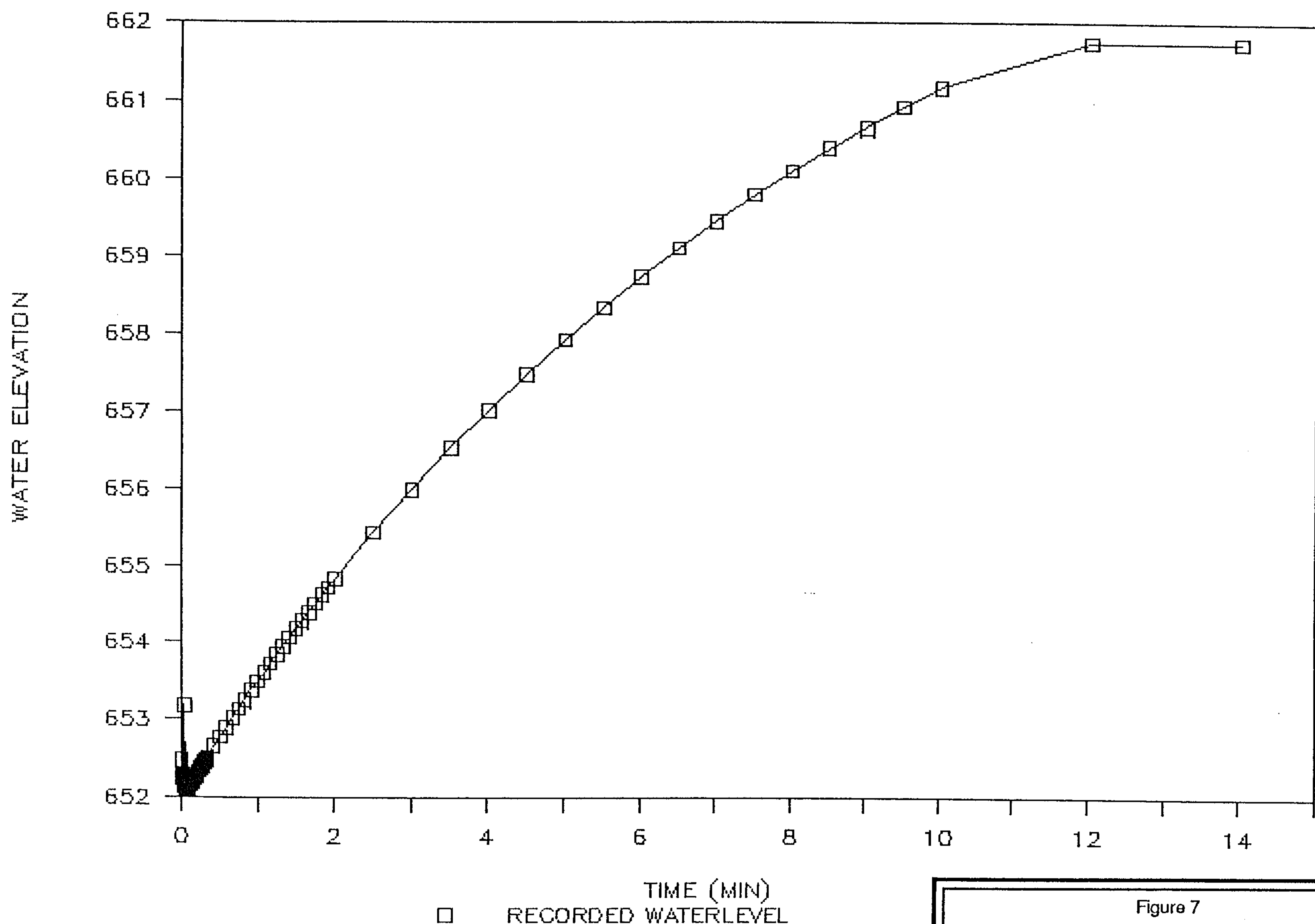

Figure 7

CPC Source Area Pump Tests

Well 87-5 9/24/87 Recovery

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6.0 CONCLUSIONS

1. Additional development of well 87-5 is unwarranted. The well can be used for monitoring purposes but is not suitable for use as a groundwater purge well.

2. Well 86-2 should be used to recover groundwater with high levels of TCE. The rate of recovery would initially be approximately 8 lb/day. The concentrations will decrease over the time required to remove three volumes from the capture zone. Assuming the presence of residual liquids, an estimate of longer term recovery of TCE would be 4 lb/day. This estimate represents the high side of expected long-term recovery rates.

3. The zone of influence of well 86-2 appears to cover a significant portion of the source area, based on a simplified model of the site. Pumping of the well will impede the flow of TCE out of the source area.

7.0 RECOMMENDATIONS

1. Install a shallow well jet pump in well 86-2 to recover ground water at 8 to 10 GPM.

2. Treat the ground water with steam stripping or aqueous carbon adsorption depending upon the cost effectiveness of the alternatives.

3. Discharge the treated water to the sanitary sewer with TOX concentrations not to exceed 2.1 ppm, total.

4. Evaluate the performance of the ground water recovery system during the first thirty days of operation to 1) determine the effectiveness of the well in controlling the source area ground water, and 2) estimate the trend of the ground water TCE concentrations.

5. Install two additional shallow monitoring wells in the source area if the cone of depression of well 86-2 cannot be determined accurately by the other existing monitoring wells.

APPENDIX A

Summary for Development of Well 87-5

DEVELOPMENT OF WELL 87-5

The following is a summary of the field work accomplished.

Monday, August 31, 1987

Previous attempts at pumping the well gave a yield of 1 gpm with submersible pump at a pwl of 50 feet.

Four-and-one-half pounds of TSP was pumped down the well which had a 30-foot water column. Pumping was then started with a 4-inch plunger. Volume was unable to be determined because water ran out of the upper screen. Pumping continued for 15 minutes. The plunger was then pulled and the well head closed.

Tuesday, September 1, 1988

1. Installed 2-inch casing and screen and then rod pumped at a rate of 1 gpm which resulted in very muddy water.

2. A 4-inch plunger pump was then installed, followed by the installation of a 2- by 4-inch K-packer above and below the upper screen. Pumping at 1 gpm resulted in muddy water.

