CLIVE FACILITY

WELL SPACING EVALUATION
CLASS A WEST EMBANKMENT

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For
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1.0 INTRODUCTION

Energy*Solutions* proposes to construct the Class A West (CAW) embankment in the northwest quarter of Section 32 at its Clive facility. The proposed CAW embankment would encompass the existing Class A and Class A North (CAN) embankments (Figure 1).

This report presents the results of a monitoring well spacing evaluation performed for the CAW embankment. A compliance monitoring well network was developed for the CAW embankment. The network includes 18 existing wells from the Class A and CAN compliance well networks and also includes 9 proposed new monitoring wells (Figure 1). The monitoring well network is designed to verify regulatory compliance with the State of Utah Ground Water Protection Levels (GWPLs) and to provide early warning of potential releases. The spacing of the new wells is consistent with the spacing of the existing wells and also meets the requirement of the Clive facility's Ground Water Quality Discharge Permit (GWQDP) for wells to be located no further than 90 feet from the edge of the waste (Part I.F.1.e).

The monitoring well network was evaluated to determine the optimum location for new monitoring wells to detect potential releases with at least 95% efficiency. The well spacing evaluation was conducted using the Monitoring Efficiency Model (MEMO) developed by Golder Associates, Inc (1992). The MEMO model generates multiple groundwater plumes emanating from a user-defined source area, and determines whether each potential plume would be detected. The efficiency of the monitoring well network is calculated by MEMO as the ratio of the number of plumes that would be detected divided by the total number of potential source releases. The objective of the modeling is to design a monitoring network that will detect at least 95% of the potential plumes before they arrive at the boundary. The modeling is performed using iodine-129 (I-129) and technetium-99 (Tc-99) as the surrogate contaminants. These radionuclides were selected because of their potential presence in CAW embankment Class A waste, their conservative transport characteristics (they are relatively mobile), and because of their long half-lives relative to the modeled time period of 500 years.

This report summarizes the model code, documents input parameters, and presents results. An optimized spacing is presented for the monitoring well network surrounding the proposed CAW embankment. Model input/output files are included in Attachment A, and well spacing model output is shown graphically in figures in Attachment B.

2.0 MODEL CODE

MEMO is a contaminant transport model that provides a simple computerized method for optimizing monitoring well locations for groundwater monitoring networks at waste management areas. MEMO was developed for the U.S. Department of Energy for evaluation and optimization of the monitoring well network at the Hanford Nuclear Weapons Site near Richland, Washington. The model incorporates the facility and source geometry, site hydrogeology, fate and transport characteristics of a specified contaminant, and initial monitoring well locations to arrive at a quantified well efficiency value.

The efficiency determination is based on whether a plume is detected by the monitoring well network before it crosses a specified buffer zone boundary. MEMO identifies areas within a potential contaminant source area where chemical releases would or would not be detected by downgradient monitoring wells. Monitoring efficiency is defined as the number of leaks detected compared to the number of non-detected leaks. For example, 90 out of 100 leaks detected at downgradient monitoring well locations would result in a monitoring efficiency of 90%.

MEMO incorporates the analytical solution developed by Domenico and Robbins (1985) and Domenico (1987) to predict the configuration of the plume as it migrates downgradient from a continuous source. The code is an analytical solution to the advection-dispersion partial-differential equation of contaminant transport processes in groundwater. The model incorporates one dimensional groundwater velocity, longitudinal and transverse dispersion, the first order degradation rates, finite contaminant source dimensions, and a steady-state source to solve for contaminant concentrations as a function of space and time. Additional information on the analytical solution used in MEMO is available in the well spacing evaluations for the Mixed Waste and CAN Embankments performed by Whetstone Associates (Whetstone Associates, 2009a and 2009b).

The use of a steady-state (continuous) source is a common approach to modeling plume detection. A continuous rather than a finite source of leachate assures that releases from leaks near the upgradient end of the waste management area do not disperse to below the detection limit (Golder Associates, 1992). As the initial concentration of contaminant in the groundwater at the source increases, the downgradient width of the plume also increases. The expansion of a given contaminant plume decreases with time, and at a critical time the plume will reach steady-state conditions and stop growing in size.

The calculation of monitoring efficiency assumes that that the probability of a release is equally likely at any given location within the source area. In reality, failure is more likely to occur in specific areas of the cell, such as the transition from the top slope to the side slope. MEMO

output includes plan view maps showing zones from which plumes would or would not be detected, so specific areas of interest can be evaluated.

3.0 INPUT PARAMETERS

Input required for the MEMO model includes site geometry, dispersion, initial contaminant concentration, time, and nature of source area.

3.1 Site Geometry and Coordinate Data

The coordinates used in the MEMO model are equivalent to the Clive site coordinates (based on a local benchmark at 10,000E, 10,000N). Model coordinates are shown in Table 10 and discussed below. The footprint of the CAW Embankment and the locations of surrounding monitoring wells (existing and proposed) are shown in Figure 1.

3.1.1 Source Area Geometry

Two potential source areas were defined for the MEMO simulations: (1) the entire footprint of the CAW embankment ($5.8x10^{+6}$ square feet [ft^2], 133 acres); and (2) the area underlying the top-slope of the embankment ($4.1x10^{+6}$ ft^2, 95 acres). MEMO simulated individual 1-foot (ft) wide point sources within the potential source areas on a 21-ft grid spacing. For the entire footprint, the 21-ft source grid spacing resulted in 13,217 individual point sources for the maximum contaminant velocities evaluated in the model. For the full top slope footprint, the 21-ft source grid spacing resulted in 9,362 individual point sources for maximum contaminant velocities. MEMO generated a plume using the Domenico analytical model at each grid point, then evaluated whether the plume was detected by the monitoring network. Each point source and resulting plume were evaluated separately, so a single model run evaluated 13,217 separate plume detections for the entire footprint source or 9,362 separate plume detections for the full top-slope source.

For the conditions of average contaminant velocity, the CAW embankment is sufficiently large that the travel time from upgradient areas of the embankment to monitoring wells is greater than the 500-year compliance period. For well spacing analysis of these conditions, the source area geometry was adjusted to remove the area of the embankment where point sources did not reach the well within 500 years. The 21-ft point source spacing was maintained; however, the number of individual point sources was less than those listed above for the entire footprint and top slope. Refer to Section 3.4 for addition information on adjustment of the source area geometry.

The selection of source area geometry is considered to be conservative because of the extremely narrow (1-ft wide) point source area. In general, a wider source area will produce a wider plume, which is more likely to be detected. Also, if failure were to occur, it would be more likely to occur at several points or along the entire interface between the top-slope and side-slope, resulting in a line source with a larger plume width that is significantly more likely to be detected.

3.1.2 Buffer Zone Geometry

The buffer zone geometry is defined by a boundary and a grid spacing along that boundary. The buffer zone boundary is defined as the limit to which a plume may extend before it should be detected by a monitoring well. Plumes that are detected at the monitoring wells before passing the buffer zone boundary are considered to have been detected. The model solves for concentration at each grid point along the buffer zone boundary, at a spacing defined by the user. A grid spacing that is too coarse could cause plumes to be missed, while a grid spacing that is too fine could cause excessive numerical computation or the model might fail to run.

In previous MEMO modeling of the Class A and lle.(2) cell at the site (Envirocare, 2000 and 2002), the buffer zone boundary was determined to be located 100 ft from the edge of the waste. As discussed in previous submittals (Envirocare, 2000 and 2002), the MEMO model allows only a single dilution contour to be calculated for each model run, while both the method detection limit (MDL) contour and Ground Water Protection Level (GWPL) contour are of interest. The MDL contour would provide the earliest indicator of a possible release from the cell, and the GWPL contour indicates the point at which the release would exceed the compliance standard. To evaluate both contour intervals simultaneously, numerical simulations were run to first determine the time for the GWPL to contact the buffer zone, then to determine how much farther the MDL contour would migrate in that time period. That migration distance (approximately 90 feet) was added to the buffer zone boundary to represent the location and time at which the MDL is detected at the buffer zone boundary and the modeled constituent meets or exceeds the GWPL at a line located 100 feet from the edge of the waste. This approach is consistent with previous MEMO modeling at the facility.

The buffer zone grid spacing was set at 40 ft for the CAW embankment. MEMO failed to run using a grid spacing finer than 40 ft in combination with the 21-ft source area grid spacing. Golder Associates (1992) recommends that the spacing of the buffer array and the spacing of the source grid be "of the same order of magnitude."

3.1.3 Monitoring Well Locations

The CAW embankment monitoring well network includes 18 existing wells from the Class A and CAN networks and also includes 9 proposed new monitoring wells (Figure 1). The locations of the monitoring wells were input into the MEMO model, using Clive site coordinates. Numerous simulations were run, using manual iteration to optimize the new well spacing and to obtain the target efficiency of 95%. As discussed in Section 1, the spacing of the new wells is generally consistent with the spacing of the existing wells while meeting requirements listed in the GWQDP. The optimized monitoring well coordinates are described in Section 4.

3.2 Contaminant Velocity

Groundwater velocity in geologic materials is controlled by hydraulic conductivity, hydraulic gradient in the vicinity of the study area, and effective porosity of the geologic material. Based on Darcy's Law, the average groundwater velocity can be calculated using the following equation:

$$v = \frac{k * i}{\theta_e}$$

Where:

K = Hydraulic conductivity [L/T]
i = Hydraulic gradient [L/L]
θ_e = Effective soil porosity

The transport of contaminants in groundwater may be retarded, or slowed, by physical processes such as sorption, filtration, or precipitation. The contaminant velocity is given by the following equation:

$$v_c = \frac{k * i}{\theta_e R_d}$$

Where:

R_d = Constituent retardation factor

Note that when the retardation factor (R_d) equals one, the preceding equation describes the aquifer velocity. In this case, the contaminant is unretarded and travels at the rate of groundwater flow.

The hydrogeologic data used in determining hydraulic conductivity, gradient, effective porosity, and retardation are described in Section 3.2.1 through 3.2.4. The calculation of contaminant velocity is given in Section 3.2.5.

3.2.1 Hydraulic Conductivity

The hydraulic conductivity used in the model was derived from 83 slug tests conducted in 39 wells surrounding the CAW embankment (Table 1). The wells are completed in the Unit 2 Clay.

The geometric mean hydraulic conductivity of the 39 wells is 1.09×10^{-3} centimeters per second (cm/sec) (3.10 ft/day), while the arithmetic average is 1.57×10^{-3} cm/sec (4.46 ft/day).

As shown in Table 2, the upper 90% confidence level of the mean results in hydraulic conductivity values of 1.42×10^{-3} cm/sec (4.02 ft/day) and 1.93xl0^{-3} cm/sec (5.48 ft/day) for the geometric mean and arithmetic mean, respectively.

3.2.2 Hydraulic Gradient and Direction

Using monthly groundwater elevation data from November 2009 to November 2010, the hydraulic gradient below the Class A and CAN embankments averaged 5.51×10^{-4} and 5.63×10^{-4} ft/ft, respectively, based on freshwater heads (Table 3). The maximum allowable gradient below the Class A and CAN embankments is 1.00×10^{-3}, as specified in the GWQDP. Both the average and GWQDP maximum gradients were used in the well spacing evaluation for the CAW embankment.

The principal direction of groundwater flow in the shallow aquifer below the proposed CAW embankment is approximately N40°E. This groundwater flow direction has been used in recent well spacing analyses for both the CAN and Mixed Waste (MW) embankments (Whetstone Associates, 2009a and 2009b). Although the MEMO model allows for changes in flow directions by defining multiple gradient zones within the model domain, the hydraulic gradient and flow direction are relatively uniform below the CAW embankment and were entered into the MEMO model as a single gradient zone. In addition to the base case (N40°E) gradient zone, sensitivity analyses were conducted using flow directions of due north (N0°E) and due east (N90°E).

3.2. Aquifer Porosity

The effective porosity value of 0.29 has been used in previous modeling exercises and is regarded by Utah DEQ as a representative value.

3.2.4 Retardation Factor (R)

The retardation factor is constituent-specific, and can be calculated from the sorption coefficient (K_d) according to the following equation:

$$R_d = 1 + \frac{\rho K_d}{\theta_e}$$

Where:

Rd = Retardation factor
ρ = Soil density (kilograms per cubic meter [kg/m3])
K_d = Soil-water distribution coefficient (liters per kilogram [L/kg])
θ_e = Effective soil porosity

The bulk density of the aquifer materials below the CAW embankment is 1,600 kg/m3. Because the MEMO model evaluation addresses only the saturated zone, the bulk density of 1,600 kg/m3 is applicable. This bulk density value was used in the well spacing analyses for the CAN and MW embankments (Whetstone Associates, 2009a and 2009b).

The K_d values for I-129 (0.12 L/kg) and Tc-99 (0.11 L/kg) are very low, indicating that these nuclides are relatively mobile. These radionuclides and K_d values were used in the well spacing analyses for the CAN and MW embankments (Whetstone Associates, 2009a and 2009b). When K_d values approach zero, the resulting retardation factor approaches 1.0 indicating conservative (non-retarded) transport in groundwater. The calculated retardation factors are shown in Table 4.

3.2.5 Contaminant Velocity Calculation

Contaminant velocities were calculated using the hydraulic conductivity, hydraulic gradient, porosity, and retardation coefficients described above. The calculated velocities are shown in Table 5.

The most conservative well spacing analysis uses contaminant velocities based on the maximum allowable hydraulic gradient and 90% confidence interval above the measured arithmetic mean hydraulic conductivity, and results in transport velocities of 0.0114 ft/day for I-129 and 0.0118 ft/day for Tc-99 (Table 5). More representative contaminant velocities are based on the average of the measured hydraulic gradient and the measured geometric mean hydraulic conductivity, which results in transport velocities of 0.00362 ft/day for I-129 and 0.00375 ft/day for Tc-99. A higher transport velocity results in less lateral spreading of the plume and a closer optimum well spacing. Well spacing analyses are performed using the most conservative higher transport velocities and the more representative average velocities.

3.3 Source Term

3.3.1 Width of Line Source

The width of the line source depends on the type of leak and on the amount of lateral spreading in the vadose zone prior to the arrival of the compound at the water table. A longer line source would result in a greater probability of plume detection. The default width of a line source in the

MEMO model is 20 ft. In the simulations of the CAW embankment, the line source width was set at 1 ft. The release width of 1 ft is considered to be very conservative because any release from the bottom liner will tend to disperse laterally as it migrates vertically through the vadose zone to the water table.

3.3.2 Dispersivity

Dispersion is the physical process of groundwater mixing at the plume boundaries, causing the periphery of the plume to be reduced in concentration. The Domenico solution in the MEMO model uses longitudinal (α_x) and transverse (α_y) dispersivities to describe the mechanical spreading and mixing caused by dispersion. Dispersivity of the aquifer is one of the primary parameters that control the fate and transport of contaminants. Dispersivity is scale-dependent, with longer flow paths resulting in higher dispersivity. Gelhar et al. (1992) produced the seminal work on aquifer dispersivity to date and determined that longitudinal dispersivity is typically 10% of the longitudinal flow distance ($\alpha_x = 0.1X$), while transverse dispersivity is typically 10% of longitudinal dispersivity ($\alpha_y = 0.1\alpha_x$).

For the MEMO well-spacing model of the CAW embankment, the longitudinal dispersivity (α_x) was set at 129.1 ft, which is one tenth the average distance from the center of the top slope to the line of compliance wells. The average distance is calculated as the average of: 1) the distance from the center of the top slope to the east line of compliance wells, and 2) the distance from the center of the top slope to the north line of compliance wells. Transverse dispersivity (α_y) was set at 10% of longitudinal dispersivity, or 12.9 ft, as shown in Table 6.

3.3.3 Diffusion Coefficient

Diffusion is an important mechanism for the transport of solutes through the saturated zone, in the absence of significant advective flux (Saripalli et al., 2002). Molecular diffusion is mixing caused by random molecular motion due to the thermal kinetic energy of the solute in groundwater. Diffusion coefficients of salts and gasses in groundwater typically range from about $4x10^{-6}$ to $lxl0^{-4}$ square centimeters per second (cm^2/sec) (Lerman, 1971; Figure 10.8 in Domenico and Schwartz, 1990). The diffusion coefficients for I-129 and Tc-99 are shown in Table 7. These values were also used in the well spacing analyses performed for the CAN and MW embankments. Derivation of the diffusion coefficients is documented in the reports for the CAN and MW well spacing analyses (Whetstone Associates, 2009a and 2009b).

3.3.4 First Order Decay Constant

Radioactive material decays according to first order kinetics. The decay constants used in the MEMO modeling for the CAW embankment are consistent with the decay constants calculated for I-129 and Tc-99 in the previous CAN and MW well spacing analyses (Whetstone Associates,

2009a and 2009b). Based on isotope half lives of $1.57x10^{+7}$ and $2.12x10^{+5}$ years for 1-129 and Tc-99, respectively, the calculated first order decay constants were $1.21x10^{-10}$ and $8.99x10^{-9}$ per day, as shown in Table 7.

3.3.5 Dilution Contour Values

The dilution concentration contour is defined as the ratio of the detection limit concentration to the source concentration. The detection limits for I-129 and Tc-99 are 5 and 10 picoCuries per liter (pCi/L), respectively, based on typical minimum detectable activities (MDAs) reported for Clive groundwater samples by the analytical laboratory performing radiological analysis.

The source concentrations for I-129 and Tc-99 shown in Table 8 are the time-weighted average concentrations at the water table presented in the Class A Combined Disposal Cell Infiltration and Transport Modeling Report (Whetstone Associates, 2006). Modeling indicated that concentrations of I-129 and Tc-99 at the water table below the top slope area would be zero for the first 95 – 105 years and would exceed GWPLs at the water table 215 years following cell closure, based on environmentally conservative modeling assumptions. Modeled concentrations of I-129 and Tc-99 would peak at the water table at 588 and 555 years, respectively, after closure.

Based on MDAs and modeled time-weighted average concentrations, the dilution concentration contour values used in the CAW well spacing analysis are $1.38x10^{-6}$ for I-129 and $1.00x10^{-6}$ for Tc-99. The calculated dilution contour value for Tc-99 is $7.32x10^{-8}$ (Table 8), which is less than the lowest dilution concentration contour ($1.00x10^{-6}$) allowed in the MEMO model. Therefore, $1.00x10^{-6}$ was used as the dilution concentration contour value for Tc-99.

3.4 Advection Time

To select the appropriate advection time input parameter, it is important to understand the MEMO model solution methods. The MEMO model provides two solution options: (1) buffer zone with advection time limit and (2) advection time only. The "buffer zone with advection time limit" solution method is the model default, in which detections are based on the migration of each plume to a specified limiting distance (the buffer zone boundary). The solution is performed as follows:

- The model first generates a source grid within the specified source areas, using the user-defined source grid spacing (21 feet, Section 3.1.1).
- The buffer zone boundary (defined as the limit to which a plume may extend before it should be detected by a monitoring well) is broken into an array of buffer points using the user-defined buffer zone spacing (40 feet, Section 3.1.2).

- For each point in the source grid, a critical time (t_c) is calculated when the plume dilution contour first crosses the buffer zone boundary (i.e., the concentration at a buffer zone point exceeds the specified dilution concentration). Each buffer zone point is checked for each plume, to ensure the minimum time is calculated.
- The concentration at each monitoring well is calculated at time t_c. If the concentration at any monitoring well meets or exceeds the specified concentration, then the leak has been successfully detected. Conversely, if the concentration at all monitoring wells is below the specified concentration at time t_c, then the plume is assumed to be "non-detect" and the area surrounding that point on the source grid is identified as a non-detect area.
- The process is repeated for all points in the source grid.

The dilution contour for plumes in the farthest upgradient portion of the source area may not reach the buffer zone boundary, in cases where (1) the plume migrates very slowly or (2) the constituent decays rapidly relative to the plume travel time. Plumes that do not reach the buffer zone boundary are considered to be not detected by the model, and are not differentiated from "non-detect' source areas where the constituent arrives at the buffer zone boundary but is not detected by the monitoring well network.

Figure 2 shows an example of non-detect zones for the CAW embankment resulting from the first case described above. Two options exist to correct for the plumes that never arrive: (1) modify the source area to exclude the farthest upgradient areas or (2) increase the advection time to allow sufficient time for all plumes to reach the buffer zone boundary. Note that if the constituent being modeled has a short half-life, or if the constituent is diluted such that it never arrives at the buffer zone, only the first option will work. In that case, the source geometry is modified to exclude the farthest upgradient areas from (which source plumes would not arrive at the buffer zone boundary). Note that by excluding these areas from the source, no credit is taken for these areas in the monitoring efficiency calculation. That is, the calculation is based on the remaining (reduced) number of source grid points, so that non-detects from the remaining source points carry more weight.

For the CAW modeling, I-129 and Tc-99 have long half lives and would arrive at the buffer zone boundary from anywhere within the source area given a sufficiently long advective transport time. However, the Utah Division of Water Quality performance-based groundwater standard for radiological constituents in Clive facility compliance wells is 500 years. Therefore, the transport time was set to 500 years (182,500 days), and the first option listed above, modification of the source area, was selected to perform sensitivity analysis modeling in cases where the embankment footprint or top slope source area initially included non-detect zones (runs using average contaminant velocities).

4.0 WELL SPACING ANALYSIS RESULTS

The MEMO model was run to optimize the CAW well spacing, as described in the following sections. Sensitivity analyses were performed using a range of contaminant transport velocities and groundwater flow directions of due north and due east. The efficiency results of all CAW well spacing runs are summarized in Table 9.

4.1 Optimized Well Network

Figure 1 presents the final optimized well spacing for the CAW embankment. The network consists of 18 existing Class A and CAN wells and 9 new wells as listed in Table 10. The spacing and location of the new wells are based on the following criteria: 1) meet the 95% detection efficiency, 2) each well located no further than 90 feet off the edge of the waste, 3) retain the existing spacing to the extent possible, and 4) not interfere with the location of existing facilities and features (e.g., Northwest Corner Pond).

The well spacing was optimized by running the MEMO model numerous times to determine the monitoring well network that produced an efficiency of 95% or greater and that also met the other criteria listed above. The CAW embankment can be efficiently monitored with well network shown on Figure 1. The optimal distance between the nine new wells to be added to the network is 388.0 feet along the east edge of the embankment and 350.0 feet along the north edge of the embankment. The optimized locations of monitoring wells are listed in Table 10. Note that well GW-142 is located 365.0 feet west of GW-143. The additional 15 feet was necessary to keep GW-142 off the Northwest Corner Pond berm. This change was included in the well spacing analysis.