3. Four-and-one-half pounds TSP was added and allowed to sit for 2 hours. The well pressurized with fresh water, 200 gallons backwash pumped with submersible pump at 1 gpm, backwash 100 gallons of water at 2.5 gpm.

September 3, 1987

1. Four-and-one-half pounds TSP was added.

2. A K-packer was installed to split the 10-foot screen into two sections for development surging. "A" is the lower section; "B" is the upper section.

3. Surge "A" for 40 minutes. Surge "B" for 20 minutes.

4. Pumped 70 gallons of muddy water with submersible pump (trace of sand).

5. Four-and-one-half pounds TSP was added.

6. Surge "A" for 30 minutes. Surge "B" for 30 minutes.

7. Pumped 50 gallons of cloudy water then 20 gallons of semi-cloudy water and 7 cc sand/liter.

September 4, 1987

1. Surge "A" for 40 minutes. Surge "B" for 40 minutes.

2. Pumped 30 gallons of cloudy water, then semi-cloudy, then semi-clear and 2 cc sand/liter; then clear and sand-free.

3. Four pounds TSP was added.

4. Surge "A" for 60 minutes. Surge "B" for 60 minutes.

5. Pumped 60 gallons of muddy water, then 20 gallons of cloudy water, then 20 gallons clear with some sand.

September 8, 1987

1. Four pounds TSP was added. Surged "A" 45 minutes (9-9:45).

2. Four pounds TSP was added and 2 gallons of water. Surged "B" 55 minutes (10:05-11:00).

3. Pumped 20 gallons in two minutes; very cloudy with fine sand. Flow rate then dropped to 1-3/4 gpm. Purged 15 minutes; cloudy to semi-cloudy, loss of sand. Sand cone 0.3 cc sand after settling 10 minutes.

4. Added 4 pounds TSP with 2-2.5 gallons of water. Surged "A" 30 minutes (12:30-1:00).

5. Added 4 pounds TSP with 2 gallons of water. Surged "B" 25 minutes (1:20-1:45).

6. Purged 20 gallons at 12 gpm with submersible pump; very cloudy with sand. After approximately 2 minutes dropped rate to 1-3/4 gpm. Purged at 1-3/4 for 15 minutes; sand cone 0.5 cc/liter. After 25 minutes, purging little to no sand.

APPENDIX B

Pump Test Data

Well 86-2

Drawdown

SE1000B

Environmental Logger

09/23 17:09

Unit# 00004 Test# 0

INPUT 1: Level (F) TOC

Reference 21.81

Scale factor 10.09

Offset 0.00

Step# 0 09/23 13:16

Elapsed Time	Value
0.0000	21.81
0.0033	21.81
0.0066	21.80
0.0099	21.80
0.0133	21.80
0.0166	21.80
0.0200	21.80
0.0233	21.80
0.0266	21.79
0.0300	21.80
0.0333	21.80
0.0500	21.79
0.0666	21.79
0.0833	21.79
0.1000	21.79
0.1166	21.97
0.1333	22.40
0.1500	22.43
0.1666	22.33
0.1833	22.24
0.2000	22.17
0.2166	22.11
0.2333	22.06
0.2500	22.02
0.2666	21.98
0.2833	21.96
0.3000	21.94
0.3166	21.91
0.3333	21.90
0.4167	21.85
0.5000	21.83
0.5833	21.82
0.6667	21.82
0.7500	21.81
0.8333	21.81
0.9167	21.79
1.0000	22.45
1.0833	22.05
1.1667	22.58
1.2500	22.11
1.3333	22.39
1.4166	22.16
1.5000	22.12
1.5833	22.20
1.6667	21.97
1.7500	22.25
1.8333	21.98
1.9167	22.31
2.0000	22.01
2.5000	22.07
3.0000	22.17
3.5000	22.32
4.0000	22.55
4.5000	22.03
5.0000	22.02
5.5000	22.10
6.0000	22.17
6.5000	22.30
7.0000	22.48
7.5000	22.39
8.0000	21.98
8.5000	22.02
9.0000	22.11
9.5000	22.24
10.0000	22.42
12.0000	22.05
14.0000	22.11
16.0000	22.14
18.0000	22.11
20.0000	22.18
22.0000	21.96
24.0000	21.99
26.0000	22.31
28.0000	22.01
30.0000	22.41
32.0000	22.04
34.0000	22.49
36.0000	22.29
38.0000	21.95
40.0000	22.28
42.0000	22.30
44.0000	22.17
46.0000	22.12
48.0000	22.21
50.0000	22.17
52.0000	22.20
54.0000	22.19
56.0000	22.30
58.0000	22.47
60.0000	22.49
62.0000	22.05
64.0000	22.50
66.0000	22.05
68.0000	22.37
70.0000	22.14
72.0000	21.78
74.0000	22.22
76.0000	21.96
78.0000	22.45
80.0000	22.07
82.0000	21.94
84.0000	22.22
86.0000	21.94
88.0000	22.38
90.0000	22.01
92.0000	22.39
94.0000	22.16
96.0000	21.94
98.0000	22.38
100.000	22.30
110.000	22.39
120.000	22.12