The MEMO model output for the entire CAW footprint is shown graphically in Figures 3 and 4 for I-129 (CAWI129a) and Tc-99 (CAWTc99a), respectively. The MEMO model output for the top slope source area is shown graphically in Figures 5 and 6 (CAWI129d and CAWTc99d, respectively). These results are for simulation of monitoring under the base case conditions of a N40°E (50 degrees in model) groundwater flow direction and highest calculated contaminant velocities. Detection efficiencies ranging from 96.2 to 99.9% met the 95% efficiency criterion (Table 9).

4.2 Sensitivity Analysis

A sensitivity analysis was conducted to evaluate the effects of uncertainty in groundwater flow direction and contaminant transport velocity on the CAW well spacing. The MEMO model was run using groundwater flow directions of N0°E (due north, 90 degrees in model) and N90°E (due east, 0 degrees in model). For all three modeled flow directions, well spacing was evaluated for both a conservative high contaminant velocity and an average velocity condition. For each well

spacing evaluation performed using the average contaminant velocity, MEMO was run twice – first for the entire CAW embankment footprint or top slope source area, and second, with up-gradient non-detection zones removed from the source area. As discussed in Section 3.4, these zones are removed because contaminant transport time from source to buffer zone boundary exceeds 500 years.

Table 9 lists the detection efficiencies of the sensitivity analysis simulations. All efficiencies are greater than 95%, indicating that the CAW monitoring well network will meet the 95% criterion if the groundwater flow direction deviates from N40°E or if contaminant transport velocities are slower (more representative, less conservative) than base-case highest calculated velocities. The results of the sensitivity analysis are shown graphically in Attachment B figures.

5.0 CONCLUSIONS

A monitoring well network consisting of 18 existing Class A and CAN wells and 9 new wells will provide leak detection with greater than 95% efficiency for the proposed CAW embankment. The new wells (GW-142 to GW-150) will be located on the east and north sides of the embankment (Figure 1). The optimal distance between new wells is 388.0 feet along the east edge of the embankment and 350.0 feet along the north edge. The location of well GW-142 was adjusted an additional 15 feet west (total distance of 365.0 feet from GW-143) prior to the spacing analysis. This will keep GW-142 off the Northwest Corner Pond berm.

The optimized well spacing will be protective of human health and the environment and will meet the GWQDP requirements for compliance monitoring wells. This optimal well spacing results in monitoring well network efficiencies of 96.3% for I-129 from the entire footprint, 96.2% for Tc-99 from the entire footprint, 99.9% for I-129 from the top slope source area, and 99.8% for Tc-99 from the top slope source area. A sensitivity analysis demonstrates that monitoring efficiencies will remain greater than 95% if the groundwater flow direction varies from that used in the base-case model or if contaminant transport velocities are slower than the conservatively high velocities used in the base case.

The nine new wells in the optimized well spacing will replace existing monitoring wells along the north and east sides of the CAN embankment. Deep aquifer monitoring well GW-139D will require abandonment to construct the CAW embankment, and therefore, Energy*Solutions* proposes to install deep aquifer monitoring well GW-148D, shown on Figure 1, as its replacement.

6.0 REFERENCES

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TABLES

Table 1. Hydraulic Conductivity Data from Slug Testing

Well	Cell	Total Depth (ft bgs)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)	Average Well Hydraulic Conductivity (cm/sec)
GW-25	11.e(2)	33.5	2.316	8.17E-04	1.05E-03
			3.326	1.17E-03	
			3.568	1.26E-03	
			2.557	9.02E-04	
			3.154	1.11E-03	
GW-26	11.e(2)	29.5	0.95	3.35E-04	3.31E-04
			0.92	3.26E-04	
GW-27	11.e(2)	29.5	0.125	4.42E-05	3.49E-05
			0.074	2.60E-05	
			0.098	3.44E-05	
GW-81	Class A	34.0	1.49	5.26E-04	5.23E-04
			1.47	5.19E-04	
GW-82	Class A	34.0	1.82	6.42E-04	5.77E-04
			1.45	5.12E-04	
GW-83	Class A	34.0	8.54	3.01E-03	3.05E-03
			8.76	3.09E-03	
GW-84	Class A	34.0	10.95	3.86E-03	3.75E-03
			10.3	3.63E-03	
GW-85	Class A	34.0	11.14	3.93E-03	3.94E-03
			11.18	3.94E-03	
GW-86	Class A	34.0	4.8	1.69E-03	1.65E-03
			4.57	1.61E-03	
GW-88	Class A	38.4	2.66	9.38E-04	9.84E-04
			2.92	1.03E-03	
GW-89	Class A	34.0	1.67	5.89E-04	6.26E-04
			1.88	6.63E-04	
GW-90	Class A	34.0	8.86	3.13E-03	2.94E-03
			7.78	2.74E-03	
GW-91	Class A	34.0	5.73	2.02E-03	1.98E-03
			5.48	1.93E-03	
GW-92	Class A	34.0	2.45	8.64E-04	8.68E-04
			2.47	8.71E-04	
GW-93	Class A	34.0	17.04	6.01E-03	5.96E-03
			16.72	5.90E-03	
GW-94	Class A	34.0	12.73	4.49E-03	4.67E-03
			13.71	4.84E-03	

Table 1. Hydraulic Conductivity Data from Slug Testing

Well	Cell	Total Depth (ft bgs)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)	Average Well Hydraulic Conductivity (cm/sec)
GW-95	Class A	29.0	1.04	3.67E-04	3.62E-04
			1.01	3.56E-04	
GW-99	Class A	29.0	0.85	3.00E-04	2.95E-04
			0.82	2.89E-04	
GW-100	Class A	29.0	1.78	6.28E-04	6.44E-04
			1.87	6.60E-04	
GW-101	Class A	34.0	2.36	8.33E-04	7.54E-04
			1.91	6.74E-04	
GW-102	Class A	34.0	2.37	8.36E-04	8.52E-04
			2.46	8.68E-04	
GW-106	CAN	38.5	1.75	6.19E-04	6.07E-04
			1.68	5.94E-04	
GW-107	CAN	38.8	1.41	4.96E-04	5.21E-04
			1.54	5.45E-04	
GW-108	CAN	39.0	1.82	6.41E-04	6.27E-04
			1.74	6.13E-04	
GW-109	CAN	38.5	1.84	6.50E-04	6.27E-04
			1.71	6.04E-04	
GW-110	CAN	38.5	2.27	8.00E-04	7.71E-04
			2.1	7.41E-04	
GW-111	CAN	38.5	5.39	1.90E-03	1.73E-03
			4.39	1.55E-03	
GW-112	CAN	38.5	5.95	2.10E-03	2.20E-03
			6.49	2.29E-03	
GW-113	CAN	38.5	3.12	1.10E-03	1.03E-03
			2.69	9.50E-04	
GW-114	CAN	38.5	3.03	1.07E-03	1.13E-03
			3.37	1.19E-03	
GW-115	CAN	38.5	3.94	1.39E-03	1.42E-03
			4.11	1.45E-03	
GW-116	CAN	38.5	6.72	2.37E-03	2.43E-03
			7.06	2.49E-03	
GW-117	CAN	38.5	5.75	2.03E-03	2.13E-03
			6.32	2.23E-03	
GW-125	CAN	38.0	8.67	3.06E-03	3.17E-03
			9.608	3.39E-03	
			8.689	3.07E-03	

Table 1. Hydraulic Conductivity Data from Slug Testing

Well	Cell	Total Depth (ft bgs)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)	Average Well Hydraulic Conductivity (cm/sec)
GW-137	CAN	35.5	4.82	1.70E-03	2.06E-03
			6.86	2.42E-03	
GW-138	CAN	39.0	6.49	2.29E-03	2.25E-03
			6.26	2.21E-03	
GW-139	CAN	38.7	3.97	1.40E-03	1.41E-03
			4.01	1.41E-03	
GW-140	CAN	39.4	2.29	8.08E-04	8.08E-04
			2.29	8.08E-04	
GW-141	CAN	35.5	1.81	6.39E-04	6.44E-04
			1.84	6.49E-04	
				Arithmetic Mean K (cm/s)	1.57E-03
				Mean +90% Confidence Level	1.93E-03
				Geometric Mean K (cm/s)	1.09E-03
				Geometric Mean +90% Confidence Level	1.42E-03

Table 2. Descriptive Statistics for Hydraulic Conductivity Test Results

Summary Stats (cm/sec)		Summary Stats log(cm/sec)	
Mean	1.57E-03	Mean	-2.961
Standard Error	2.14E-04	Standard Error	0.066
Median	1.03E-03	Median	-2.989
Mode	6.27E-04	Mode	-3.203
Standard Deviation	1.33E-03	Standard Deviation	0.415
Sample Variance	1.78E-06	Sample Variance	0.172
Kurtosis	2.12E+00	Kurtosis	3.077
Skewness	1.49E+00	Skewness	-0.993
Range	5.92E-03	Range	2.232
Minimum	3.49E-05	Minimum	-4.458
Maximum	5.96E-03	Maximum	-2.225
Sum	6.14E-02	Sum	-115.468
Count	39	Count	39
Confidence Level (90.0%)	3.60E-04	Confidence Level (90.0%)	0.112
Mean + 90% CI	1.93E-03		
GeoMean +90% CI	1.42E-03		

Table 3. Horizontal Hydraulic Gradient

Date	Class A	Class A North
Nov-09	6.08E-04	5.80E-04
Dec-09	5.45E-04	5.25E-04
Jan-10	5.52E-04	5.37E-04
Feb-10	5.73E-04	5.43E-04
Mar-10	5.81E-04	5.25E-04
Apr-10	5.81E-04	5.58E-04
May-10	5.19E-04	5.62E-04
Jun-10	5.45E-04	5.48E-04
Jul-10	5.55E-04	5.68E-04
Aug-10	5.32E-04	5.67E-04
Sep-10	5.34E-04	5.87E-04
Oct-10	5.23E-04	5.95E-04
Nov-10	5.20E-04	6.23E-04
Average	5.51E-04	5.63E-04
GWQDP Limit	1.00E-03	1.00E-03

Groundwater Quality Discharge Permit (GWQDP) limit from Part 1.H.2(d).

Table 4. Calculated Retardation Factors

Constituent	K_d (L/kg)	ρ (kg/m^3)	θ_e	R_d
I-129	0.12	1,600	0.29	1.662
Tc-99	0.11	1,600	0.29	1.607

Table 5. Calculated Contaminant Velocities

Constituent	Effective Porosity θ_e	Hydraulic Gradient i (ft/ft)		Hydraulic Conductivity k (ft/day)		Retardation Factor R_d	Seepage Velocity v (ft/day)	Contaminant Velocity v_c (ft/day)
I-129	0.29	Permit Maximum	1.00E-03	Arithmetric mean +90% CI	5.48	1.662	1.89E-02	1.14E-02
I-129	0.29	Permit Maximum	1.00E-03	Geometric mean +90% CI	4.02	1.662	1.39E-02	8.33E-03
I-129	0.29	Permit Maximum	1.00E-03	Geometric mean	3.10	1.662	1.07E-02	6.44E-03
I-129	0.29	Average	5.63E-04	Arithmetric mean +90% CI	5.48	1.662	1.06E-02	6.40E-03
I-129	0.29	Average	5.63E-04	Geometric mean +90% CI	4.02	1.662	7.79E-03	4.69E-03
I-129	0.29	Average	5.63E-04	Geometric mean	3.10	1.662	6.02E-03	3.62E-03
Tc-99	0.29	Permit Maximum	1.00E-03	Arithmetric mean +90% CI	5.48	1.607	1.89E-02	1.18E-02
Tc-99	0.29	Permit Maximum	1.00E-03	Geometric mean +90% CI	4.02	1.607	1.39E-02	8.62E-03
Tc-99	0.29	Permit Maximum	1.00E-03	Geometric mean	3.10	1.607	1.07E-02	6.66E-03
Tc-99	0.29	Average	5.63E-04	Arithmetric mean +90% CI	5.48	1.607	1.06E-02	6.62E-03
Tc-99	0.29	Average	5.63E-04	Geometric mean +90% CI	4.02	1.607	7.79E-03	4.85E-03
Tc-99	0.29	Average	5.63E-04	Geometric mean	3.10	1.607	6.02E-03	3.75E-03

CI = Confidence interval

Table 6. Dispersivity Values

Longitudinal Transport Distance x (ft)	Longitudinal Dispersivity α_x (ft)	Transverse Dispersivity α_y (ft)
1,291	129.1	12.9

Table 7. Diffusion Coefficients, Half-Lives, and Decay Constants

Constituent	Effective Diffusion Coefficient (ft^2/day)	Half Life $t_{1/2}$ (years)	Decay Constant λ (/day)	Half Live Data Source
I-129	1.19E-03	1.57E+07	1.21E-10	Chart of the Nuclides Knolls Atomic Power Laboratory Naval Reactors, DOE, Rev. 1996
Tc-99	9.03E-04	2.11E+05	8.99E-09	National Nuclear Data Center, Brookhaven National Laboratory, August 1996

Table 8. Source Concentrations and Derivation of Dilution Contours

	I-129	Tc-99
Time-weighted average concentration (C_o, pC/L)	3.63E+06	1.37E+08
Minimum Detectable Activity (MDA, pCi/L)	5	10
Dilution Contour (MDA/C_o)	1.38E-06	7.32E-08[a]

[a] 1.00E-06 is lowest dilution contoured allowed by MEMO model, so it was used as the Tc-99 dilution contour.

Table 9. Summary of Monitoring Efficiency Modeling for the Class A West Embankment

Model Run	Constituent	Type	Source Area	Flow Direction	Contaminant Velocity (ft/day)	Upgradient Non-Arrival Zones[a]	Undetected Leaks	Monitoring Efficiency (%)
CAWI129a	I-129	Base Case	Footprint	N40°E	1.14E-02	None	485 / 13217	96.3
CAWI129b	I-129	Sensitivity	Footprint	N40°E	3.62E-03	Included	2732 / 13217	79.3
CAWI129c	I-129	Sensitivity	Footprint	N40°E	3.62E-03	Excluded	502 / 10922	95.4
CAWI129d	I-129	Base Case	Top Slope	N40°E	1.14E-02	None	14 / 9362	99.9
CAWI129e	I-129	Sensitivity	Top Slope	N40°E	3.62E-03	Included	1449 / 9362	84.5
CAWI129f	I-129	Sensitivity	Top Slope	N40°E	3.62E-03	Excluded	20 / 7878	99.7
CAWI129g	I-129	Sensitivity	Footprint	N90°E	1.14E-02	None	183 / 13217	98.6
CAWI129h	I-129	Sensitivity	Footprint	N90°E	3.62E-03	Included	1623 / 13217	87.7
CAWI129i	I-129	Sensitivity	Footprint	N90°E	3.62E-03	Excluded	191 / 11717	98.4
CAWI129j	I-129	Sensitivity	Footprint	N0°E	1.14E-02	None	190 / 13217	98.6
CAWI129k	I-129	Sensitivity	Footprint	N0°E	3.62E-03	Included	2300 / 13217	82.6
CAWI129L	I-129	Sensitivity	Footprint	N0°E	3.62E-03	Excluded	203 / 11012	98.2
CAWI129m	I-129	Sensitivity	Top Slope	N90°E	1.14E-02	None	0 / 9362	100.0
CAWI129n	I-129	Sensitivity	Top Slope	N90°E	3.62E-03	Included	748 / 9362	92.0
CAWI129o	I-129	Sensitivity	Top Slope	N90°E	3.62E-03	Excluded	5 / 8551	99.9
CAWI129p	I-129	Sensitivity	Top Slope	N0°E	1.14E-02	None	0 / 9362	100.0
CAWI129q	I-129	Sensitivity	Top Slope	N0°E	3.62E-03	Included	1502 / 9362	84.0
CAWI129r	I-129	Sensitivity	Top Slope	N0°E	3.62E-03	Excluded	0 / 7757	100.0
CAWTc99a	Tc-99	Base Case	Footprint	N40°E	1.18E-02	None	500 / 13217	96.2
CAWTc99b	Tc-99	Sensitivity	Footprint	N40°E	3.75E-03	Included	2449 / 13217	81.5
CAWTc99c	Tc-99	Sensitivity	Footprint	N40°E	3.75E-03	Excluded	505 / 11201	95.5
CAWTc99d	Tc-99	Base Case	Top Slope	N40°E	1.18E-02	None	18 / 9362	99.8
CAWTc99e	Tc-99	Sensitivity	Top Slope	N40°E	3.75E-03	Included	1223 / 9362	86.9
CAWTc99f	Tc-99	Sensitivity	Top Slope	N40°E	3.75E-03	Excluded	21 / 8133	99.7
CAWTc99g	Tc-99	Sensitivity	Footprint	N90°E	1.18E-02	None	195 / 13217	98.5
CAWTc99h	Tc-99	Sensitivity	Footprint	N90°E	3.75E-03	Included	1298 / 13217	90.2
CAWTc99i	Tc-99	Sensitivity	Footprint	N90°E	3.75E-03	Excluded	204 / 12041	98.3
CAWTc99j	Tc-99	Sensitivity	Footprint	N0°E	1.18E-02	None	214 / 13217	98.4
CAWTc99k	Tc-99	Sensitivity	Footprint	N0°E	3.75E-03	Included	2014 / 13217	84.8
CAWTc99L	Tc-99	Sensitivity	Footprint	N0°E	3.75E-03	Excluded	236 / 11377	97.9
CAWTc99m	Tc-99	Sensitivity	Top Slope	N90°E	1.18E-02	None	0 / 9362	100.0
CAWTc99n	Tc-99	Sensitivity	Top Slope	N90°E	3.75E-03	Included	427 / 9362	95.4
CAWTc99o	Tc-99	Sensitivity	Top Slope	N90°E	3.75E-03	Excluded	0 / 8810	100.0
CAWTc99p	Tc-99	Sensitivity	Top Slope	N0°E	1.18E-02	None	0 / 9362	100.0
CAWTc99q	Tc-99	Sensitivity	Top Slope	N0°E	3.75E-03	Included	1211 / 9362	87.1
CAWTc99r	Tc-99	Sensitivity	Top Slope	N0°E	3.75E-03	Excluded	7 / 8103	99.9

[a] Refer to discussion in Sections 3.4 and 4.2.

Table 10. Optimized Monitoring Well Network for the Class A West Embankment

Well	Model Well Designation[a]	Clive Coordinates	
		Northing (feet)	Easting (feet)
Existing Wells:			
GW-88	10	13,695.79	12,709.21
GW-89	11	13,302.32	12,703.06
GW-90	12	12,910.76	12,697.17
GW-91	13	12,516.05	12,690.76
GW-92	14	12,117.04	12,683.66
GW-25	15	12,137.43	11,817.42
GW-26	16	12,150.89	11,078.35
GW-27	17	12,171.23	10,243.49
GW-93	18	12,127.21	12,295.96
GW-94	19	12,143.73	11,496.85
GW-95	20	12,159.57	10,666.92
GW-99	21	12,565.38	10,250.19
GW-100	22	12,958.43	10,259.09
GW-101	23	13,351.91	10,267.65
GW-102	24	13,746.02	10,276.70
GW-106	25	14,061.30	10,292.39
GW-107	26	14,454.18	10,303.03
GW-108	27	14,800.39	10,312.87
New Wells:			
GW-142	1	14,902.99	10,613.15
GW-143	2	14,895.54	10,978.15
GW-144	3	14,888.39	11,328.15
GW-145	4	14,881.24	11,678.15
GW-146	5	14,874.09	12,028.15
GW-147	6	14,866.94	12,378.15
GW-148	7	14,859.79	12,728.15
GW-149	8	14,471.79	12,721.91
GW-150	9	14,083.79	12,715.67

[a] Well designation used in MEMO model runs, Attachments A and B.

FIGURES

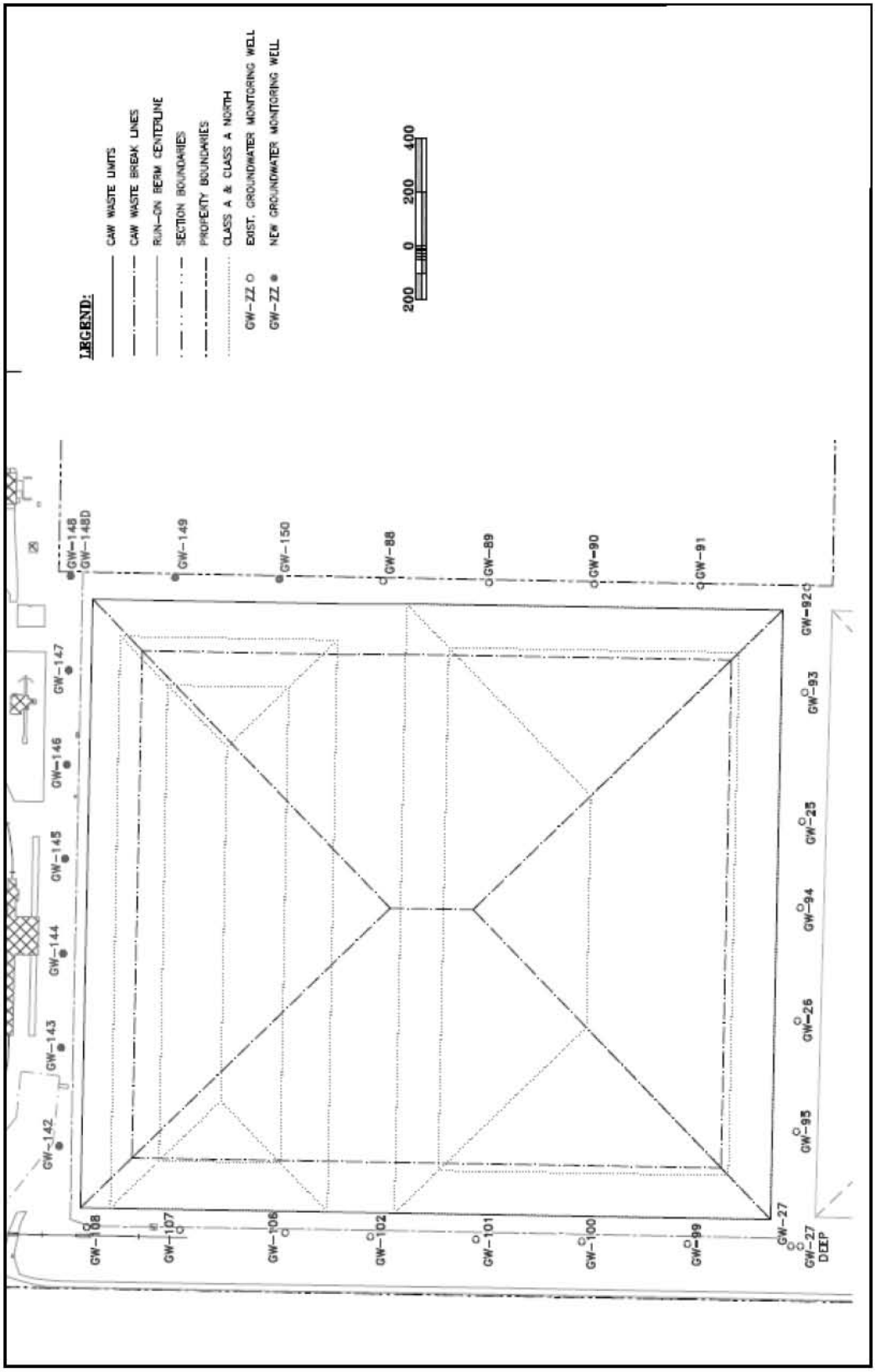


Figure 1. Class A West (CAW) Embankment Optimized Monitoring Well Network with Efficiency Exceeding 95%

Figure 2. Model Results Showing Upgradient Non-Arrival Zone, Model Run CAWI129b, Average Contaminant Velocity, Entire Footprint Source, N40°E Hydraulic Gradient

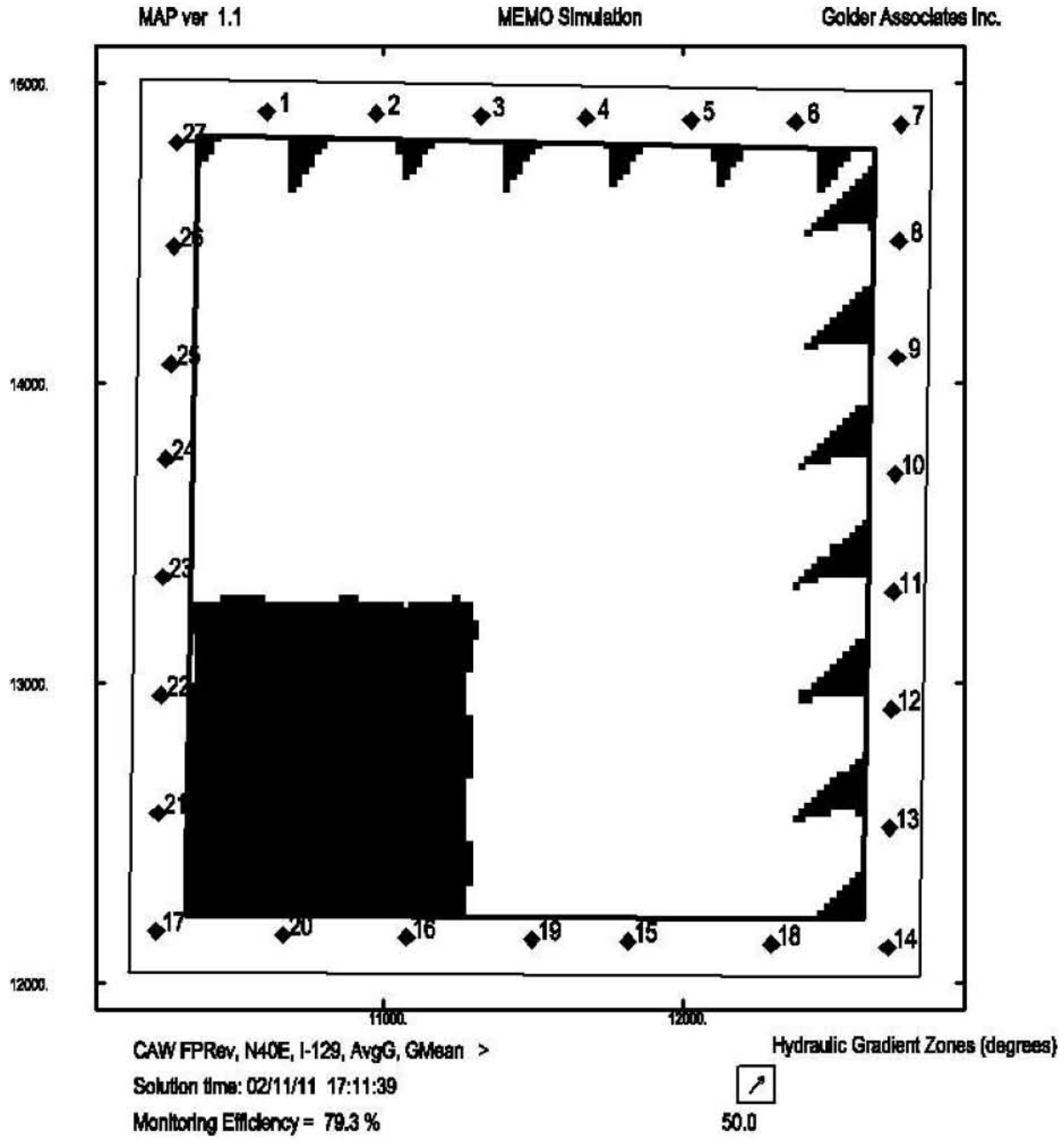


Figure 3. Model Results for I-129, Base Case Conditions, Entire CAW Footprint, Maximum Contaminant Velocity, N40°E Hydraulic Gradient

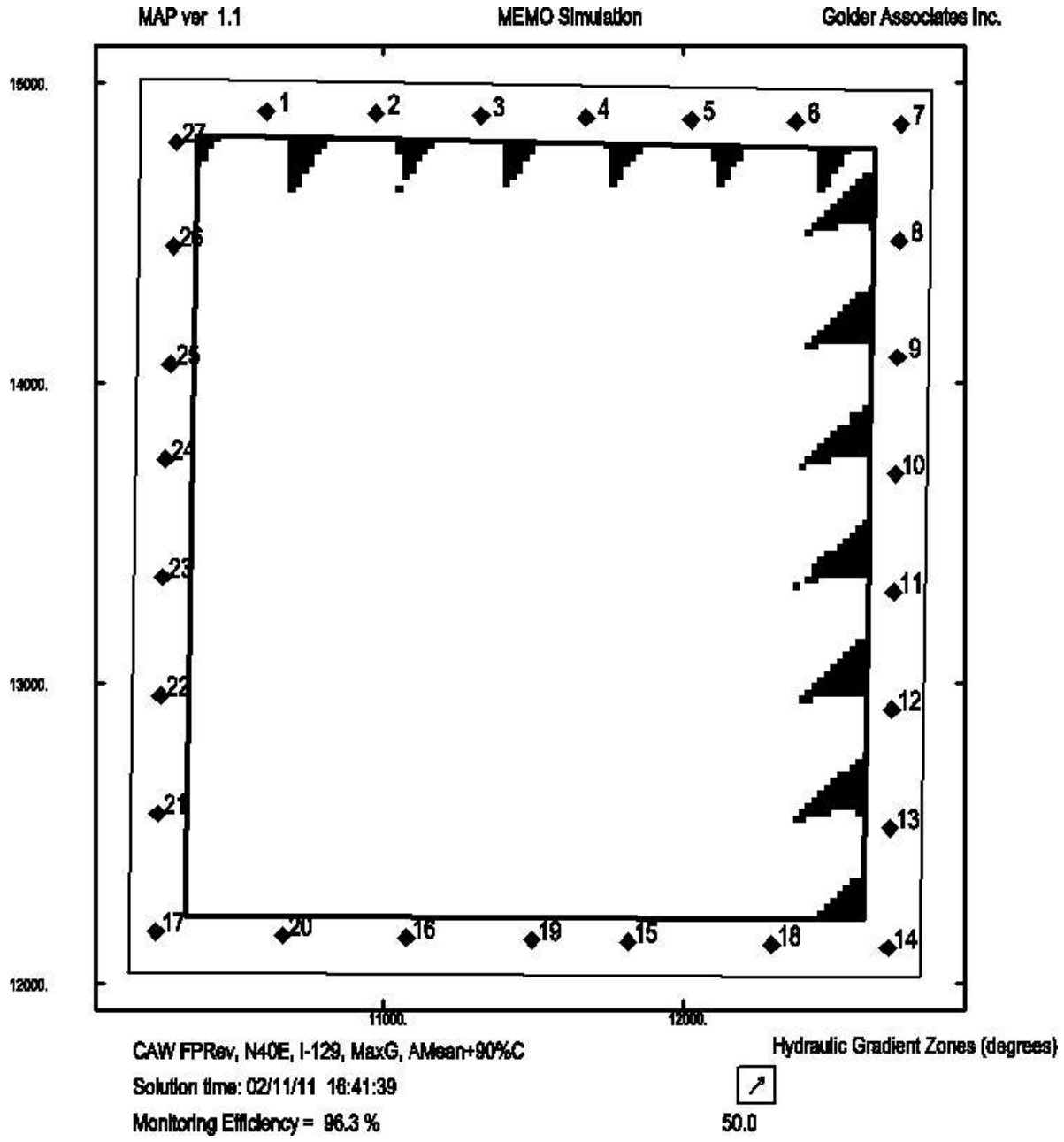


Figure 4. Model Results for Tc-99, Base Case Conditions, Entire CAW Footprint, Maximum Contaminant Velocity, N40°E Hydraulic Gradient

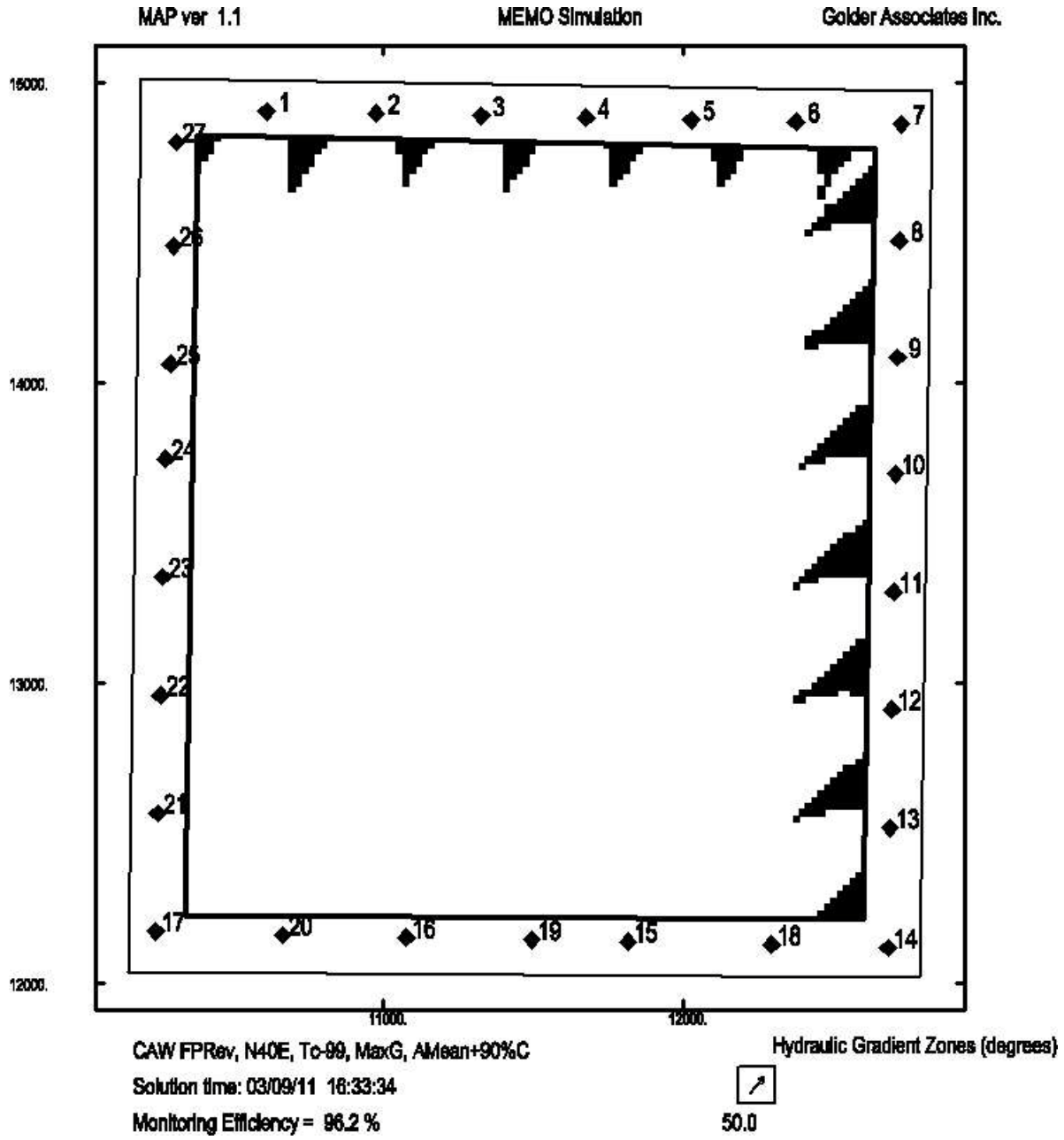


Figure 5. Model Results for I-129, Base Case Conditions, CAW Top Slope, Maximum Contaminant Velocity, N40°E Hydraulic Gradient

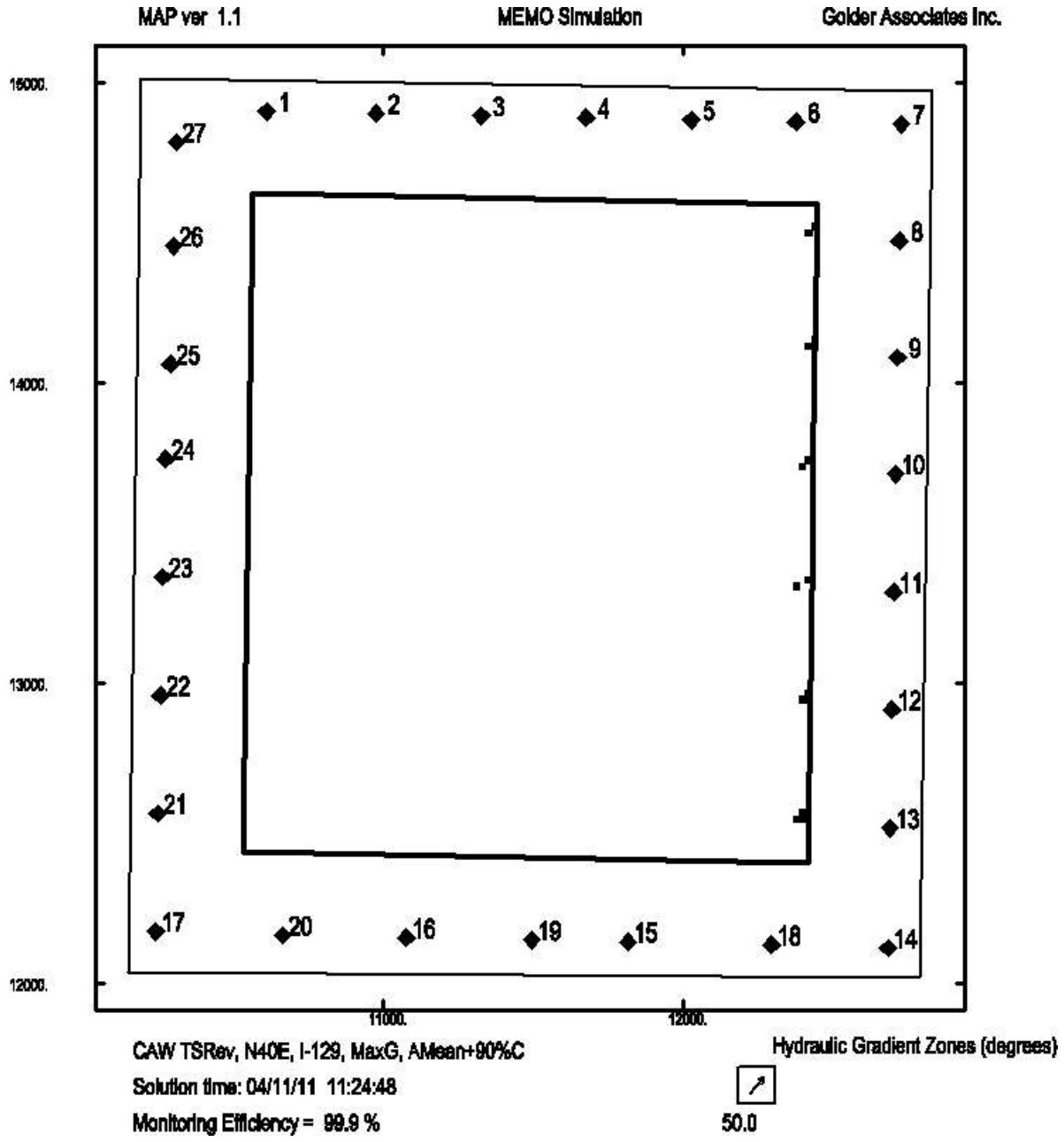
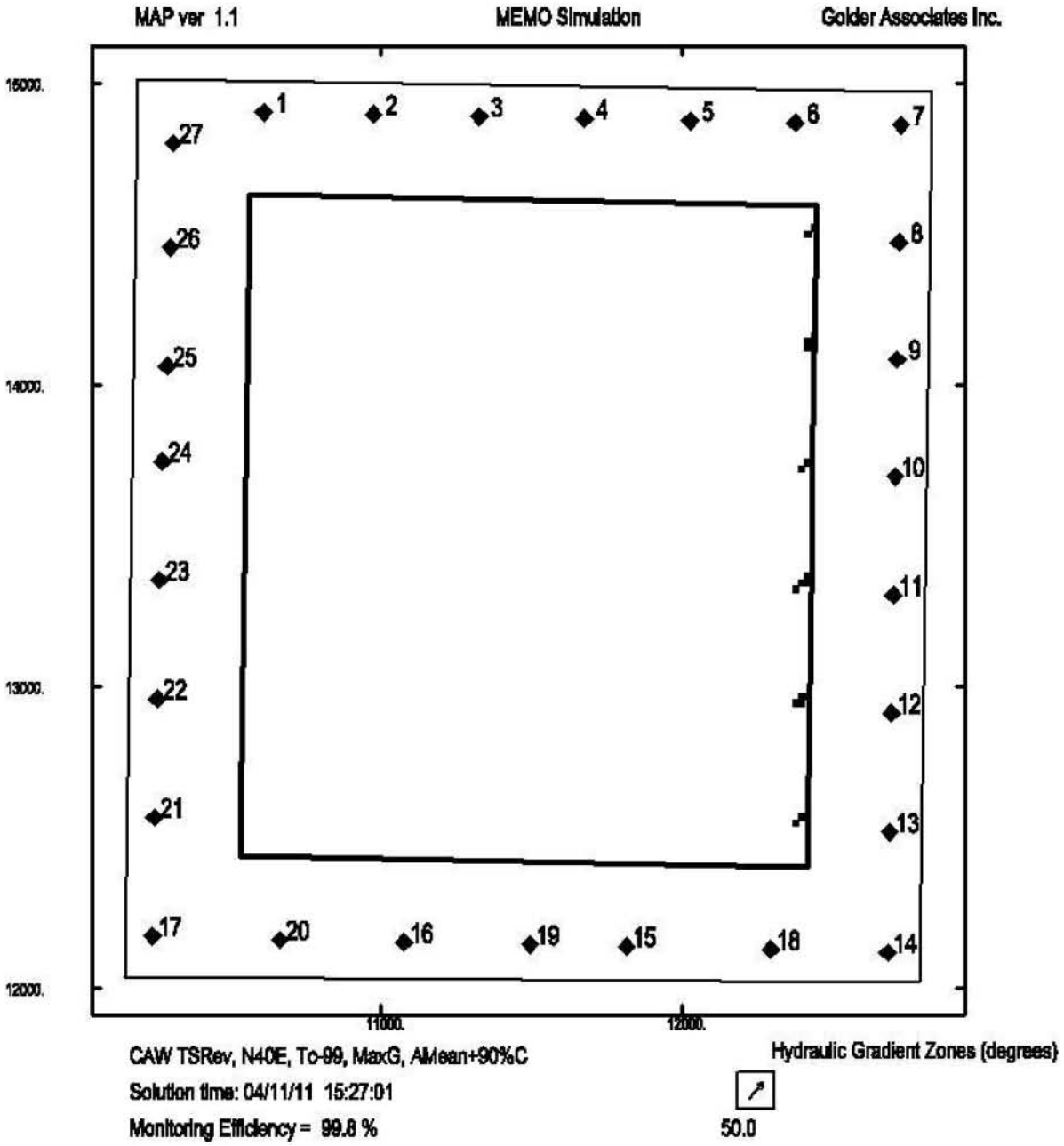


Figure 6. Model Results for Tc-99, Base Case Conditions, CAW Top Slope, Maximum Contaminant Velocity, N40°E Hydraulic Gradient



ATTACHMENT A

MEMO MODEL INPUT/OUTPUT FILES

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 02/11/11 at 16:41:39        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N40E, I-129, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         485
 Monitoring efficiency = 96.3 %.
  *   END OF MAP FILE
1
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 02/11/11 at 17:11:39        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N40E, I-129, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        2732
 Monitoring efficiency = 79.3 %.
  *   END OF MAP FILE
2
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 02/11/11 at 18:00:46        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N40E, I-129, AvgG, GMean     >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.77       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       11291.05       12218.56         1
  7       11291.05       13295.35         1
  8       10358.82       13295.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
```

```
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       10922
  # of undetected leaks =         502
 Monitoring efficiency = 95.4 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 11:24:48         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N40E, I-129, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =          14
 Monitoring efficiency = 99.9 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 11:38:34        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N40E, I-129, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =        1449
 Monitoring efficiency = 84.5 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 13:13:46        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N40E, I-129, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       11304.20       12425.71         1
  7       11304.20       13291.44         1
  8       10548.48       13291.44         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
```