END

Well 86-2 Recovery

SE1000B
Environmental Logger
09/23 17:12

Unit# 00004 Test# 0

INPUT 1: Level (F) TOC

Reference	21.81
Scale factor	10.09
Offset	0.00

Step# 1 09/23 15:19

Elapsed Time	Value
0.0000	21.96
0.0033	21.95
0.0066	21.95
0.0099	21.94
0.0133	21.93
0.0166	21.93
0.0200	21.92
0.0233	21.92
0.0266	21.91
0.0300	21.91
0.0333	21.90
0.0500	22.27
0.0666	22.48
0.0833	22.38
0.1000	22.28
0.1166	22.20
0.1333	22.13
0.1500	22.07
0.1666	22.02
0.1833	21.98
0.2000	21.95
0.2166	21.92
0.2333	21.90
0.2500	21.88
0.2666	21.87
0.2833	21.86
0.3000	21.84
0.3166	21.83
0.3333	21.82
0.4167	21.80
0.5000	21.79
0.5833	21.78
0.6667	21.78
0.7500	21.78
0.8333	21.78
0.9167	21.77
1.0000	21.78
1.0833	21.77
1.1667	21.77
1.2500	21.78
1.3333	21.78
1.4166	21.77
1.5000	21.78
1.5833	21.77
1.6667	21.77
1.7500	21.77
1.8333	21.77
1.9167	21.78
2.0000	21.78
2.5000	21.77
3.0000	21.77
3.5000	21.77
4.0000	21.77
4.5000	21.77
5.0000	21.77
5.5000	21.77
6.0000	21.77
6.5000	21.77
7.0000	21.77
7.5000	21.77
8.0000	21.77
8.5000	21.77
9.0000	21.77
9.5000	21.77
10.0000	21.77
12.0000	21.77
14.0000	21.77
16.0000	21.77
18.0000	21.77
20.0000	21.77
22.0000	21.77
24.0000	21.77
26.0000	21.77
28.0000	21.77
30.0000	21.77
32.0000	21.77
34.0000	21.76
36.0000	21.75
38.0000	21.76
40.0000	21.76
42.0000	21.76

END

Well 87-5 Drawdown

SE1000B
Environmental Logger
09/25 08:50

Unit# 00004 Test# 0

INPUT 1: Level (F) TOC

Reference	19.03
Scale factor	10.09
Offset	0.00

Step# 1 09/24 15:19

Elapsed Time	Value
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0.0033	28.51
0.0066	28.48
0.0099	28.49
0.0133	28.48
0.0166	28.48
0.0200	28.48
0.0233	28.47
0.0266	28.46
0.0300	28.62
0.0333	27.59
0.0500	28.54
0.0666	28.64
0.0833	28.64
0.1000	28.61
0.1166	28.59
0.1333	28.57
0.1500	28.53
0.1666	28.51
0.1833	28.49
0.2000	28.46
0.2166	28.43
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0.2666	28.36
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0.3000	28.31
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0.3333	28.26
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0.5000	27.99
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0.6667	27.74
0.7500	27.63
0.8333	27.51
0.9167	27.38
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1.0833	27.16
1.1667	27.04
1.2500	26.93
1.3333	26.82
1.4166	26.70
1.5000	26.59
1.5833	26.49
1.6667	26.38
1.7500	26.27
1.8333	26.16
1.9167	26.06
2.0000	25.95
2.5000	25.35
3.0000	24.79
3.5000	24.25
4.0000	23.77
4.5000	23.30
5.0000	22.85
5.5000	22.44
6.0000	22.04
6.5000	21.67
7.0000	21.32
7.5000	20.98
8.0000	20.67
8.5000	20.38
9.0000	20.11
9.5000	19.85
10.0000	19.60
12.0000	19.03
14.0000	19.03
16.0000	19.03
18.0000	19.03
20.0000	19.03
22.0000	19.03
24.0000	19.03
26.0000	19.03
28.0000	19.03
30.0000	19.03

END

Well 87-5 Recovery

SE1000B
Environmental Logger
09/25 08:47

Unit# 00004 Test# 0

INPUT 1: Level (F) TOC

Reference 19.03
Scale factor 10.09
Offset 0.00

Step# 0 09/24 13:07

Elapsed Time	Value
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0.0033	19.03
0.0066	19.03
0.0099	19.03
0.0133	19.03
0.0166	19.03
0.0200	19.03
0.0233	19.03
0.0266	19.03
0.0300	19.03
0.0333	19.03
0.0500	19.03
0.0666	19.03
0.0833	19.03
0.1000	19.03
0.1166	19.03
0.1333	19.03
0.1500	19.03
0.1666	19.03
0.1833	19.03
0.2000	19.03
0.2166	19.03
0.2333	19.03
0.2500	19.03
0.2666	19.03
0.2833	19.03
0.3000	19.03
0.3166	19.03
0.3333	19.03
0.4167	19.03
0.5000	19.03
0.5833	19.03
0.6667	19.03
0.7500	19.03
0.8333	19.03
0.9167	19.03
1.0000	19.03
1.0833	19.03
1.1667	19.03
1.2500	19.03
1.3333	19.03
1.4166	19.03
1.5000	19.03
1.5833	19.03
1.6667	19.03
1.7500	19.03
1.8333	19.03
1.9167	19.03
2.0000	19.03
2.5000	19.03
3.0000	19.03
3.5000	19.03
4.0000	19.03
4.5000	20.24
5.0000	20.26
5.5000	20.42
6.0000	20.85
6.5000	21.27
7.0000	21.71
7.5000	22.11
8.0000	22.44
8.5000	22.75
9.0000	23.06
9.5000	23.38
10.0000	23.65
12.0000	24.63
14.0000	25.63
16.0000	26.17
18.0000	26.33
20.0000	26.88
22.0000	27.36
24.0000	27.53
26.0000	27.52
28.0000	27.76
30.0000	27.57
32.0000	27.68
34.0000	27.73
36.0000	27.84
38.0000	27.98
40.0000	28.09
42.0000	28.17
44.0000	28.11
46.0000	28.24
48.0000	28.24
50.0000	28.27
52.0000	28.30
54.0000	28.31
56.0000	28.31
58.0000	28.46
60.0000	28.32
62.0000	29.16
64.0000	28.46
66.0000	28.54
68.0000	28.55
70.0000	28.54
72.0000	28.54
74.0000	28.53
76.0000	28.50
78.0000	28.63
80.0000	28.24
82.0000	28.48
84.0000	28.44
86.0000	29.79
88.0000	28.40
90.0000	28.64
92.0000	28.21
94.0000	28.26
96.0000	28.48
98.0000	28.56
100.000	28.51
110.000	28.50
120.000	28.40
130.000	28.66

END

APPENDIX C

Model Results and Plots

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*****************************************************************************************************
                                             AQUIFEM-1
                                             =========
*****************************************************************************************************
                                TWO DIMENSIONAL FINITE ELEMENT MODEL
                                     OF GROUNDWATER FLOW WITH
                                    LINEAR TRIANGULAR ELEMENTS

                                  DEPARTMENT OF CIVIL ENGINEERING
                                MASSACHUSETTS INSTITUTE OF TECHNOLOGY
                                  CAMBRIDGE, MASSACHUSETTS. 02139

                                                                             NOVEMBER 1979 VERSION

*****************************************************************************************************

                        AQUIFEM WELL DRAWDOWN MODEL:pumping well B6-2 at 8gpm LOWERED K

*****************************************************************************************************


PROBLEM DESCRIPTION
===================

TYPE OF AQUIFER.......................................................................LINEAR=       .F.
   LINEAR=.T.  LINEAR (CONFINED) OR LINEARIZED AQUIFER
   LINEAR=.F.  NONLINEAR (UNCONFINED OR MIXED) AQUIFER

TYPE OF PROBLEM.......................................................................STEADY=       .F.
   STEADY=.T.  STEADY STATE PROBLEM
   STEADY=.F.  UNSTEADY OR TRANSIENT PROBLEM

INITIAL CONDITIONS/GUESSES PARAMETER..................................................INITAL=       .F.
   INITAL=.T.  COMPUTE LINEAR SOLUTION AS A FIRST GUESS FOR A NONLINEAR PROBLEM
               AND/OR INITIAL STEADY STATE SOLUTION FOR AN UNSTEADY PROBLEM
   INITAL=.F.  READ INITIAL CONDITIONS OR GUESSES

FINAL STEADY STATE SOLUTION PARAMETER..................................................FINAL=       .F.
   FINAL=.T.  COMPUTE FINAL STEADY STATE SOLUTION WITH BOUNDARY CONDITIONS AT TIME=ENDTIM
   FINAL=.F.  DO NOT COMPUTE FINAL STEADY STATE SOLUTION

DATA CHECK PARAMETER...................................................................CHECK=       .F.
   CHECK=.T.  CHECK DATA THEN STOP
   CHECK=.F.  EXECUTE PROGRAM NORMALLY


FINITE ELEMENT GRID PARAMETERS
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NUMBER OF ELEMENTS..............................................................NUMEL=      408

NUMBER OF NODE POINTS...........................................................NUMNP=      223

FLAG FOR PRINTING GEOMETRIC DATA...............................................PRGEOM=      .F.
   PRGEOM=.T.  PRINT GEOMETRIC DATA
   PRGEOM=.F.  DO NOT PRINT GEOMETRIC DATA

FLAG FOR PRINT-PLOTTING GEOMETRIC DATA.........................................PLGEOM=      .F.
   PLGEOM=.T.  PLOT GEOMETRIC DATA
   PLGEOM=.F.  DO NOT PLOT GEOMETRIC DATA

SCALING FACTOR FOR X-COORDINATES...............................................XSCALE=    10.000

SCALING FACTOR FOR Y-COORDINATES...............................................YSCALE=    10.000

LARGEST ELEMENT IDENTIFICATION NUMBER..........................................MAXELT=      408

LARGEST NODE IDENTIFICATION NUMBER.............................................MAXNOD=      223

1
AQUIFER PROPERTY PARAMETERS
===========================

NUMBER OF REGIONS WITH REGIONALLY DEFINED AQUIFER PROPERTIES.........................NAQR=        0

NUMBER OF INDIVIDUAL ELEMENTS OR NODES WITH SPECIALLY DEFINED AQUIFER PROPERTIES.....NSPEC=        0

METHOD BY WHICH AQUIFER PROPERTIES ARE GIVEN.....................................BYNODE=      .F.
   BYNODE=.T.  BY NODES
   BYNODE=.F.  BY ELEMENTS

METHOD BY WHICH HYDRAULIC PROPERTIES ARE GIVEN.....................................PERM=      .T.
   PERM=.T.  PERMEABILITIES KXX,KYY ARE GIVEN
   PERM=.F.  TRANSMISSIVITIES TXX,TYY ARE GIVEN

1
BOUNDARY CONDITION PARAMETERS
=============================

NUMBER OF PRESCRIBED BOUNDARY HEAD NODES........................................NHNODE=       22

NUMBER OF TIMES WHEN PRESCRIBED HEAD BOUNDARY CONDITIONS ARE SET......................NTBH=        1

NUMBER OF NODES WHERE GROUND LEVELS ARE SPECIFIED.....................................NGRD=        0

NUMBER OF TIMES WHEN GROUND LEVELS ARE SET...........................................NTGRD=        0

NUMBER OF FLUX ELEMENTS..............................................................NFLXE=        0

NUMBER OF TIMES WHEN PRESCRIBED BOUNDARY FLUXES ARE SET.............................NTFLXE=        0

NUMBER OF REGIONS WITH REGIONAL ELEMENT FLUX..........................................NEFR=        0

NUMBER OF FLUX SIDES.................................................................NFLXS=        0

NUMBER OF TIMES WHEN PRESCRIBED SIDE FLUXES ARE SET.................................NTFLXS=        0

NUMBER OF FLUX NODES.................................................................NFLXN=        1

NUMBER OF TIMES WHEN PRESCRIBED NODE FLUXES ARE SET.................................NTFLXN=        2
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NUMBER OF 3RD-TYPE BOUNDARY SIDES.........................................................NBC3=        0

NUMBER OF TIMES WHEN 3RD-TYPE BOUNDARY HEADS ARE SET.....................................NTBC3=        0

NUMBER OF NODES ON THE 3RD-TYPE BOUNDARY SIDES...........................................NNOD3=        0

3RD-TYPE BOUNDARY PARAMETER.............................................................BEDBC3=       .F.
   BEDBC3=.T.  USE RIVER BED LEVELS TO MODIFY 3RD-TYPE INFLOWS
   BEDBC3=.F.  DO NOT USE RIVER BED LEVELS

NUMBER OF NODES WHERE HEADS IN ADJACENT AQUIFER ARE GIVEN................................NHADJ=        0

NUMBER OF TIMES WHEN HEADS IN ADJACENT AQUIFER ARE SET..................................NTHADJ=        0

ADJACENT AQUIFER PARAMETER...............................................................ATTOP=       .F.
   ATTOP=.T.  ADJACENT AQUIFER IS ABOVE AQUIFER UNDER STUDY
   ATTOP=.F.  ADJACENT AQUIFER IS NOT AT TOP

METHOD OF SUPPLYING ADJACENT HEADS......................................................HAVARY=       .F.
   HAVARY=.T.  ADJACENT HEADS VARY IN SPACE
   HAVARY=.F.  ADJACENT HEADS ARE CONSTANT