```
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        7878
  # of undetected leaks =          20
 Monitoring efficiency = 99.7 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 02/14/11 at 14:11:23         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N90E, I-129, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         183
 Monitoring efficiency = 98.6 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 02/14/11 at 14:17:32         ++
++++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N90E, I-129, AvgG, GMean >   >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        1623
 Monitoring efficiency = 87.7 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 02/14/11 at 15:40:40         ++
++++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N90E, I-129, AvgG, GMean >   >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
  7       10348.94       12700.35         1
  8       10778.94       12700.35         1
  9       10778.94       14323.89         1
 10       10375.91       14323.89         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       11717
  # of undetected leaks =         191
 Monitoring efficiency = 98.4 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 02/14/11 at 15:53:41         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N0E, I-129, MaxG, AMean+90%C >
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         190
 Monitoring efficiency = 98.6 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 02/14/11 at 16:01:17        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N0E, I-129, AvgG, GeoMeanHC >>
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        2300
 Monitoring efficiency = 82.6 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 02/14/11 at 16:41:54        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N0E, I-129, AvgG, GeoMeanHC >>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       12160.71       12212.34         1
  7       12160.71       12952.34         1
  8       10831.05       12961.85         1
  9       10831.05       12221.85         1
 10       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       11012
  # of undetected leaks =         203
 Monitoring efficiency = 98.2 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 13:45:31         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N90E, I-129, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 13:51:13         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N90E, I-129, AvgG, GMeanHC > >
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =         748
 Monitoring efficiency = 92.0 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 14:07:03         ++
++++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N90E, I-129, AvgG, GMeanHC > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
  7       10538.57       12701.44         1
  8       10778.94       12701.44         1
  9       10778.94       14320.04         1
 10       10565.77       14320.04         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        8551
  # of undetected leaks =           5
 Monitoring efficiency = 99.9 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 14:23:51         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N0E, I-129, MaxG, AMean+90%C>>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    1.140000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 14:32:44        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N0E, I-129, AvgG, GMeanHC > >>
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =        1502
 Monitoring efficiency = 84.0 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 14:37:43        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N0E, I-129, AvgG, GMeanHC > >>
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       12163.93       12408.16         1
  7       12163.93       12952.34         1
  8       10834.20       12961.85         1
  9       10834.20       12435.31         1
 10       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.380000E-06      129.100000       12.900000    1.190000E-03
        1.000000    1.210000E-10    3.620000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        7757
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 03/09/11 at 16:33:34         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N40E, Tc-99, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         500
 Monitoring efficiency = 96.2 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 03/09/11 at 16:36:28        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N40E, Tc-99, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        2449
 Monitoring efficiency = 81.5 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 17:28:01        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N40E, Tc-99, AvgG, GMean     >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.77       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       11231.05       12218.99         1
  7       11231.05       13225.35         1
  8       10357.66       13225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
```

```
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       11201
  # of undetected leaks =         505
 Monitoring efficiency = 95.5 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 15:27:01        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N40E, Tc-99, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =          18
 Monitoring efficiency = 99.8 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 15:32:12        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N40E, Tc-99, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =        1223
 Monitoring efficiency = 86.9 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 17:00:04        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N40E, Tc-99, AvgG, GMean   > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       11234.20       12427.14         1
  7       11234.20       13216.44         1
  8       10547.22       13216.44         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
```

```
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          50.00
    2       12850.00       15030.00         1          50.00
    3       12850.00       12010.00         1          50.00
    4       10140.00       12010.00         1          50.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        8133
  # of undetected leaks =          21
 Monitoring efficiency = 99.7 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 03/09/11 at 17:37:34        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N90E, Tc-99, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         195
 Monitoring efficiency = 98.5 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 03/09/11 at 17:58:18         ++
++++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N90E, Tc-99, AvgG, GMean >   >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        1298
 Monitoring efficiency = 90.2 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/12/11 at 09:46:39        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW FPRev, N90E, Tc-99, AvgG, GMean >   >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
  7       10348.94       12725.35         1
  8       10678.94       12725.35         1
  9       10678.94       14311.89         1
 10       10375.91       14311.89         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       12041
  # of undetected leaks =         204
 Monitoring efficiency = 98.3 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 03/09/11 at 18:07:56        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N0E, Tc-99, MaxG, AMean+90%C >
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =         214
 Monitoring efficiency = 98.4 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 03/10/11 at 14:06:48        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N0E, Tc-99, AvgG, GeoMeanHC >>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       13217
  # of undetected leaks =        2014
 Monitoring efficiency = 84.8 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 17:42:29        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW FPRev, N0E, Tc-99, AvgG, GeoMeanHC >>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10384.21       14823.89         1
  2       12641.27       14777.79         1
  3       12624.26       13865.49         1
  4       12624.12       13609.08         1
  5       12600.71       12209.19         1
  6       12135.71       12212.52         1
  7       12135.71       12852.52         1
  8       10851.05       12861.70         1
  9       10851.05       12221.70         1
 10       10341.05       12225.35         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =       11377
  # of undetected leaks =         236
 Monitoring efficiency = 97.9 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 15:43:55         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N90E, Tc-99, MaxG, AMean+90%C>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 16:23:21        ++
+++++++++++++++++++++++++++++++++++++++++++


---------------------------------------------
< CAW TSRev, N90E, Tc-99, AvgG, GMeanHC > >
---------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =         427
 Monitoring efficiency = 95.4 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/12/11 at 10:08:00        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N90E, Tc-99, AvgG, GMeanHC > >
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
  7       10538.97       12724.49         1
  8       10692.97       12724.49         1
  9       10719.41       14302.08         1
 10       10565.41       14302.08         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1            .00
    2       12850.00       15030.00         1            .00
    3       12850.00       12010.00         1            .00
    4       10140.00       12010.00         1            .00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        8810
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
++++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                  ++
++                                        ++
++     Monitoring Analysis Package        ++
++        MAP Version   1.1               ++
++                                        ++
++       GOLDER ASSOCIATES INC.           ++
++                                        ++
++    Run on 04/11/11 at 17:08:41         ++
++++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N0E, Tc-99, MaxG, AMean+90%C>>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    1.180000E-02
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =           0
 Monitoring efficiency =100.0 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 17:13:13        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N0E, Tc-99, AvgG, GMeanHC > >>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
 12       12697.17       12910.76
 13       12690.76       12516.05
 14       12683.66       12117.04
 15       11817.42       12137.43
```

```
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        9362
  # of undetected leaks =        1211
 Monitoring efficiency = 87.1 %.
  *   END OF MAP FILE
```

```
+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version   1.1              ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/11/11 at 17:20:53        ++
+++++++++++++++++++++++++++++++++++++++++++



---------------------------------------------
< CAW TSRev, N0E, Tc-99, AvgG, GMeanHC > >>
---------------------------------------------