TYPE OF INITIAL CONDITIONS/GUESSES IF INITAL=.F.........................................ICVARY=       .T.
   ICVARY=.T.  INITIAL CONDITIONS VARY IN SPACE
   ICVARY=.F.  INITIAL CONDITIONS ARE CONSTANT
```

SOLUTION STRATEGY
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START TIME..............................................................................STRTIM=     .0000

END TIME................................................................................ENDTIM=  100.0000

TOLERANCE FOR CONVERGENCE..................................................................TOL=     .0500

INDICATOR FOR CONVERGENCE CRITERION.......................................................ITOL=         1
   ITOL=0  ROOT MEAN SQUARE ERROR CRITERION
   ITOL=1  MAXIMUM ABSOLUTE ERROR CRITERION

MAXIMUM NUMBER OF ITERATIONS.............................................................MAXIT=         5

TIME STEP...................................................................................DT=    .01000

ALPHA PARAMETER FOR TIME INTEGRATION SCHEME..............................................ALPHA=     .5000

TIME STEP PARAMETER.....................................................................DTPARM=    1.1000

INDICATOR FOR CHANGING TIME STEP...........................................................IDT=         1
   IDT=0  NO CHANGE OF TIME STEP
   IDT=1  DT=DT*DTPARM AFTER NDT TIME STEPS
   IDT=2  DT=DT+DTPARM AFTER NDT TIME STEPS

NUMBER OF CONSTANT LENGTH TIME STEPS BEFORE CHANGING ACCORDING TO IDT......................NDT=         1

NUMBER OF ITERATIONS WITH SAME LEFT HAND SIDE SYSM MATRIX.................................NSYS=         2
   NSYS=999  REFORM SYSM ONCE EACH TIME STEP
```

OUTPUT CONTROL
==============

16	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
17	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
18	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
19	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
20	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
21	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
22	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
23	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
24	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
25	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
26	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
27	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
28	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
29	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
30	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
31	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
32	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
33	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
34	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
35	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
36	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
37	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
38	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
39	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
40	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
41	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
42	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
43	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
44	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
45	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
46	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
47	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
48	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
49	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
50	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
51	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
52	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
53	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
54	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
55	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
56	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
57	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
58	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
59	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
60	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
61	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
62	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
63	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
64	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
65	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
66	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
67	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
68	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
69	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
70	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
71	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
72	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
73	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
74	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
75	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
76	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
77	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
78	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
79	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
80	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
81	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

FIRST TIME STEP FOR PRINTED OUTPUT...ISTPRT= 1000000

NUMBER OF TIME STEPS BETWEEN PRINTED OUTPUTS..NDTPRT= 1

NUMBER OF SPECIAL PRINTED OUTPUT TIMES..NOUT= 2

FIRST TIME STEP FOR PLOTTED OUTPUT...ISTPLT= 1000000

NUMBER OF TIME STEPS BETWEEN PLOTTED OUTPUTS..NDTPLT= 1

NUMBER OF SPECIAL PLOTTED OUTPUT TIMES..NPLT= 6

PLOT SCALING FACTOR...FSCALE= 300.00

INCREMENT FOR LABELLING PLOT AXES...PDELTA= .00

ROTATION PARAMETER..NRFLAG= 1
NRFLAG=0 ROTATION OF PLOT IS ALLOWED
NRFLAG=1 NO ROTATION IS ALLOWED, X-AXIS ACROSS THE PAGE
NRFLAG=2 ROTATION IS FORCED, Y-AXIS ACROSS THE PAGE

NUMBER OF ROWS/COLUMNS AROUND PLOT BOUNDARY...NBOUND= 3

NUMBER OF DECIMAL PLACES IN PLOTTED VALUES OF HEAD......................................NDF= 2

THE TOTAL MODEL AREA IS .8000E+06

1
NUMBER OF ELEMENTS (NK) IN SYMMETRIC COMPACTED MATRIX IS 4848

BANDWIDTH OF MATRIX IN FULL FORM WOULD BE 55

27432 WORDS OF STORAGE HAVE BEEN USED OUT OF A TOTAL ALLOCATION OF 50000

CALCULATIONS ARE IN SINGLE PRECISION

1
AQUIFER CHARACTERISTICS
=======================

ELEMENT NO	BOTTOM ELEVATION	AQUIFER THICKNESS	KXX	KYY	STORATIVITY	SPECIFIC YIELD	CONF.LAYER K'/B'
1	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
2	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
3	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
4	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
5	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
6	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
7	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
8	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
9	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
10	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
11	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
12	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
13	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
14	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
15	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

82	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
83	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
84	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
85	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
86	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
87	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
88	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
89	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
90	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
91	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
92	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
93	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
94	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
95	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
96	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
97	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
98	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
99	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
100	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
101	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
102	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
103	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
104	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
105	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
106	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
107	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
108	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
109	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
110	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
111	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
112	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
113	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
114	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
115	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
116	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
117	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
118	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
119	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
120	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
121	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
122	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
123	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
124	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
125	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
126	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
127	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
128	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
129	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
130	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
131	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
132	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
133	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
134	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
135	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
136	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
137	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
138	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
139	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
140	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
141	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
142	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
143	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
144	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
145	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
146	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
147	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

148	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
149	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
150	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
151	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
152	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
153	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
154	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
155	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
156	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
157	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
158	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
159	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
160	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
161	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
162	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
163	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
164	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
165	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
166	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
167	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
168	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
169	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
170	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
171	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
172	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
173	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
174	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
175	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
176	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
177	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
178	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
179	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
180	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
181	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
182	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
183	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
184	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
185	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
186	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
187	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
188	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
189	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
190	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
191	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
192	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
193	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
194	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
195	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
196	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
197	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
198	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
199	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
200	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
201	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
202	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
203	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
204	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
205	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
206	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
207	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
208	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
209	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
210	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
211	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
212	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
213	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

214	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
215	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
216	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
217	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
218	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
219	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
220	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
221	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
222	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
223	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
224	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
225	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
226	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
227	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
228	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
229	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
230	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
231	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
232	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
233	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
234	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
235	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
236	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
237	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
238	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
239	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
240	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
241	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
242	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
243	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
244	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
245	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
246	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
247	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
248	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
249	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
250	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
251	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
252	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
253	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
254	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
255	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
256	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
257	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
258	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
259	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
260	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
261	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
262	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
263	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
264	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
265	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
266	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
267	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
268	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
269	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
270	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
271	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
272	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
273	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
274	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
275	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
276	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
277	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
278	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
279	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

280	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
281	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
282	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
283	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
284	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
285	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
286	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
287	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
288	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
289	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
290	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
291	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
292	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
293	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
294	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
295	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
296	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
297	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
298	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
299	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
300	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
301	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
302	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
303	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
304	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
305	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
306	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
307	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
308	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
309	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
310	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
311	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
312	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
313	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
314	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
315	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
316	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
317	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
318	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
319	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
320	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
321	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
322	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
323	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
324	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
325	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
326	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
327	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
328	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
329	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
330	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
331	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
332	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
333	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
334	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
335	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
336	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
337	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
338	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
339	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
340	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
341	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
342	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
343	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
344	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
345	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

346	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
347	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
348	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
349	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
350	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
351	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
352	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
353	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
354	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
355	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
356	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
357	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
358	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
359	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
360	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
361	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
362	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
363	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
364	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
365	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
366	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
367	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
368	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
369	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
370	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
371	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
372	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
373	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
374	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
375	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
376	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
377	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
378	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
379	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
380	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
381	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
382	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
383	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
384	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
385	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
386	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
387	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
388	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
389	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
390	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
391	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
392	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
393	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
394	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
395	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
396	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
397	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
398	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
399	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
400	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
401	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
402	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
403	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
404	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
405	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
406	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
407	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
408	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

PRESCRIBED HEAD BOUNDARY DATA - SPECIFIED PIEZOMETRIC HEADS AND ASSOCIATED NODE NUMBERS

TIMES......

1000.000

NODE NO	HEADS UP TO AND INCLUDING THE ABOVE TIMES......
144	60.050
145	60.050
146	60.050
147	60.050
148	60.050
169	60.050
170	60.050
171	60.050
192	60.050
193	60.050
194	60.050
202	59.050
203	59.050
204	59.050
205	59.050
206	59.050
207	59.050
208	59.050
216	59.050
218	59.050
219	59.050
220	59.050

1

PRESCRIBED FLUXES CONCENTRATED AT NODES (L3/T) - VOLUME PER UNIT TIME
REPRESENTING LOCALIZED RECHARGE OR PUMPING WELLS

TIMES......

.000 1000.000

NODE NO	FLUXES UP TO AND INCLUDING THE ABOVE TIMES ...... FLOW IN(+),FLOW OUT(-)	
1	.00	-1540.00

1

INITIAL HEAD VECTOR

NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD
1	59.68	2	59.70	3	59.70	4	59.68	5	59.65	6	59.65	7	59.65	8	59.68	9	59.70	10	59.73
11	59.73	12	59.73	13	59.73	14	59.70	15	59.68	16	59.65	17	59.63	18	59.63	19	59.63	20	59.63
21	59.63	22	59.65	23	59.68	24	59.70	25	59.73	26	59.75	27	59.75	28	59.75	29	59.75	30	59.75
31	59.75	32	59.73	33	59.70	34	59.68	35	59.65	36	59.63	37	59.60	38	59.60	39	59.60	40	59.60
41	59.60	42	59.60	43	59.60	44	59.63	45	59.65	46	59.68	47	59.70	48	59.73	49	59.75	50	59.80
51	59.80	52	59.80	53	59.80	54	59.80	55	59.75	56	59.70	57	59.65	58	59.60	59	59.55	60	59.55
61	59.55	62	59.55	63	59.55	64	59.60	65	59.65	66	59.70	67	59.75	68	59.80	69	59.85	70	59.85
71	59.85	72	59.85	73	59.85	74	59.80	75	59.75	76	59.70	77	59.65	78	59.60	79	59.55	80	59.50
81	59.50	82	59.50	83	59.50	84	59.50	85	59.55	86	59.60	87	59.65	88	59.70	89	59.75	90	59.80
91	59.85	92	59.90	93	59.90	94	59.90	95	59.90	96	59.90	97	59.85	98	59.80	99	59.75	100	59.70
101	59.65	102	59.60	103	59.55	104	59.50	105	59.45	106	59.45	107	59.45	108	59.45	109	59.45	110	59.50
111	59.55	112	59.60	113	59.65	114	59.70	115	59.75	116	59.80	117	59.88	118	59.93	119	59.95	120	59.95
121	59.95	122	59.93	123	59.88	124	59.80	125	59.75	126	59.70	127	59.65	128	59.60	129	59.55	130	59.48
131	59.43	132	59.40	133	59.40	134	59.40	135	59.43	136	59.48	137	59.55	138	59.60	139	59.65	140	59.70
141	59.75	142	59.80	143	59.93	144	60.05	145	60.05	146	60.05	147	60.05	148	60.05	149	59.93	150	59.93
151	59.80	152	59.73	153	59.68	154	59.62	155	59.55	156	59.43	157	59.30	158	59.30	159	59.30	160	59.30
161	59.30	162	59.43	163	59.55	164	59.63	165	59.68	166	59.73	167	59.80	168	59.93	169	60.05	170	60.05
171	60.05	172	59.93	173	59.80	174	59.68	175	59.55	176	59.43	177	59.43	178	59.30	179	59.18	180	59.18
181	59.18	182	59.18	183	59.18	184	59.18	185	59.30	186	59.43	187	59.55	188	59.68	189	59.80	190	59.93
191	59.93	192	60.05	193	60.05	194	60.05	195	59.93	196	59.80	197	59.68	198	59.55	199	59.43	200	59.30

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 201   59.18  202   59.05  203   59.05  204   59.05  205   59.05  206   59.05  207   59.05  208   59.05  209   59.18  210   59.30
 211   59.43  212   59.55  213   59.68  214   59.30  215   59.18  216   59.05  217   59.18  218   59.05  219   59.05  220   59.05
 221   59.18  222   59.30  223   59.43
1
 TABLE OF PRINTED OUTPUT TIMES
 =============================