*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  10341.050000    12209.190000       21.000000
       110         125
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1       10569.01       14632.08         1
  2       12449.80       14593.66         1
  3       12436.26       13867.29         1
  4       12436.12       13610.70         1
  5       12415.89       12401.00         1
  6       12135.71       12408.73         1
  7       12135.71       12852.52         1
  8       10851.05       12861.70         1
  9       10851.05       12434.97         1
 10       10532.17       12439.49         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     40.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1       10194.21       15013.89
  2       12831.27       14967.79
  3       12790.71       12019.19
  4       10151.05       12035.35
*   MONITORING WELL COORDINATES (#,x,y)
  1       10613.15       14902.99
  2       10978.15       14895.54
  3       11328.15       14888.39
  4       11678.15       14881.24
  5       12028.15       14874.09
  6       12378.15       14866.94
  7       12728.15       14859.79
  8       12721.91       14471.79
  9       12715.67       14083.79
 10       12709.21       13695.79
 11       12703.06       13302.32
```

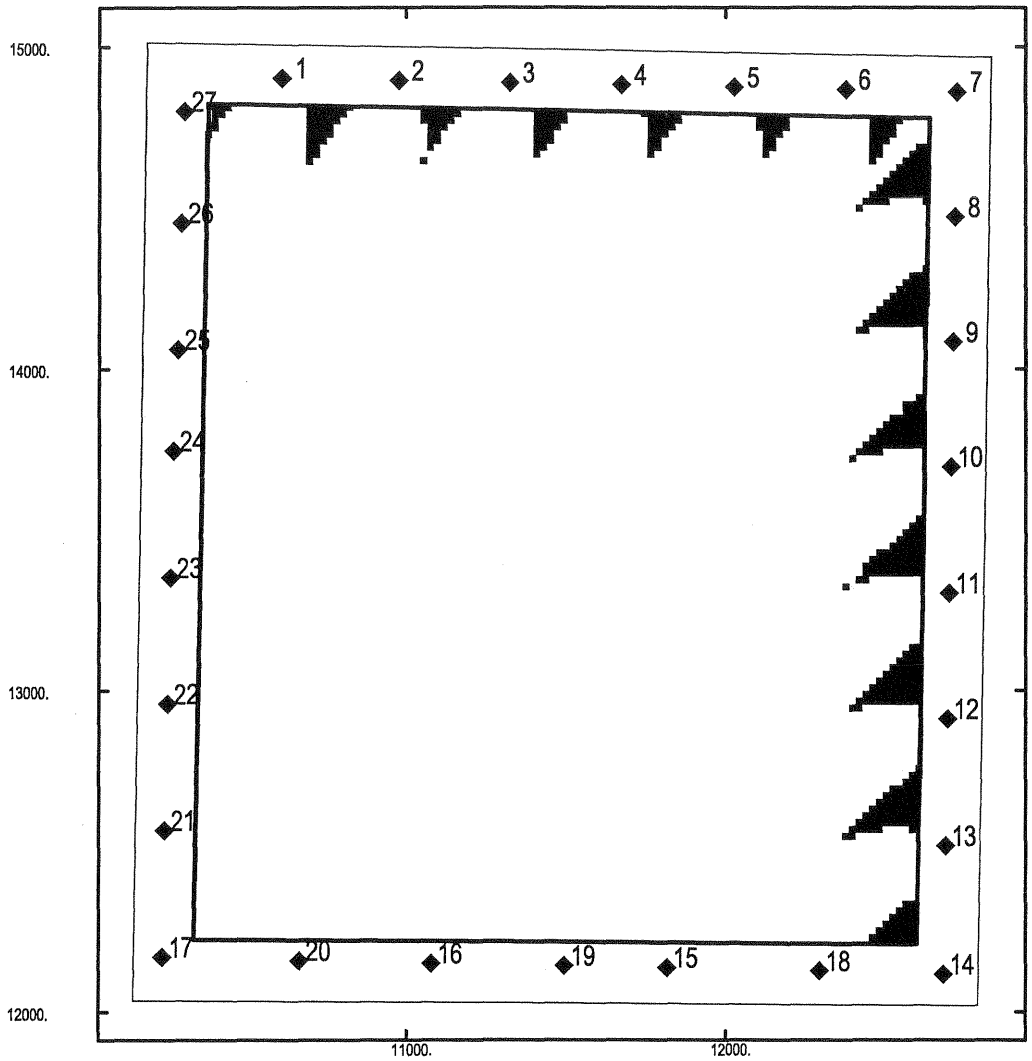
```
   12       12697.17       12910.76
   13       12690.76       12516.05
   14       12683.66       12117.04
   15       11817.42       12137.43
   16       11078.35       12150.89
   17       10243.49       12171.23
   18       12295.96       12127.21
   19       11496.85       12143.73
   20       10666.92       12159.57
   21       10250.19       12565.38
   22       10259.09       12958.43
   23       10267.65       13351.91
   24       10276.70       13746.02
   25       10292.39       14061.30
   26       10303.03       14454.18
   27       10312.87       14800.39
  *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source
width,lmb,cvel)
    1.000000E-06      129.100000       12.900000    9.030000E-04
        1.000000    8.990000E-09    3.750000E-03