    50.0000    100.0000
1
 TABLE OF PRINT-PLOT TIMES
 =========================

    20.0000     40.0000     50.0000     60.0000     80.0000    100.0000
1
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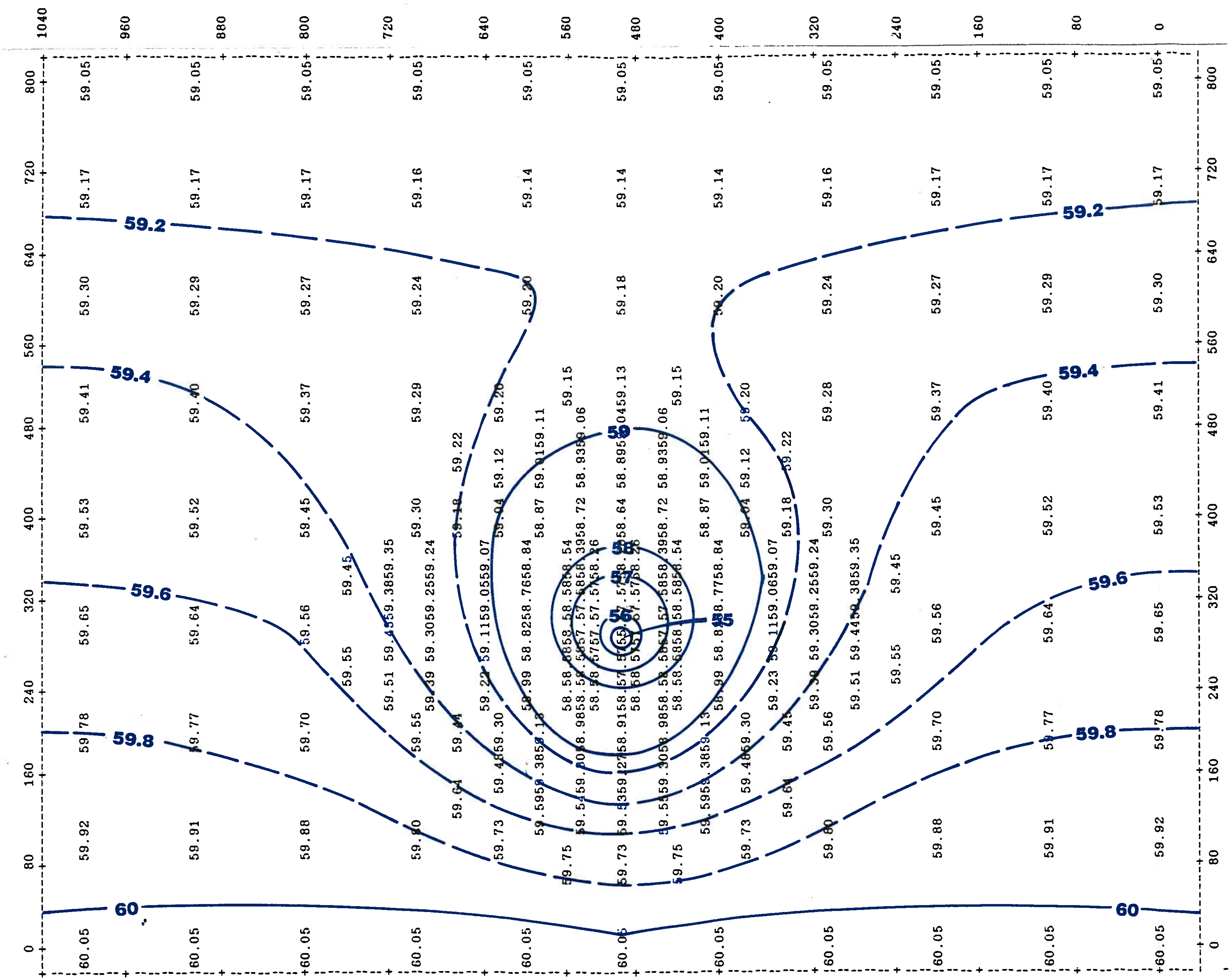


Aquifem Well Drawdown Model
Pumping Well 86-2 at 4gpm K=3

Time = 20.00000

X Coordinates Range from .00 to 800.0

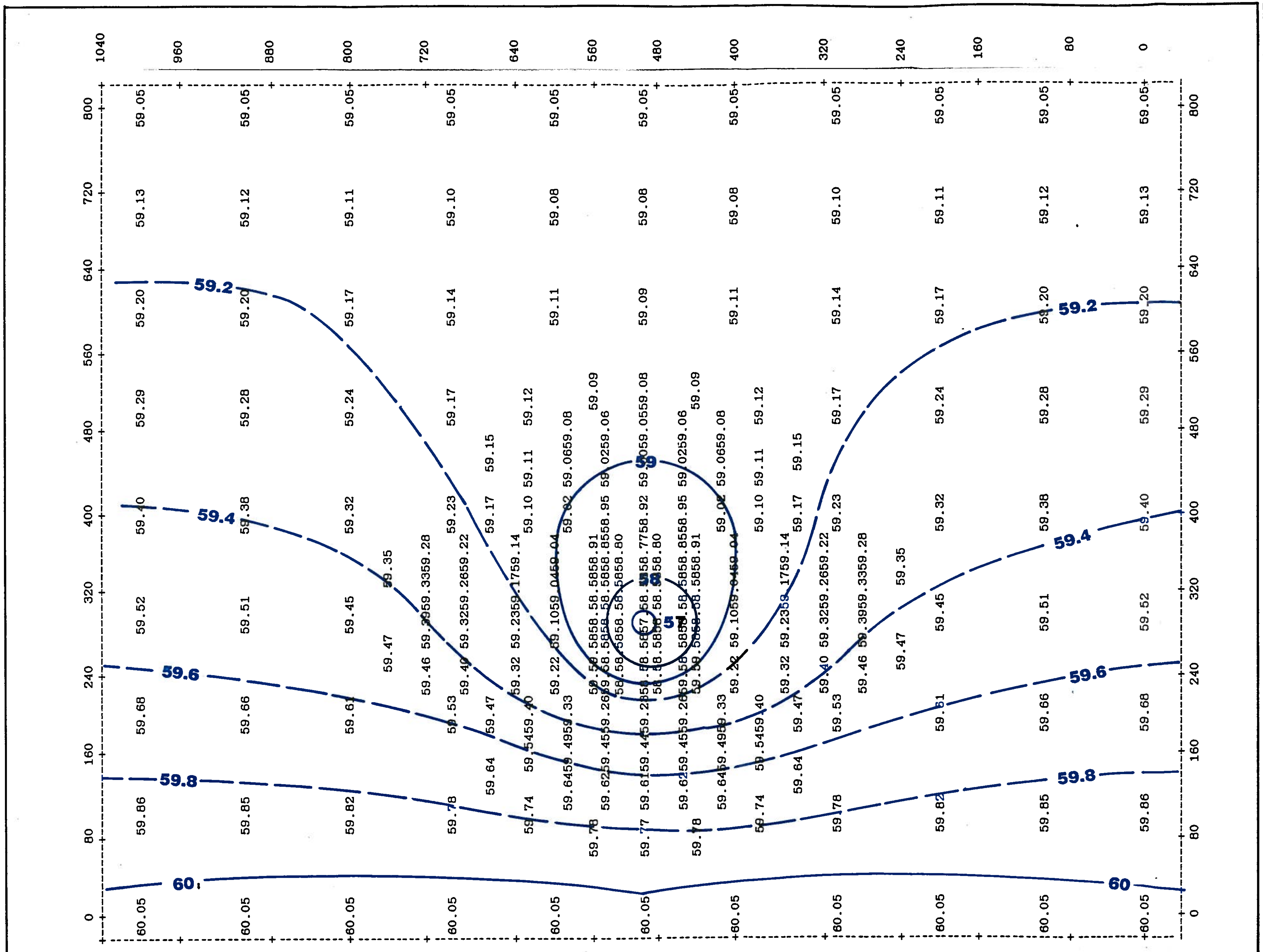
Y Coordinates Range from .00 to 1000.