  *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
    1       10140.00       15030.00         1          90.00
    2       12850.00       15030.00         1          90.00
    3       12850.00       12010.00         1          90.00
    4       10140.00       12010.00         1          90.00
  *   SOLUTION RESULTS
  Maximum advection time =   182500.000000
  Accuracy of solution =    1.000000E-07
  Solution basis = buffer zone/advection time
  Total # of source points =        8103
  # of undetected leaks =           7
 Monitoring efficiency = 99.9 %.
  *   END OF MAP FILE
```

ATTACHMENT B

MEMO MODEL OUTPUT PLOTS

CAWI129a.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N40E, I-129, MaxG, AMean+90%C

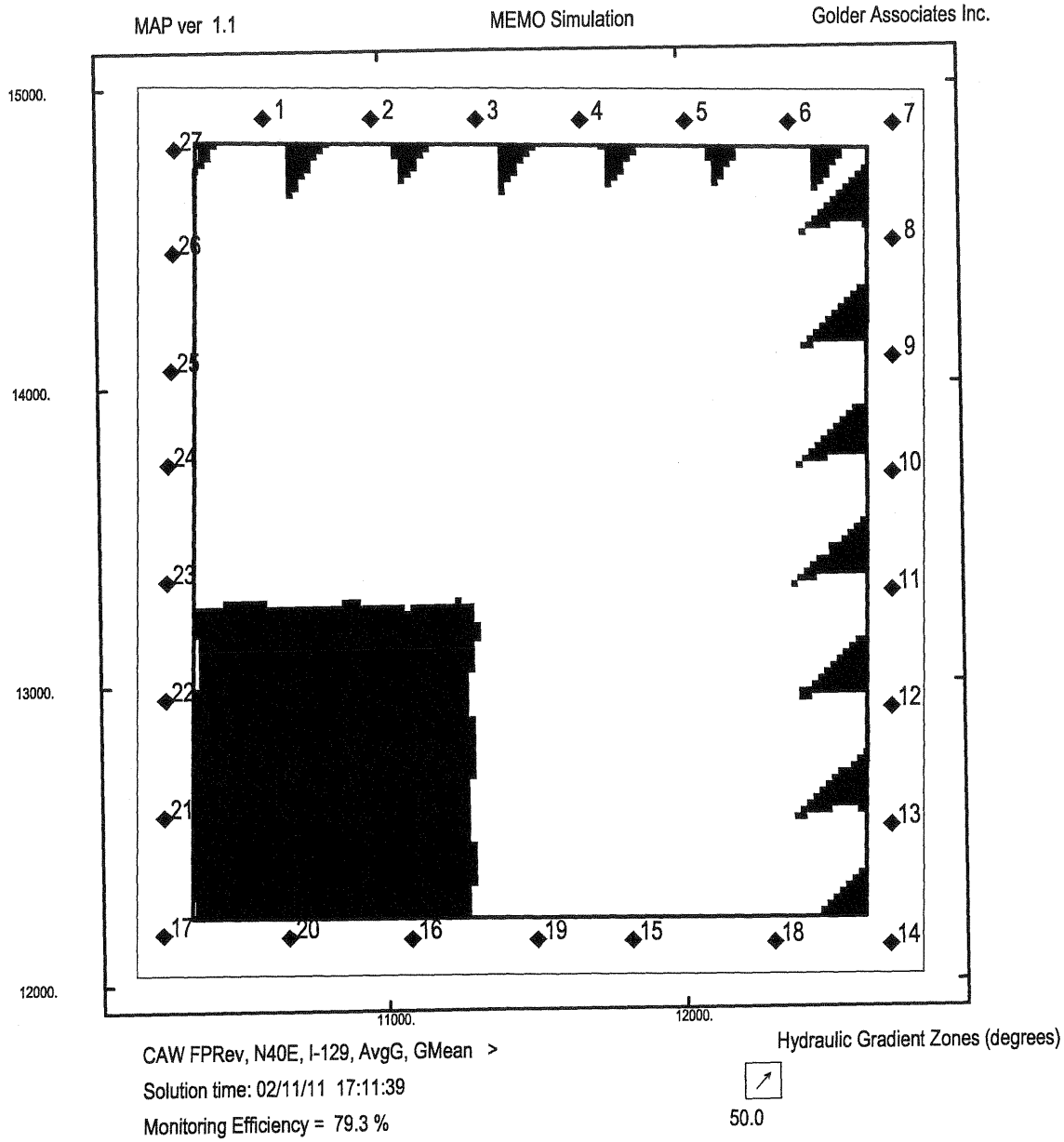
Solution time: 02/11/11 16:41:39

Monitoring Efficiency = 96.3 %

Hydraulic Gradient Zones (degrees)

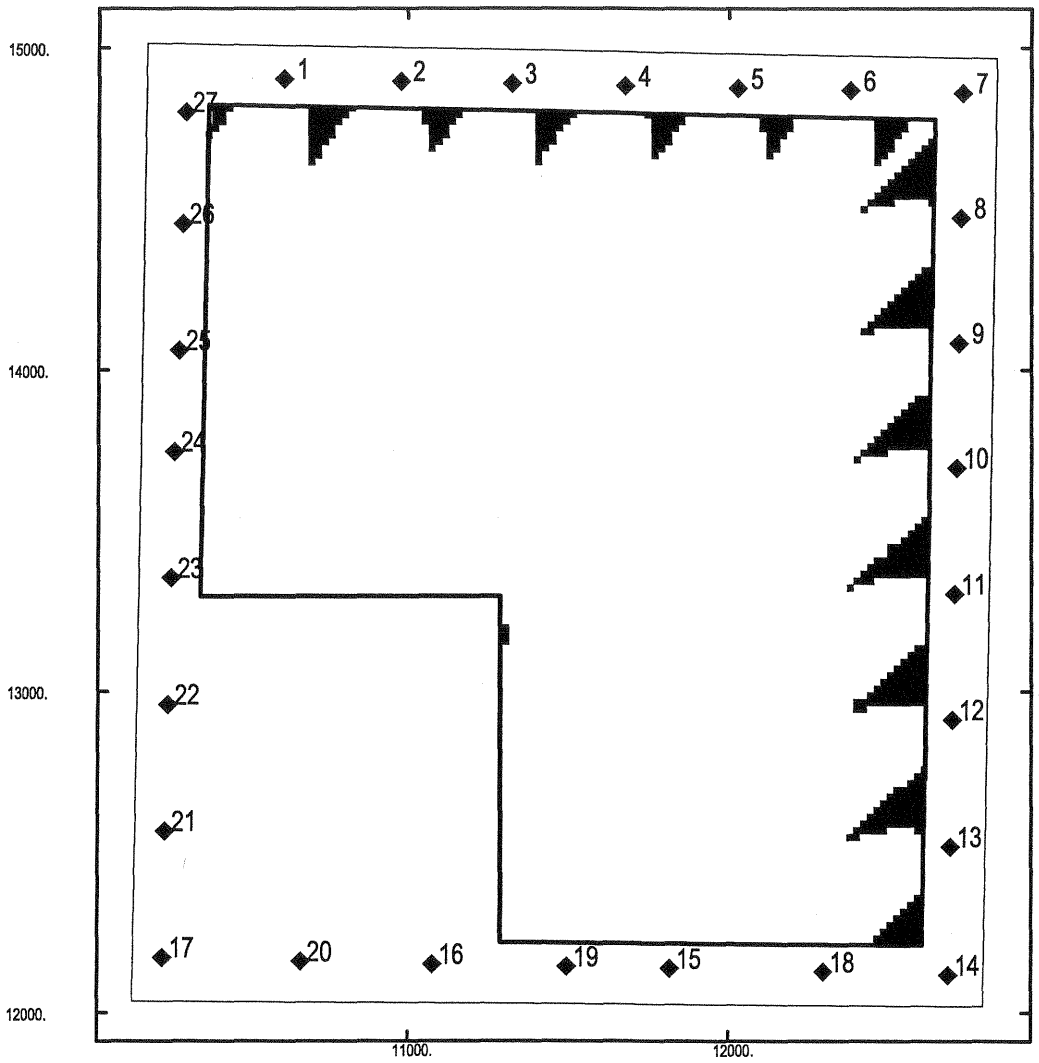
50.0

CAWI129b.PLT



CAWI129c.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N40E, I-129, AvgG, GMean

Solution time: 02/11/11 18:00:46

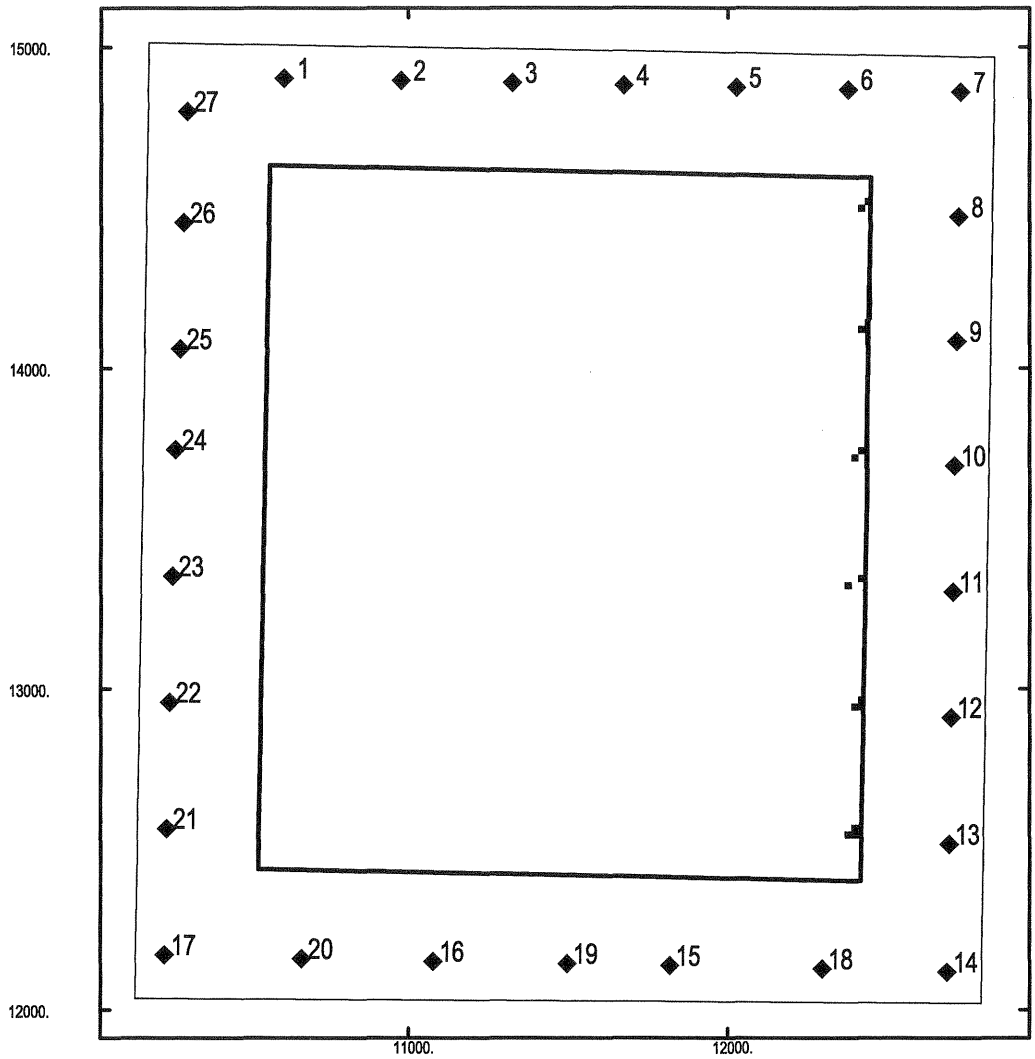
Monitoring Efficiency = 95.4 %

Hydraulic Gradient Zones (degrees)

50.0

CAWI129d.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N40E, I-129, MaxG, AMean+90%C

Solution time: 04/11/11 11:24:48

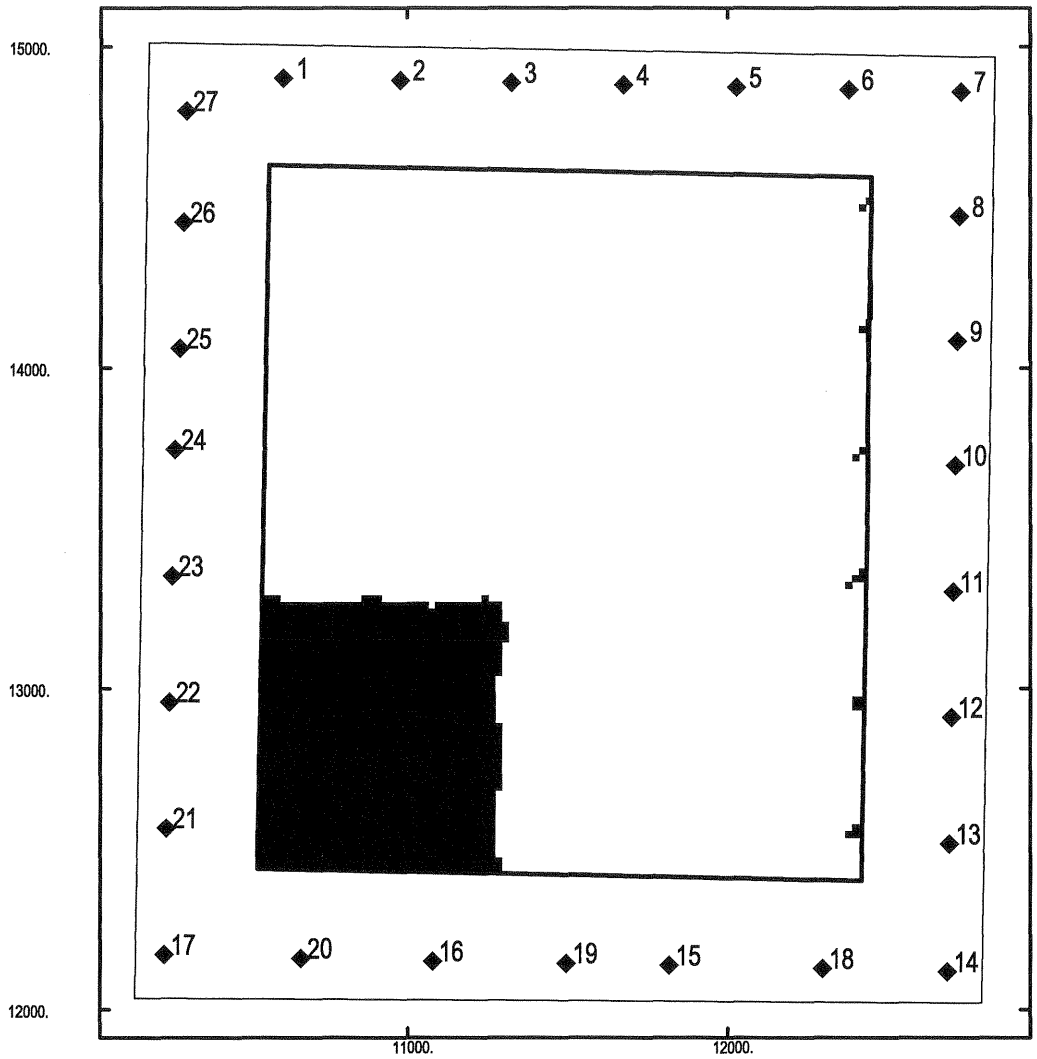
Monitoring Efficiency = 99.9 %

Hydraulic Gradient Zones (degrees)

50.0

CAWI129e.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N40E, I-129, AvgG, GMean >

Solution time: 04/11/11 11:38:34

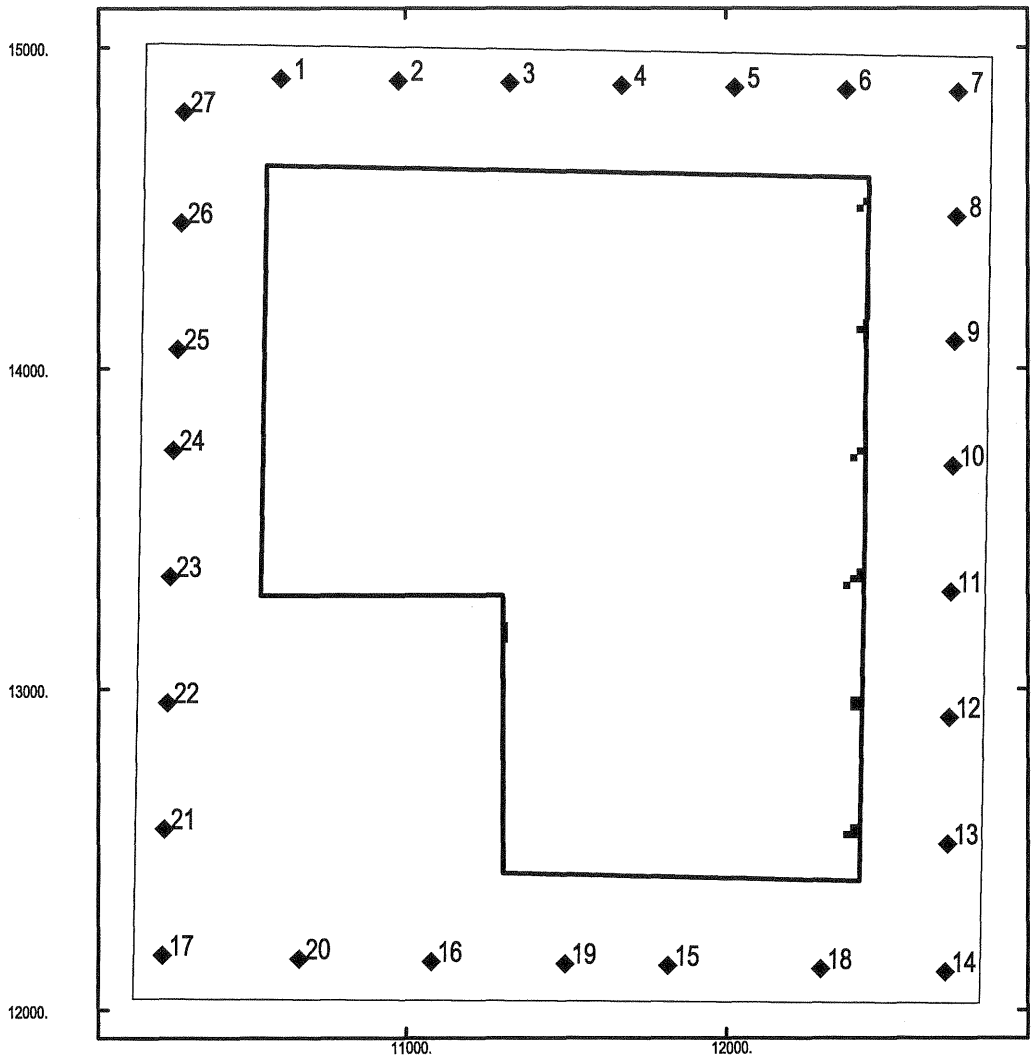
Monitoring Efficiency = 84.5 %

Hydraulic Gradient Zones (degrees)

50.0

CAWI129f.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N40E, I-129, AvgG, GMean >

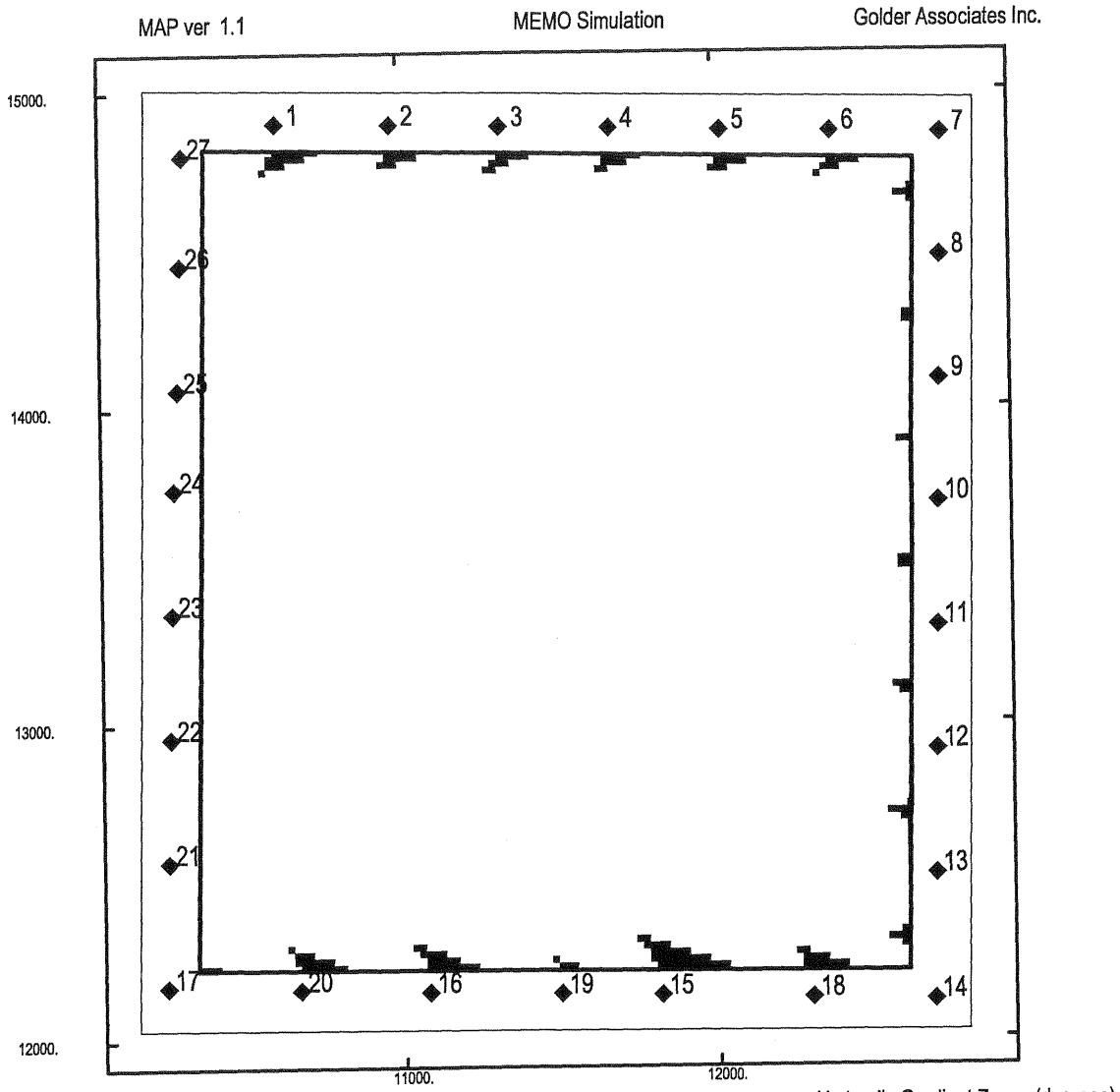
Solution time: 04/11/11 13:13:46

Monitoring Efficiency = 99.7 %

Hydraulic Gradient Zones (degrees)

50.0

CAWI129g.PLT



CAW FPRev, N90E, I-129, MaxG, AMean+90%C

Solution time: 02/14/11 14:11:23

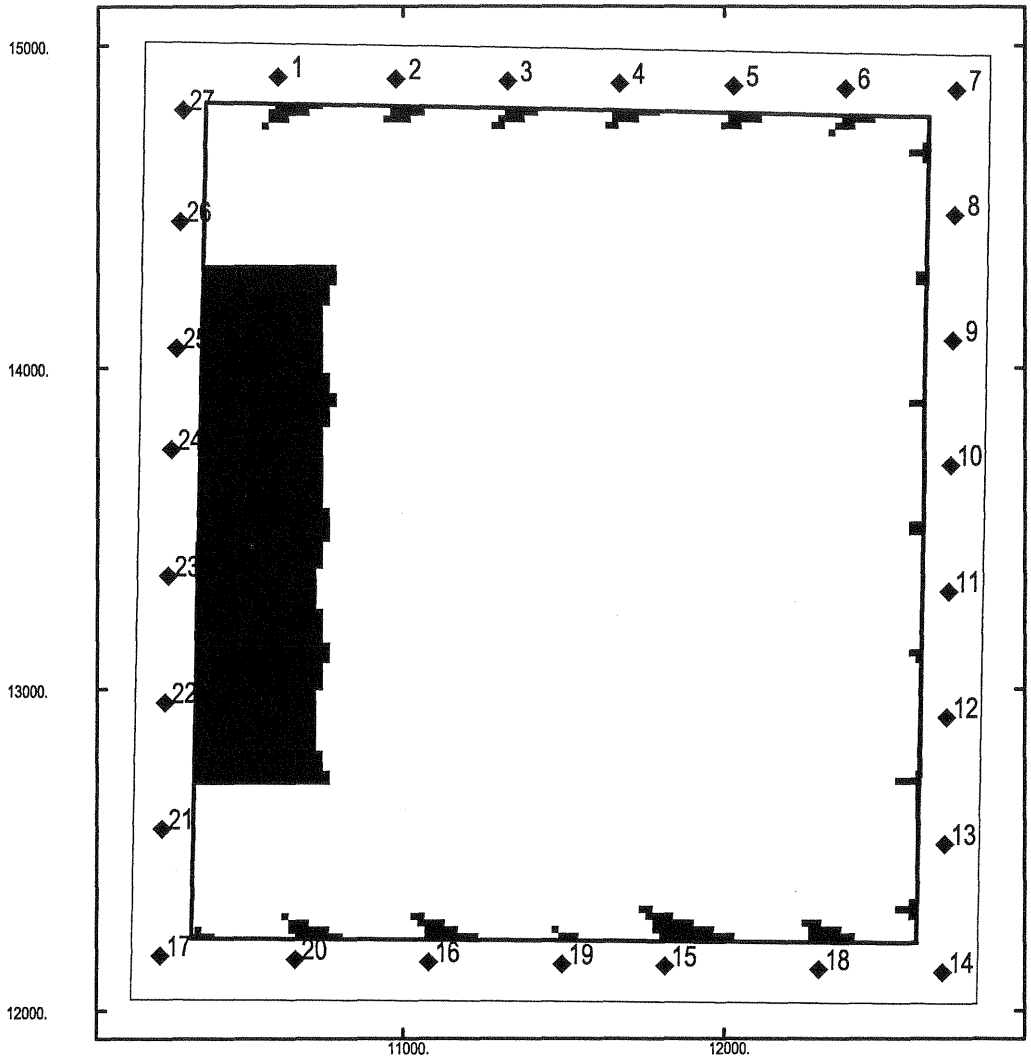
Monitoring Efficiency = 98.6 %

Hydraulic Gradient Zones (degrees)

.0

CAWI129h.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N90E, I-129, AvgG, GMean >

Solution time: 02/14/11 14:17:32

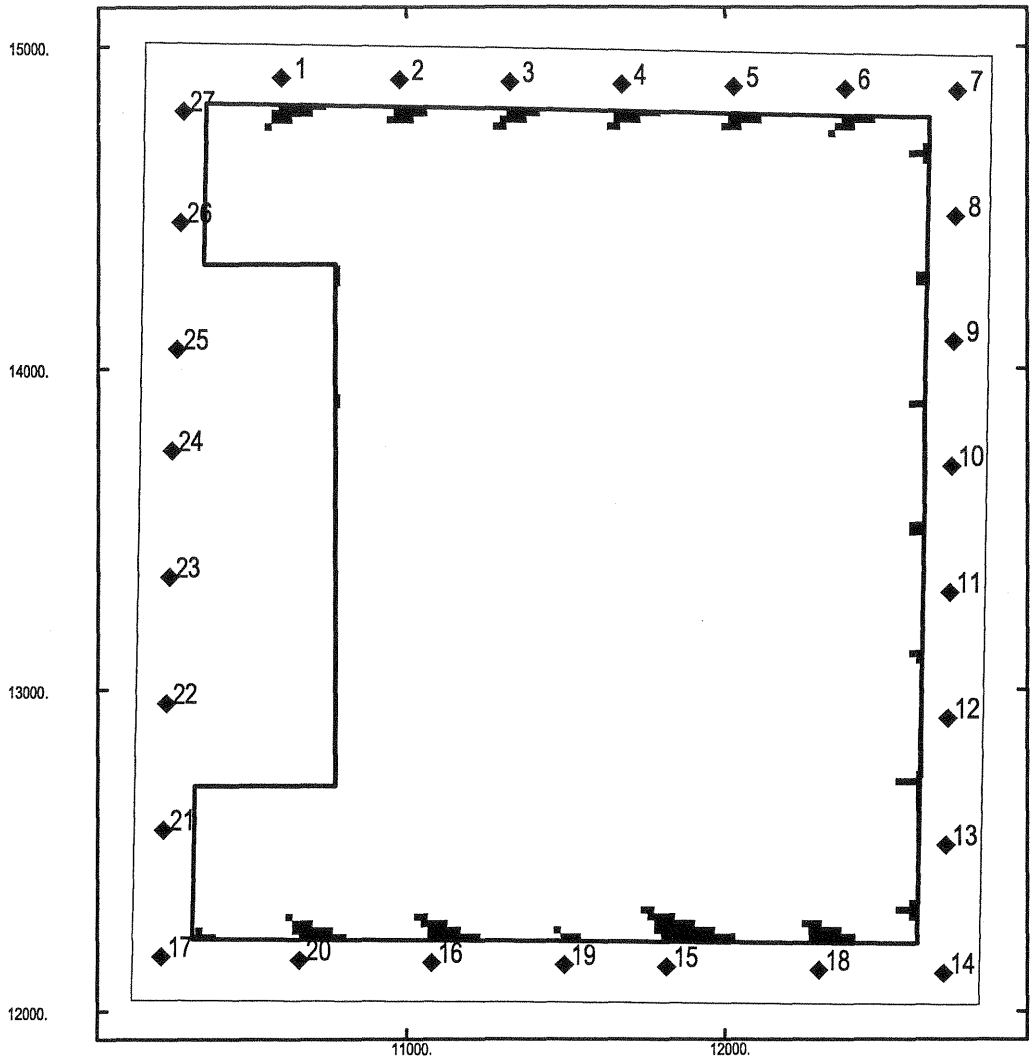
Monitoring Efficiency = 87.7 %

Hydraulic Gradient Zones (degrees)

.0

CAWI129i.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N90E, I-129, AvgG, GMean >

Solution time: 02/14/11 15:40:40

Monitoring Efficiency = 98.4 %

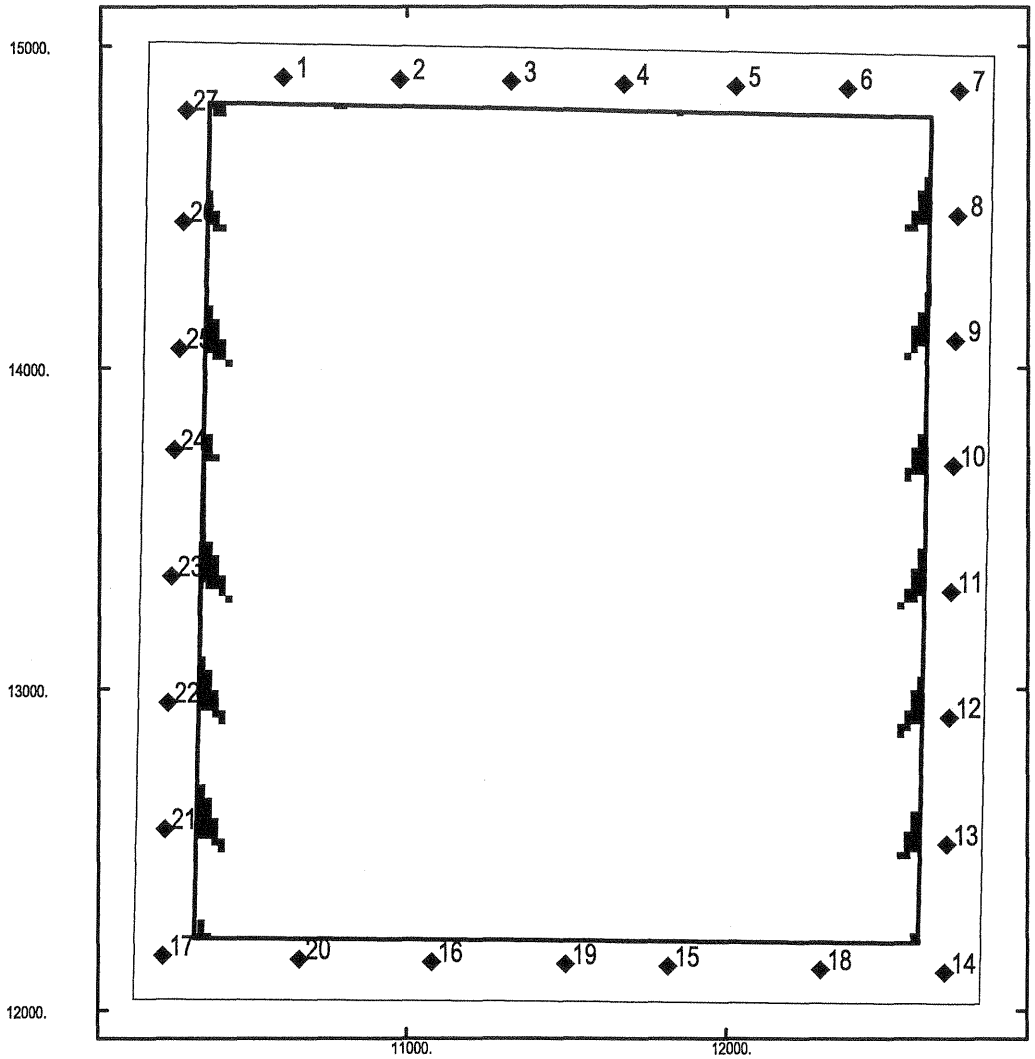
Hydraulic Gradient Zones (degrees)

→

.0

CAWI129j.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N0E, I-129, MaxG, AMean+90%C

Solution time: 02/14/11 15:53:41

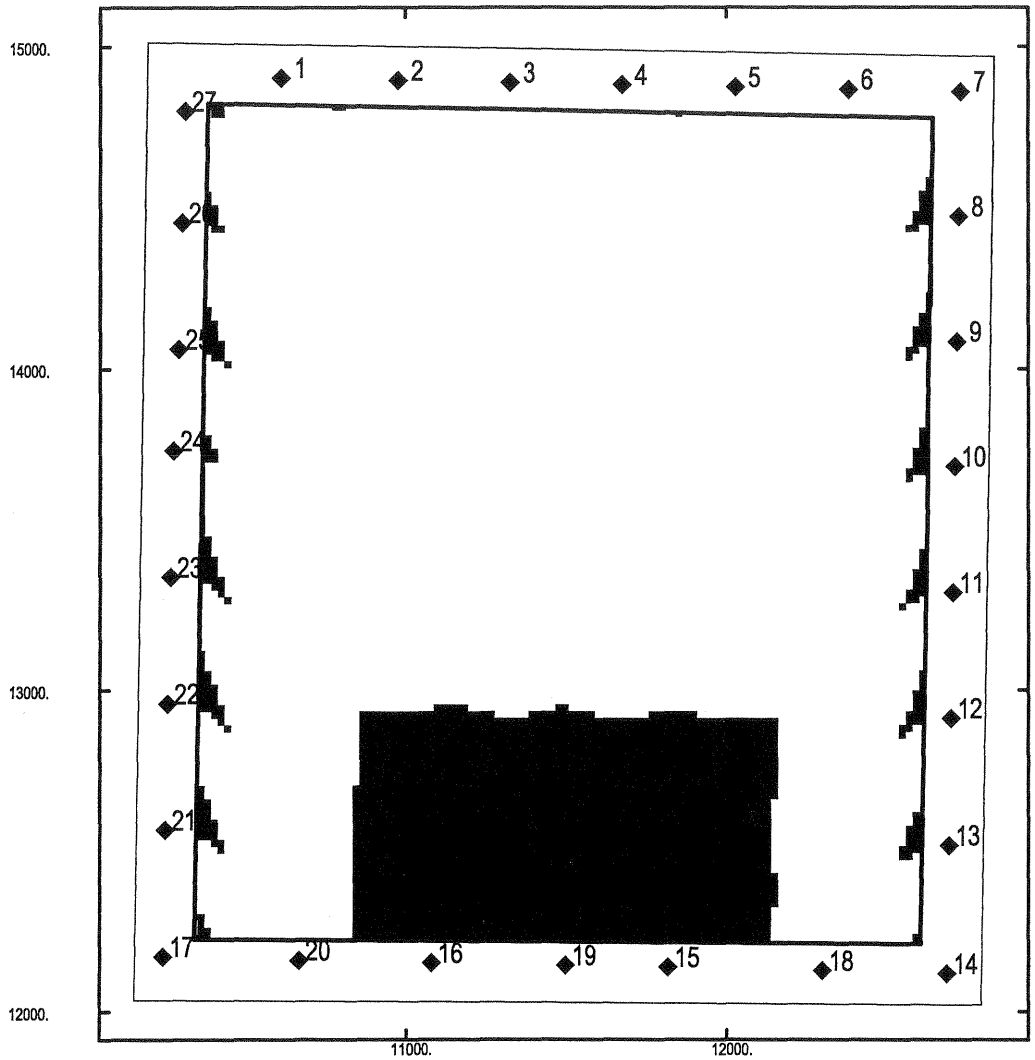
Monitoring Efficiency = 98.6 %

Hydraulic Gradient Zones (degrees)

90.0

CAWI129k.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N0E, I-129, AvgG, GeoMeanHC >

Solution time: 02/14/11 16:01:17

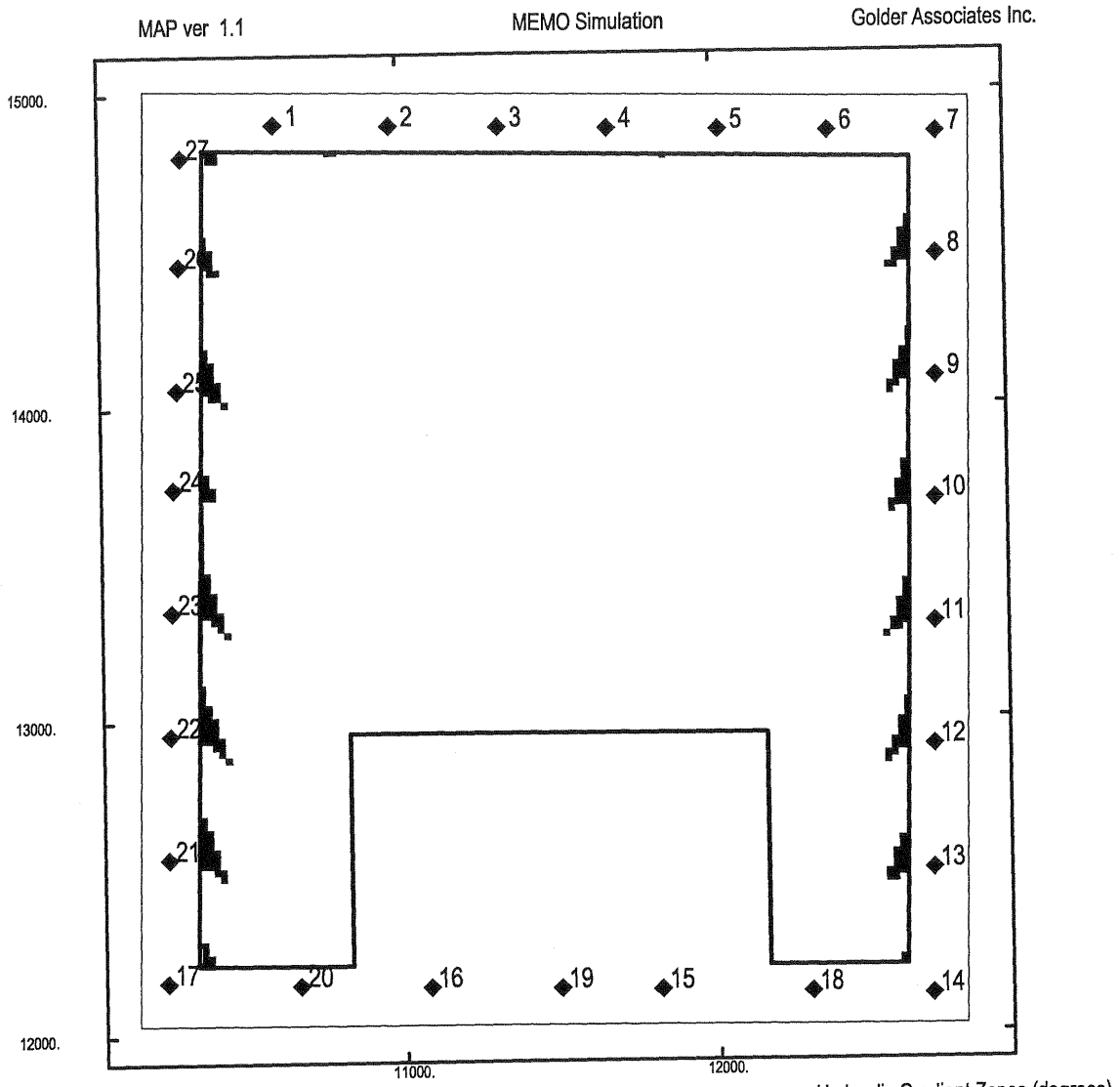
Monitoring Efficiency = 82.6 %

Hydraulic Gradient Zones (degrees)

↑

90.0

CAWI129L.PLT

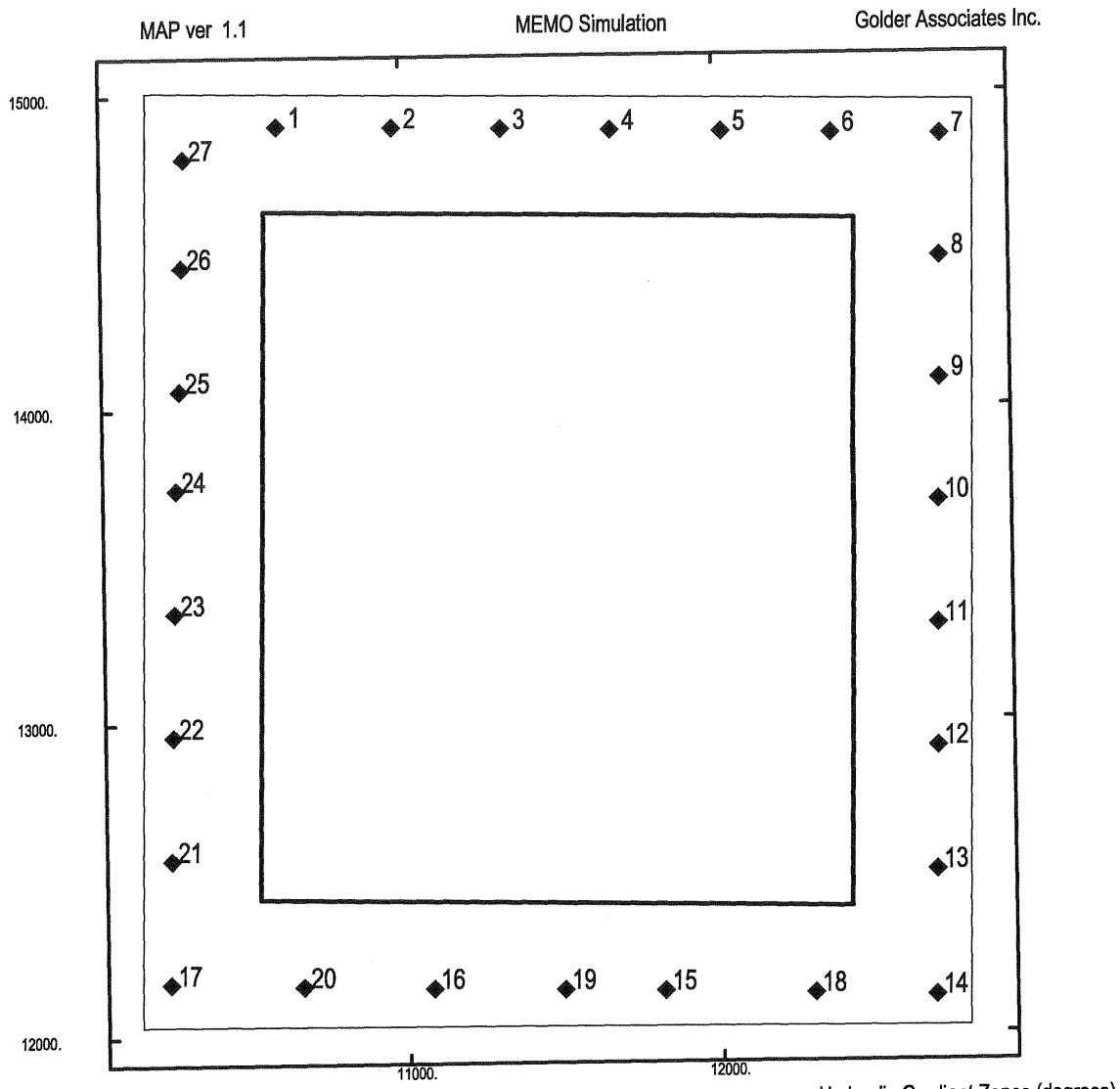


CAW FPRev, N0E, I-129, AvgG, GeoMeanHC >

Solution time: 02/14/11 16:41:54

Monitoring Efficiency = 98.2 %

CAWI129m.PLT



CAW TSRev, N90E, I-129, MaxG, AMean+90%C

Solution time: 04/11/11 13:45:31

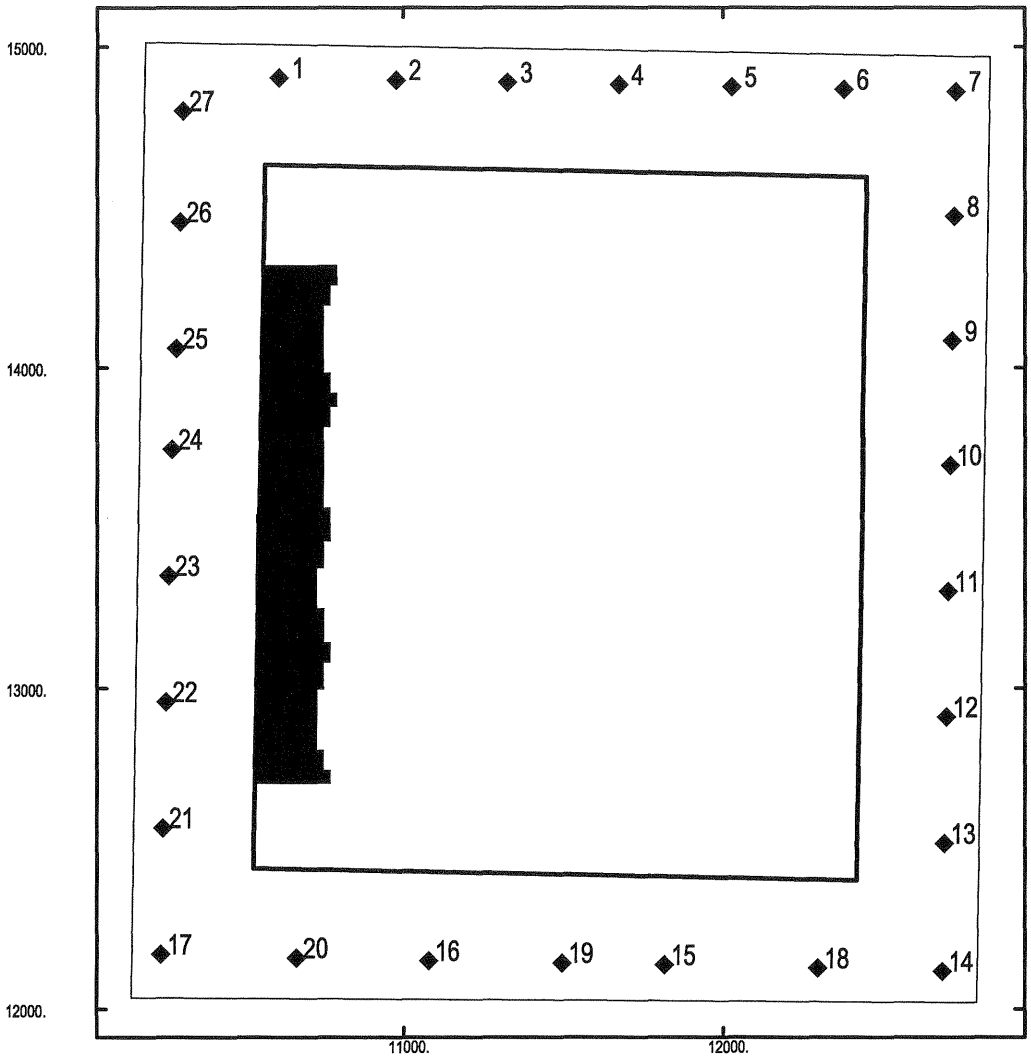
Monitoring Efficiency = 100.0 %

Hydraulic Gradient Zones (degrees)

.0

CAWI129n.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N90E, I-129, AvgG, GMeanHC >

Solution time: 04/11/11 13:51:13

Monitoring Efficiency = 92.0 %

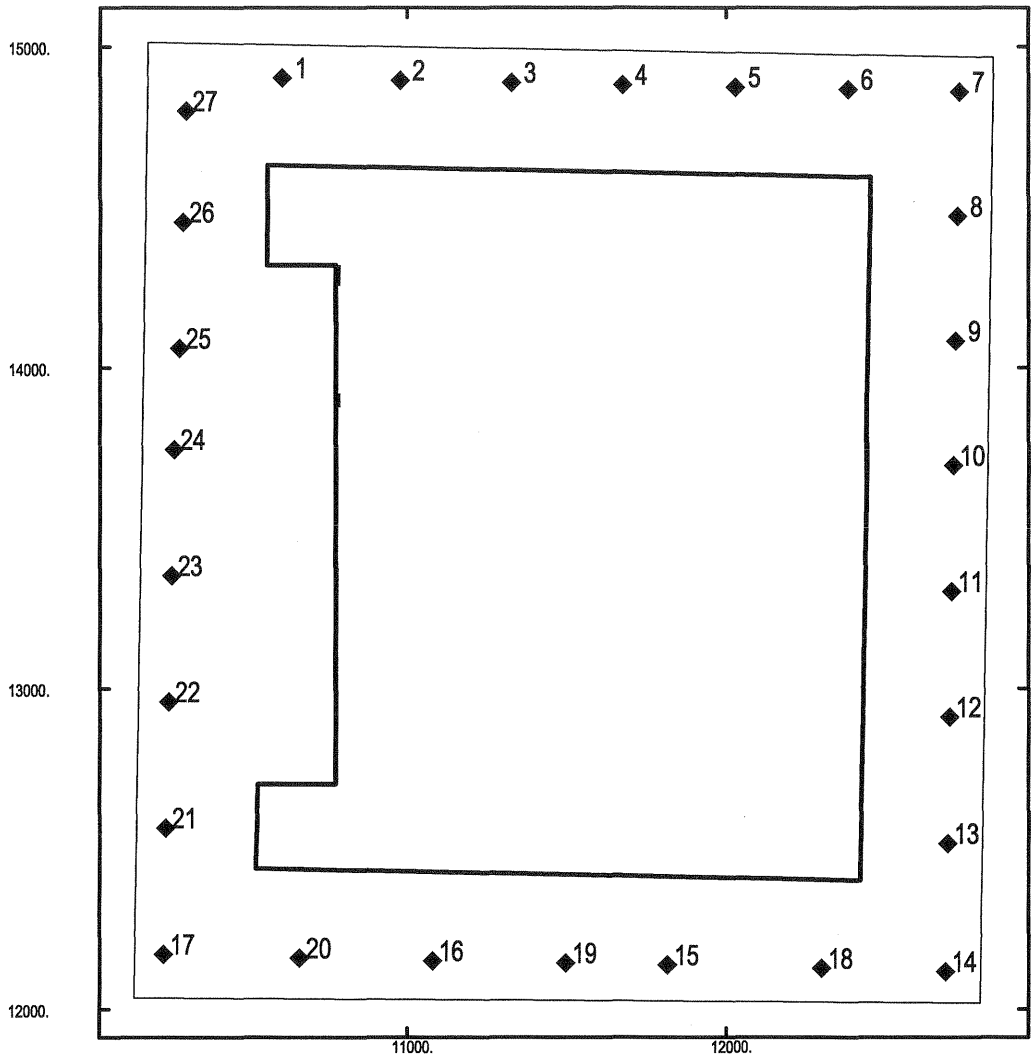
Hydraulic Gradient Zones (degrees)

→

.0

CAWI129o.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N90E, I-129, AvgG, GMeanHC >

Solution time: 04/11/11 14:07:03

Monitoring Efficiency = 99.9 %

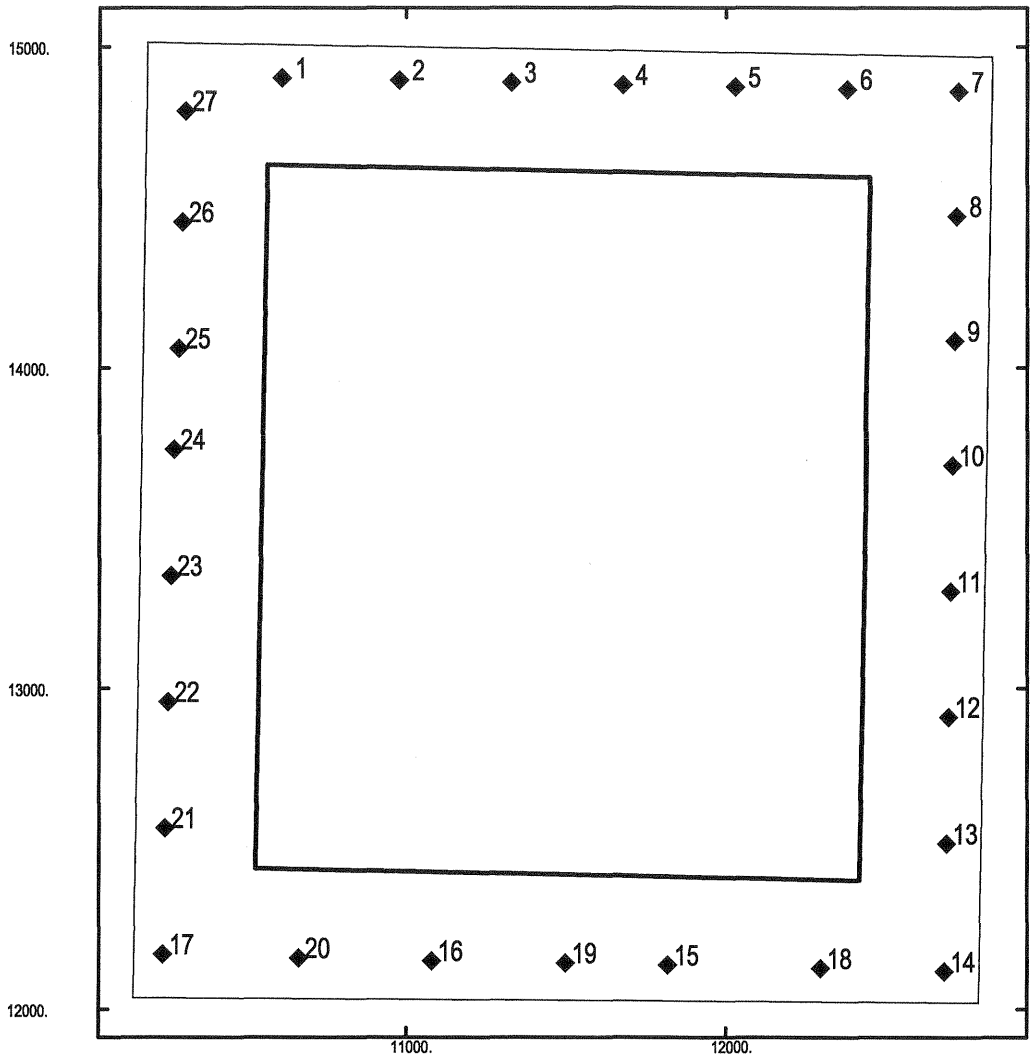
Hydraulic Gradient Zones (degrees)

→

.0

CAWI129p.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N0E, I-129, MaxG, AMean+90%C>

Solution time: 04/11/11 14:23:51

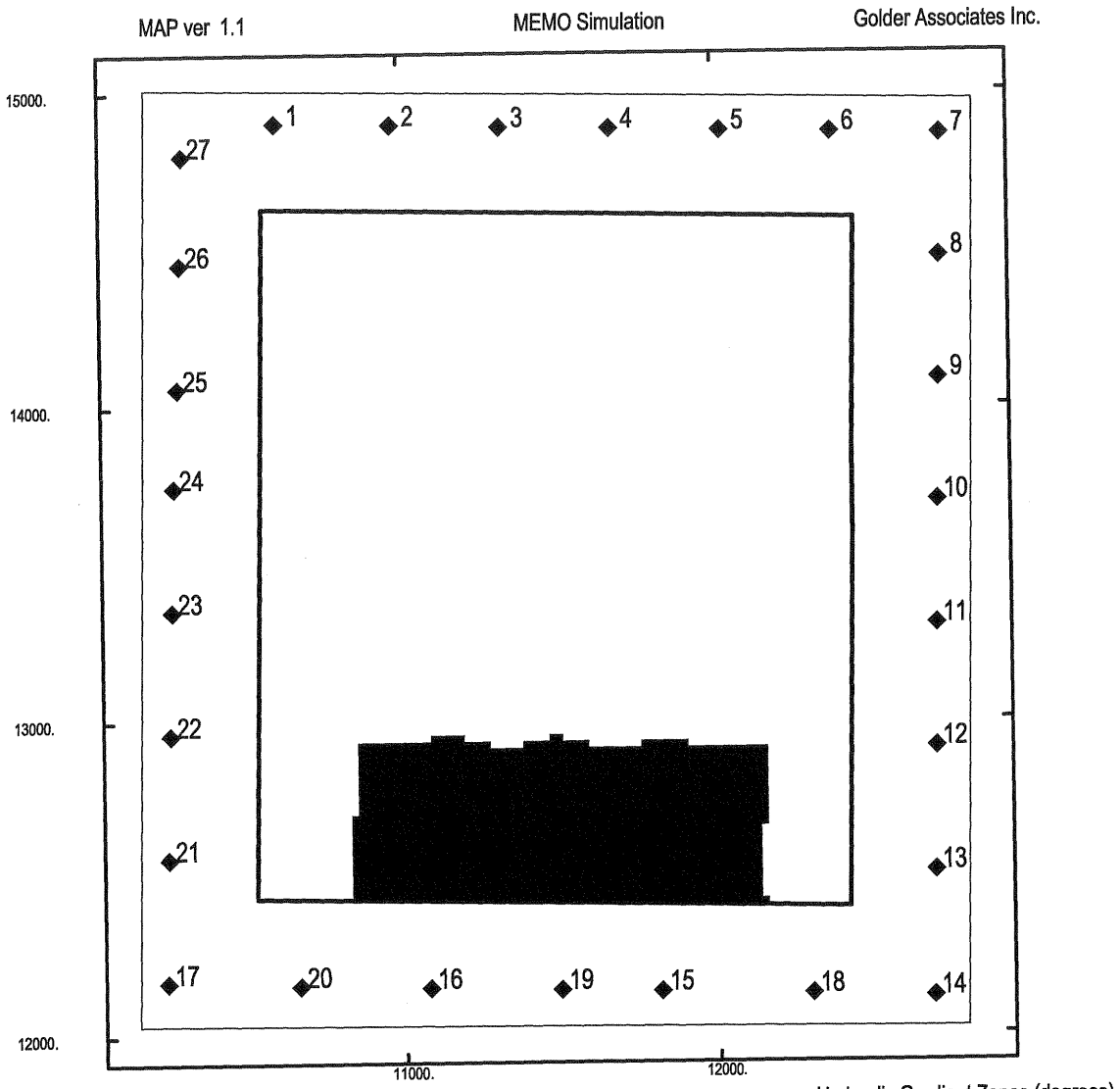
Monitoring Efficiency = 100.0 %

Hydraulic Gradient Zones (degrees)

↑

90.0

CAWI129q.PLT



CAW TSRev, N0E, I-129, AvgG, GMeanHC > >

Solution time: 04/11/11 14:32:44