Scale: 1/3000

N

CPC-Grand Rapids

July, 1988



EDI Engineering & Science

Aquifem Well Drawdown Model
Pumping Well 86-2 at 8 gpm K=15

Time = 20.00000

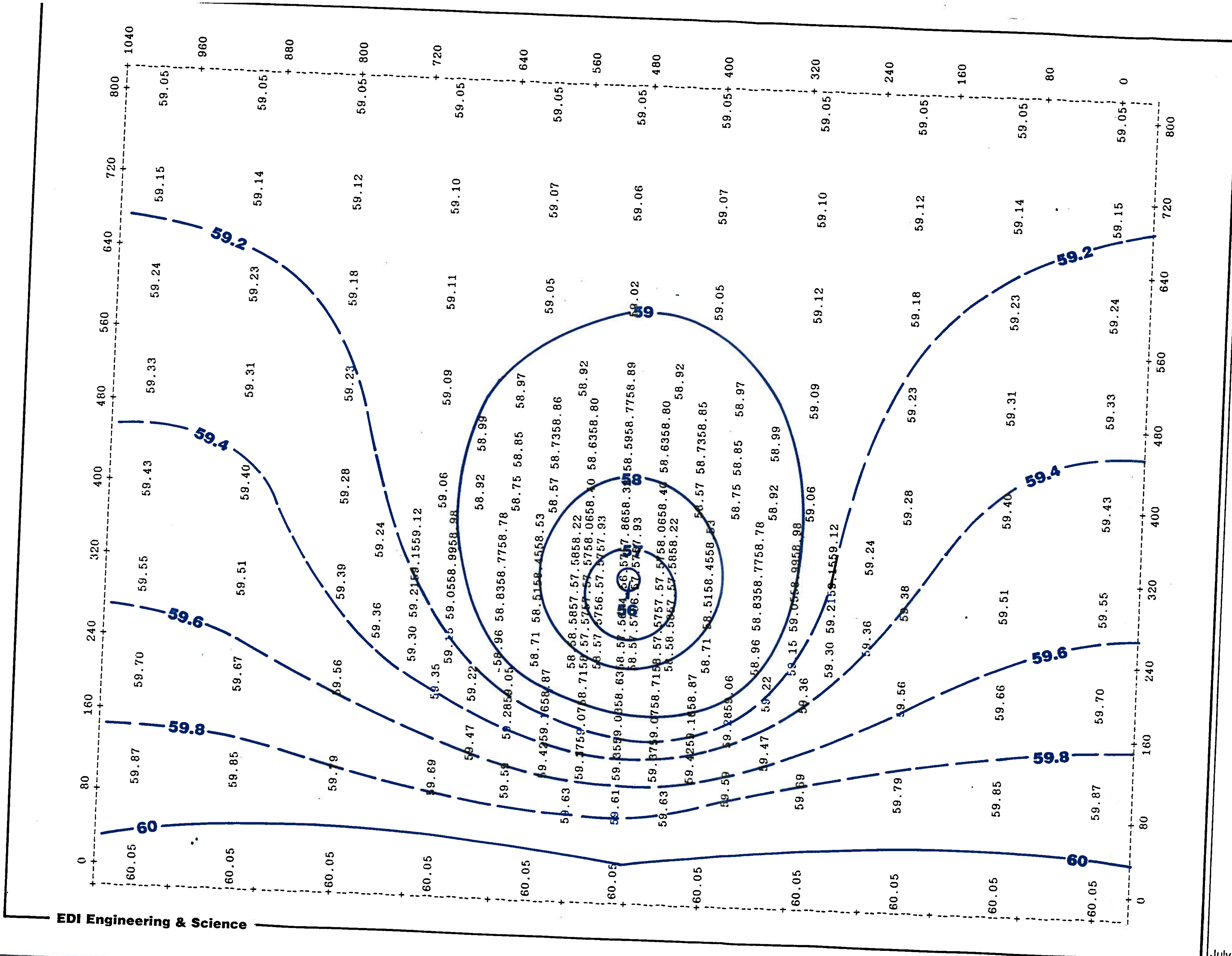
X Coordinates Range from .00 to 800.00

Y Coordinates Range from .00 to 1000.0

Scale: 1/3000

N

CPC-Grand Rapids



Aquifem Well Drawdown Mod
Pumping Well 86-2 at 8gpm K=6

Time = 20.00000

X Coordinates Range from .00 to 800

Y Coordinates Range from .00 to 100

Scale: 1/3000

N

CPC-Grand Rapids

July, 1988

2077