Monitoring Efficiency = 84.0 %

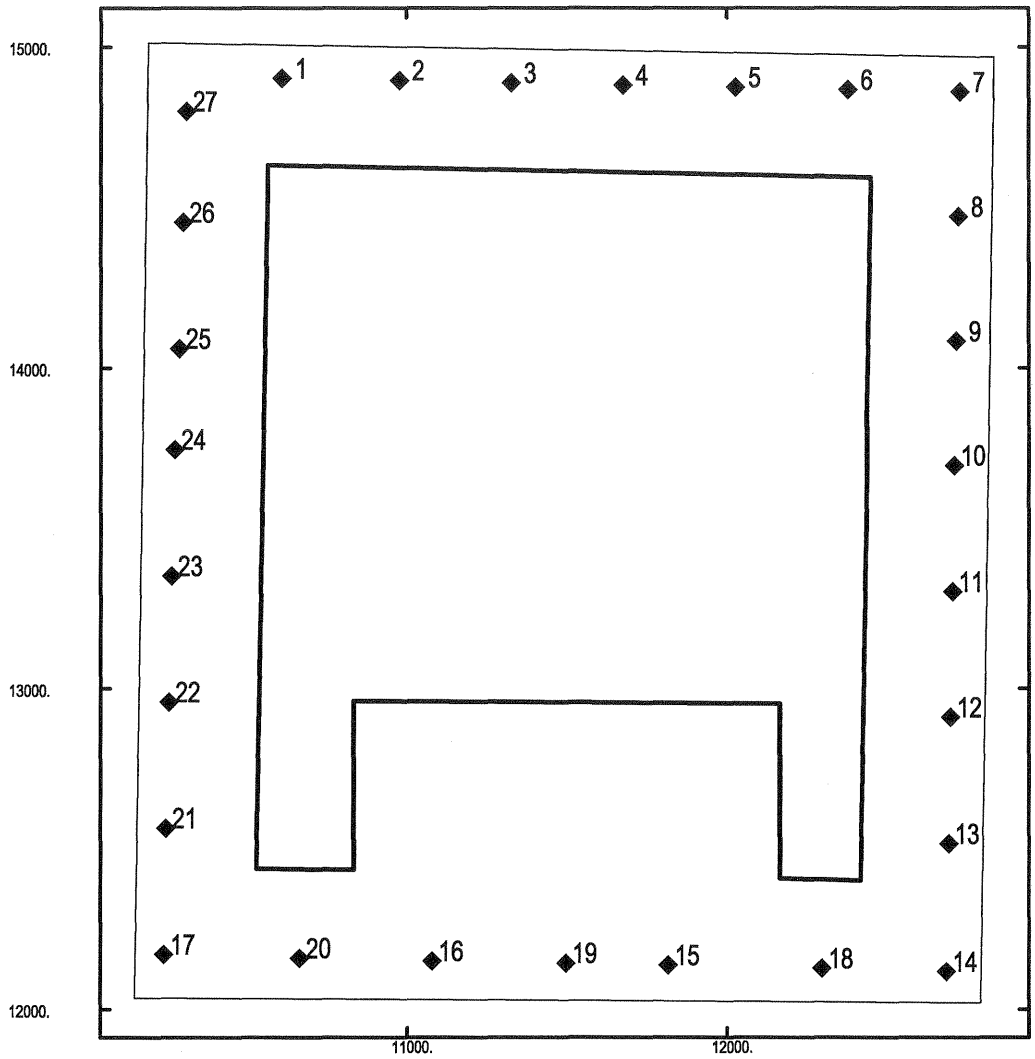
Hydraulic Gradient Zones (degrees)

↑

90.0

CAWI129r.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N0E, I-129, AvgG, GMeanHC > >

Solution time: 04/11/11 14:37:43

Monitoring Efficiency = 100.0 %

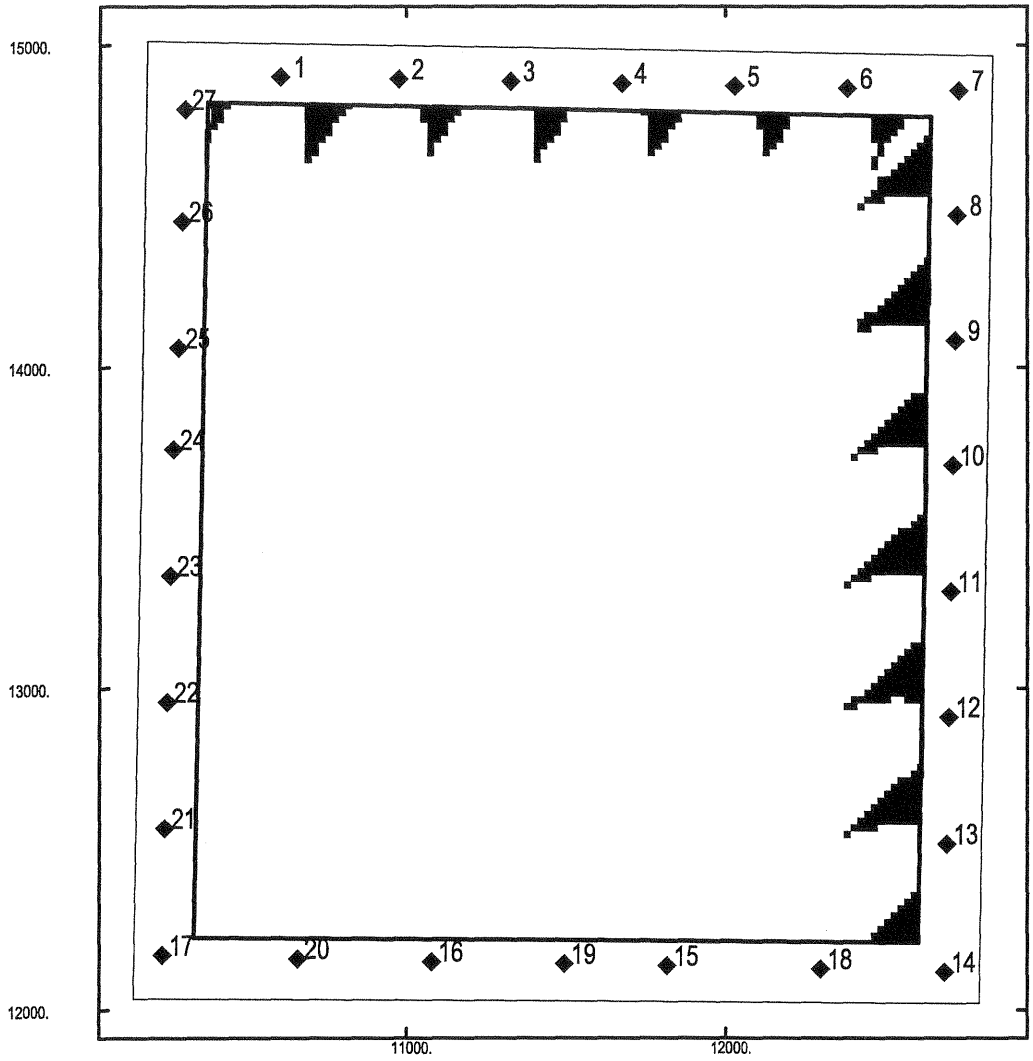
Hydraulic Gradient Zones (degrees)

↑

90.0

CAWTc99a.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N40E, Tc-99, MaxG, AMean+90%C

Solution time: 03/09/11 16:33:34

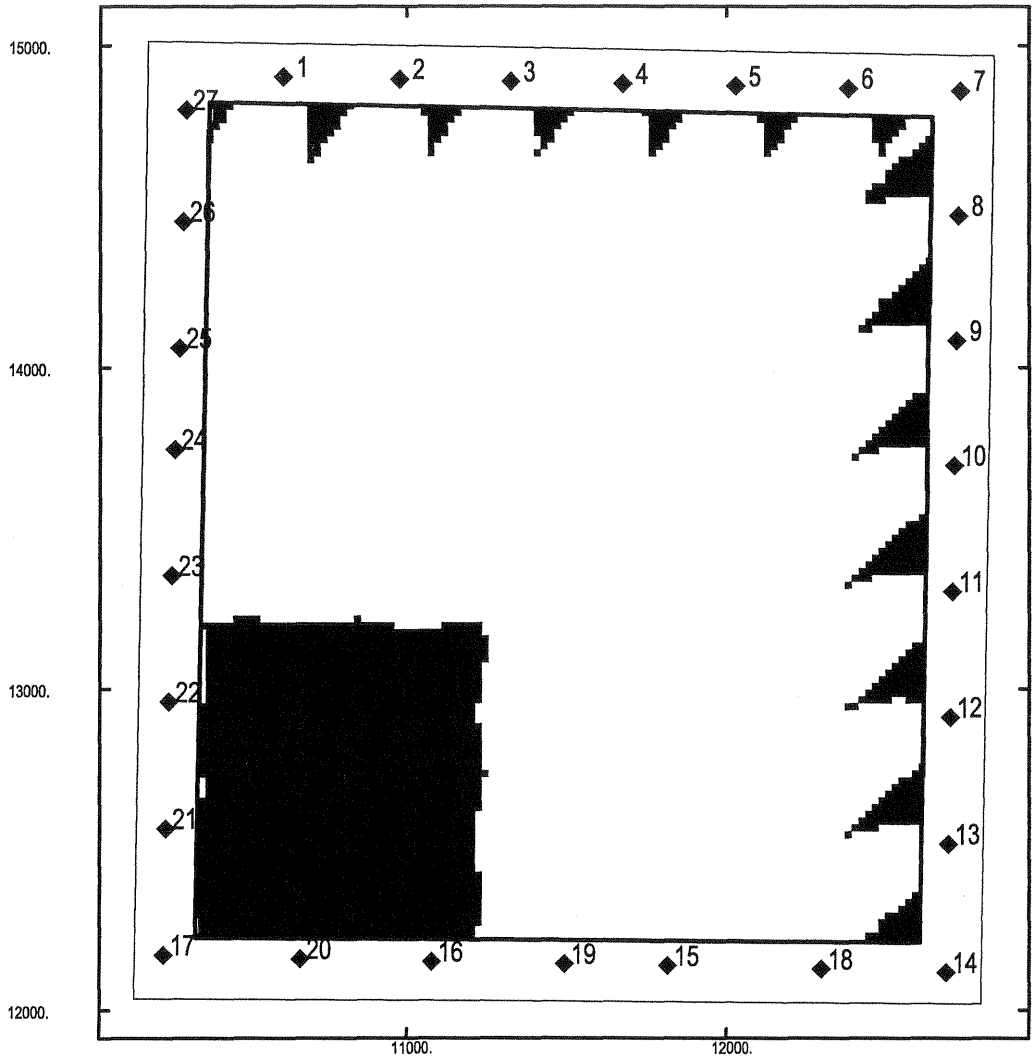
Monitoring Efficiency = 96.2 %

Hydraulic Gradient Zones (degrees)

50.0

CAWTc99b.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N40E, Tc-99, AvgG, GMean >

Solution time: 03/09/11 16:36:28

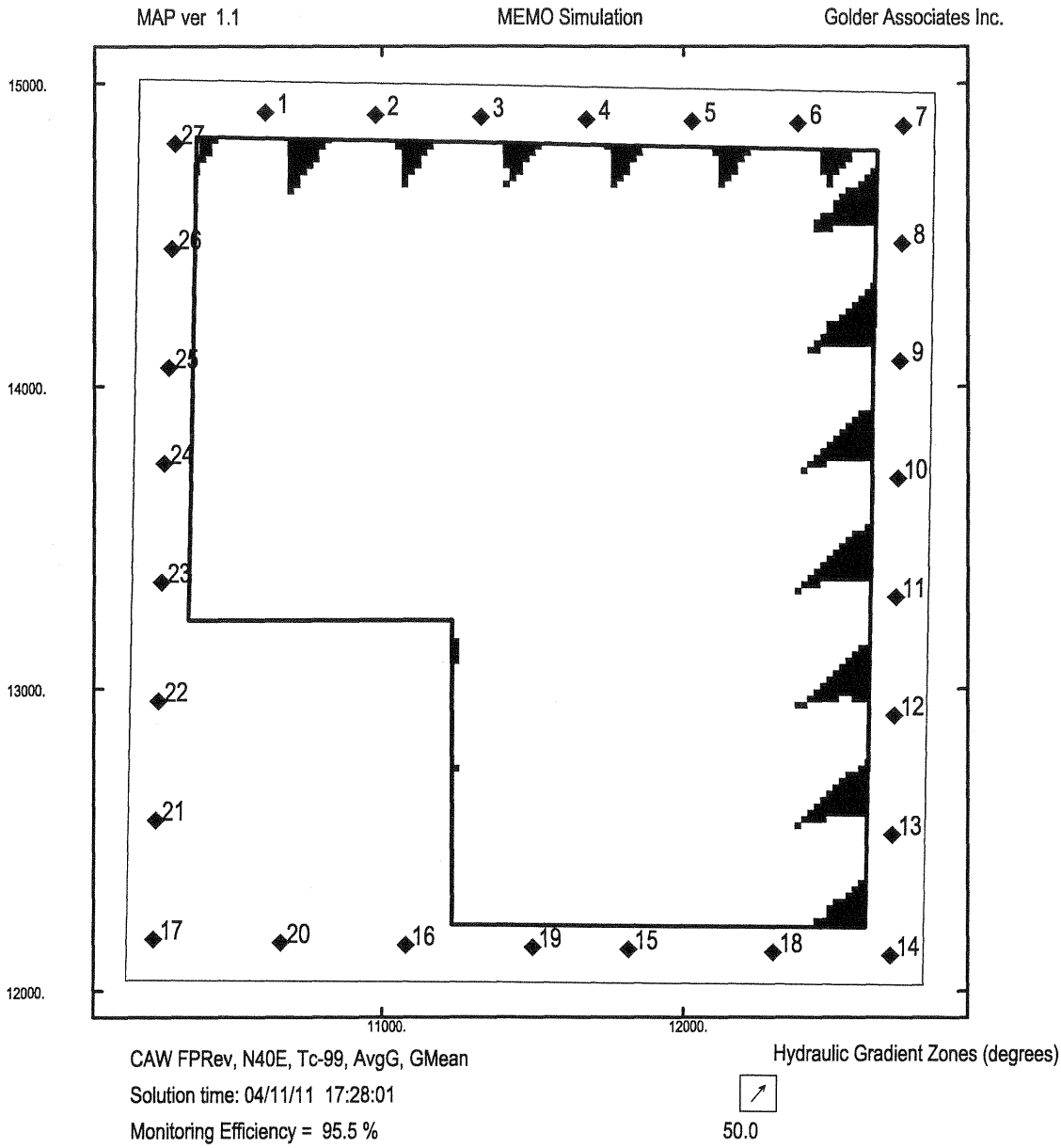
Monitoring Efficiency = 81.5 %

Hydraulic Gradient Zones (degrees)

↗

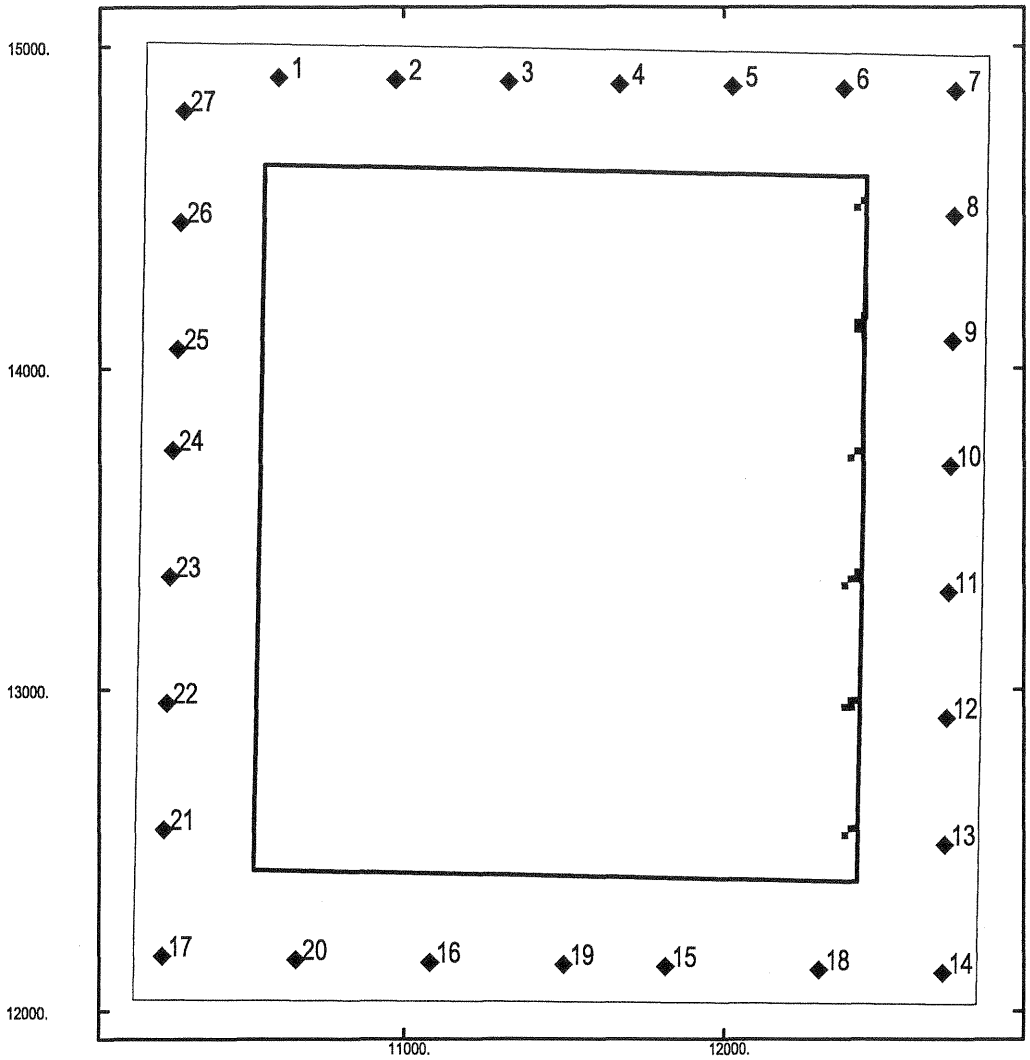
50.0

CAWTc99c.PLT



CAWTc99d.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N40E, Tc-99, MaxG, AMean+90%C

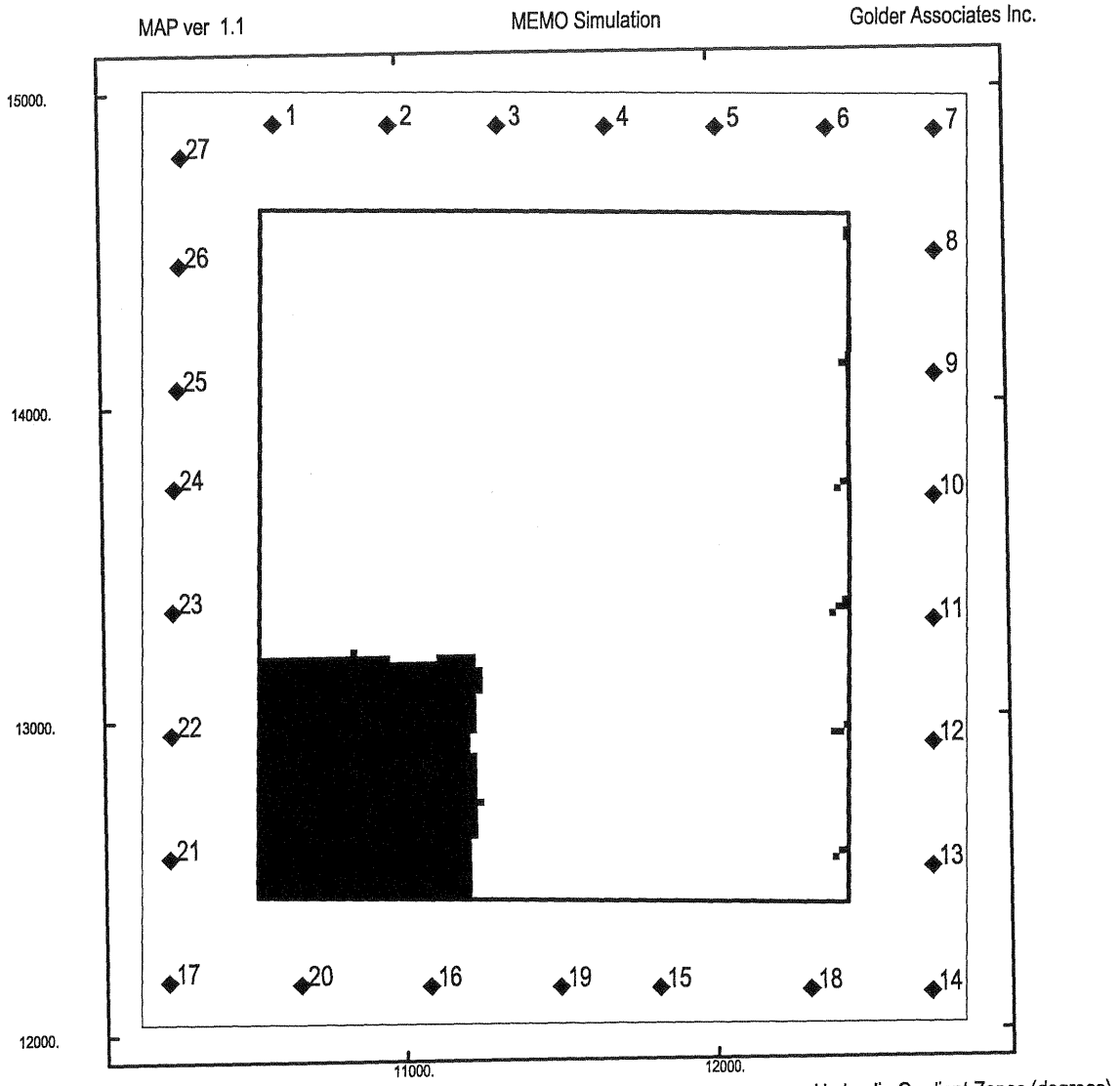
Solution time: 04/11/11 15:27:01

Monitoring Efficiency = 99.8 %

Hydraulic Gradient Zones (degrees)

50.0

CAWTc99e.PLT



CAW TSRev, N40E, Tc-99, AvgG, GMean >

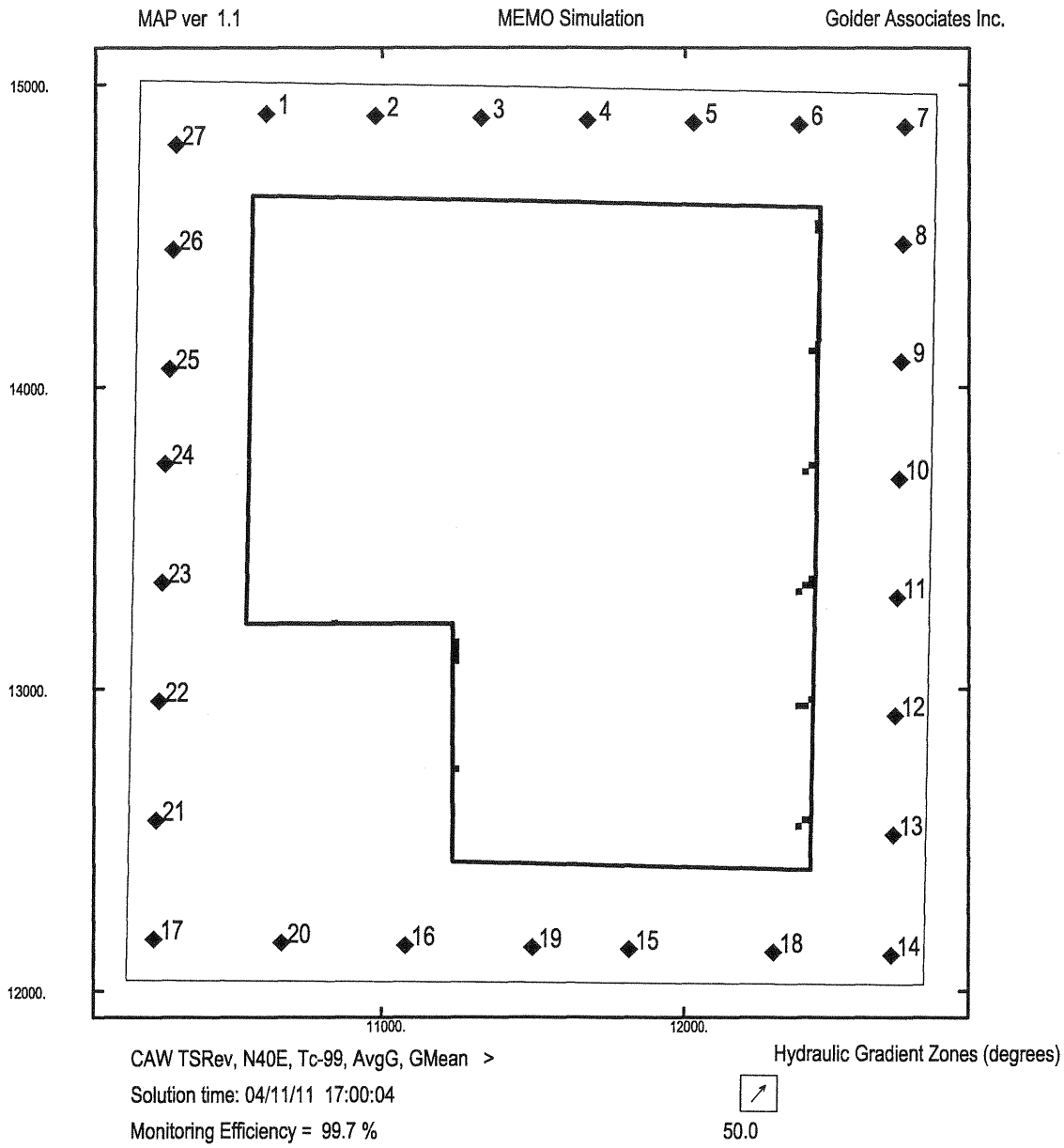
Solution time: 04/11/11 15:32:12

Monitoring Efficiency = 86.9 %

Hydraulic Gradient Zones (degrees)

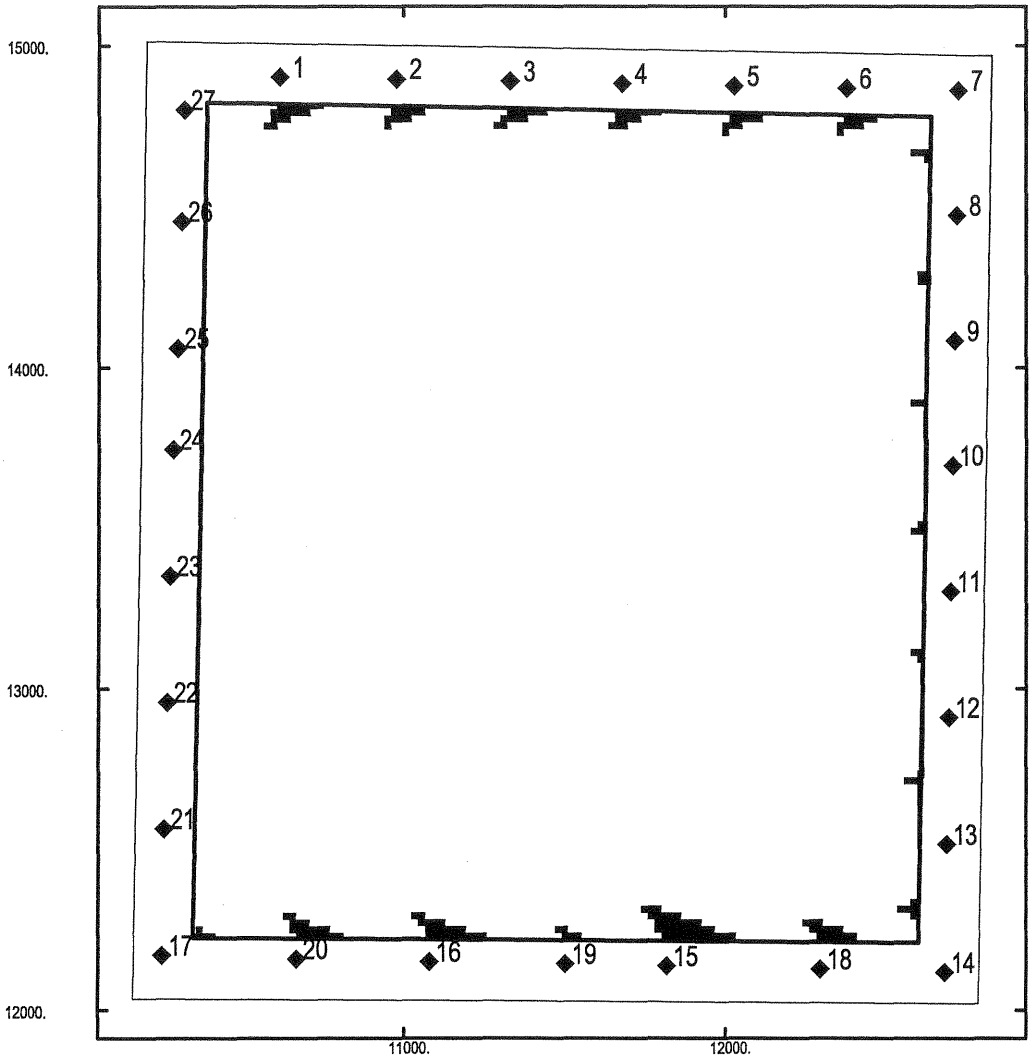
50.0

CAWTc99f.PLT



CAWTc99g.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N90E, Tc-99, MaxG, AMean+90%C

Solution time: 03/09/11 17:37:34

Monitoring Efficiency = 98.5 %

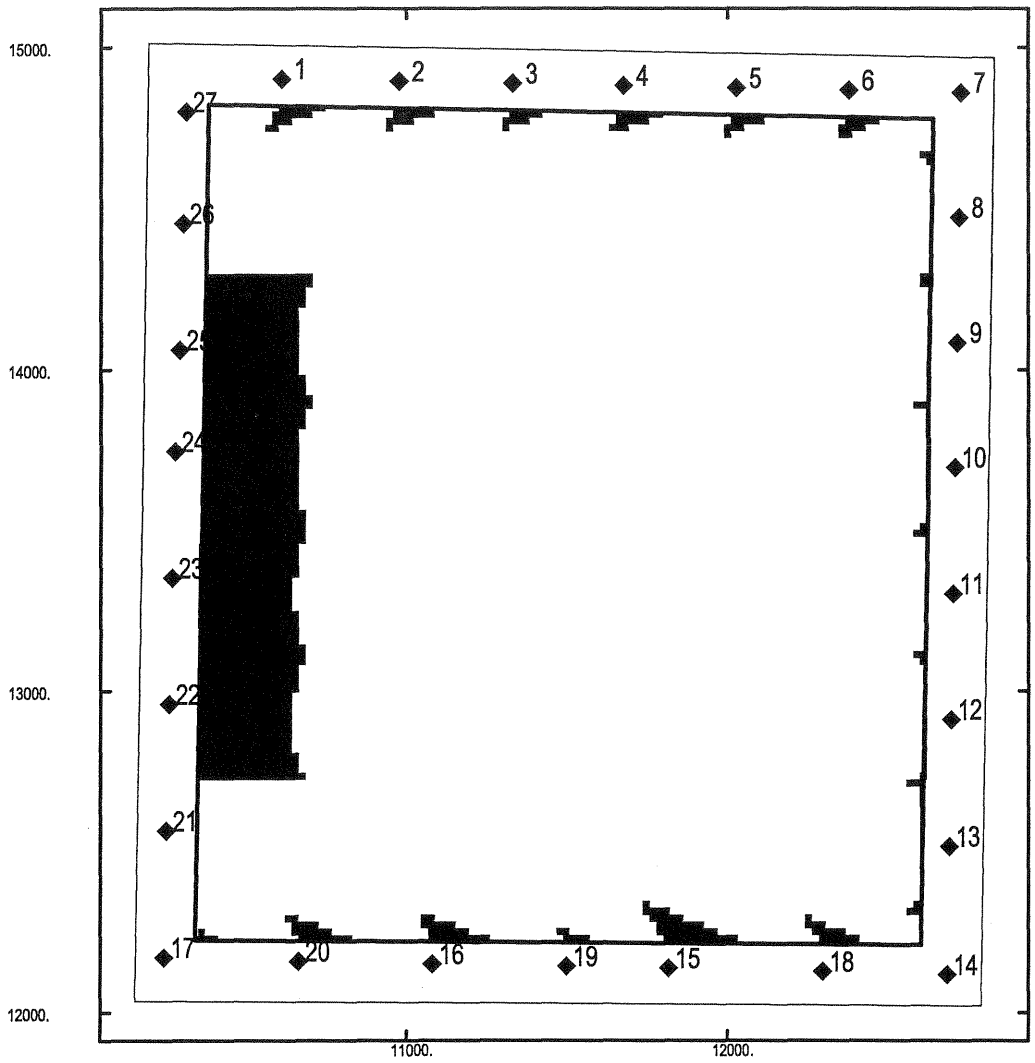
Hydraulic Gradient Zones (degrees)

→

.0

CAWTc99h.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N90E, Tc-99, AvgG, GMean >

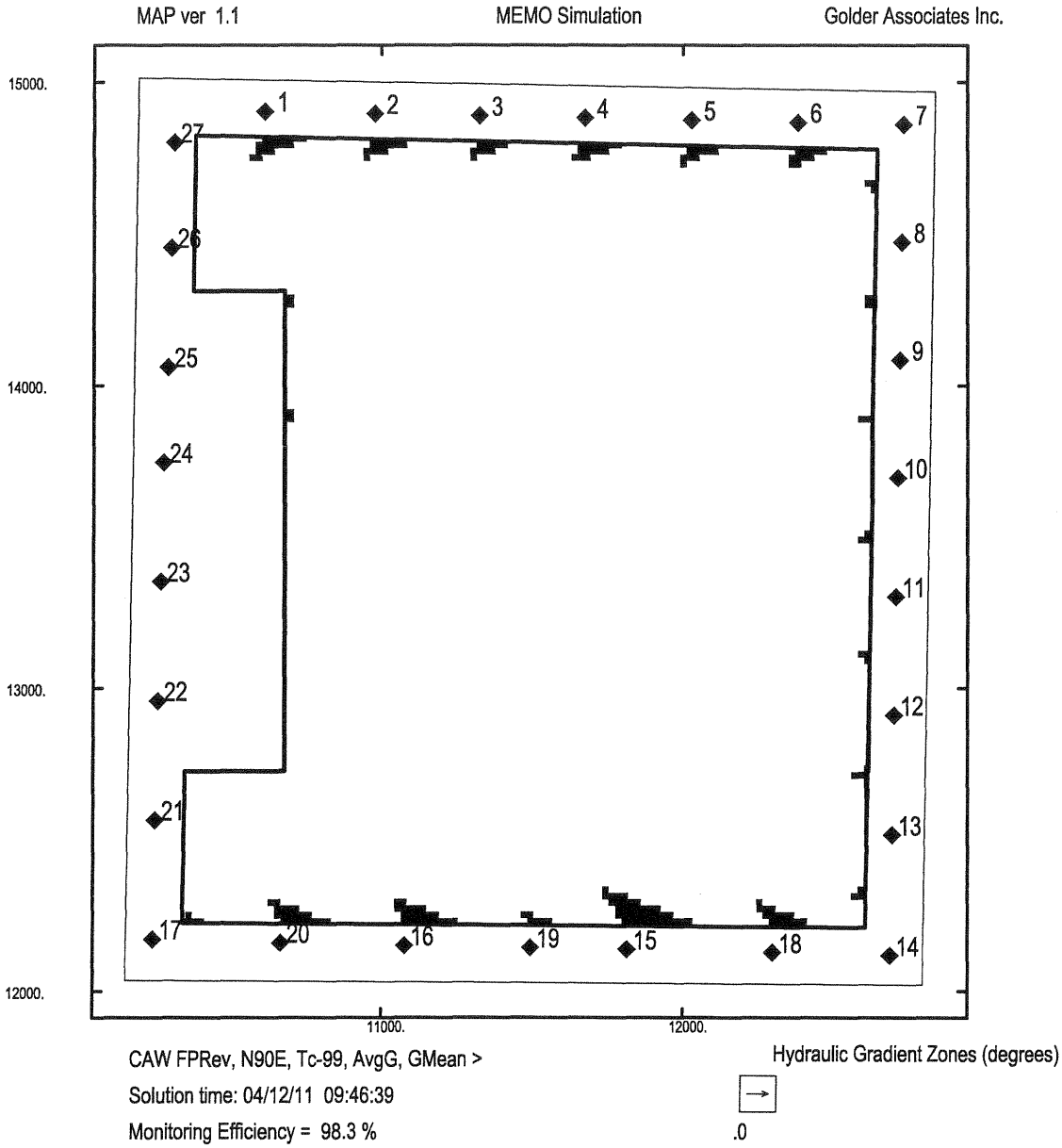
Solution time: 03/09/11 17:58:18

Monitoring Efficiency = 90.2 %

Hydraulic Gradient Zones (degrees)

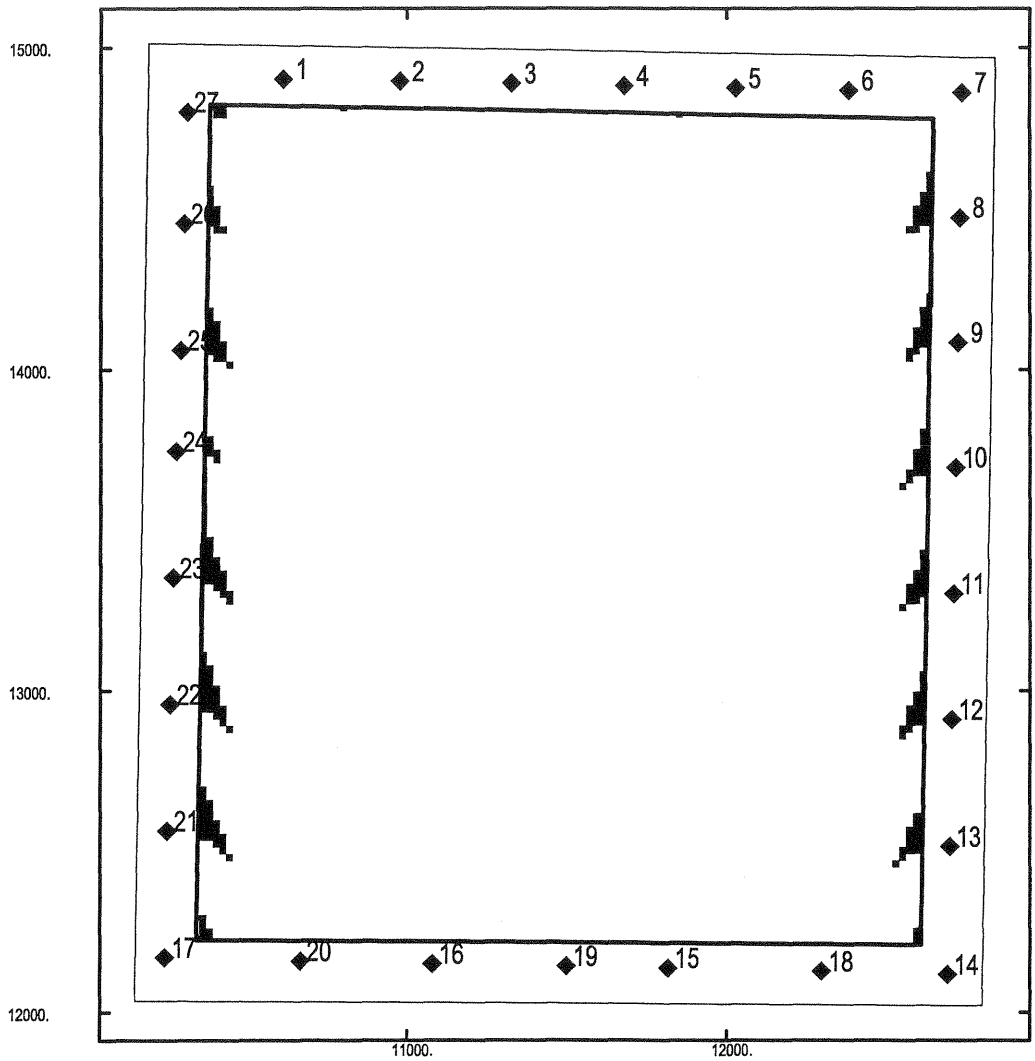
.0

CAWTc99i.PLT



CAWTc99j.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N0E, Tc-99, MaxG, AMean+90%C

Solution time: 03/09/11 18:07:56

Monitoring Efficiency = 98.4 %

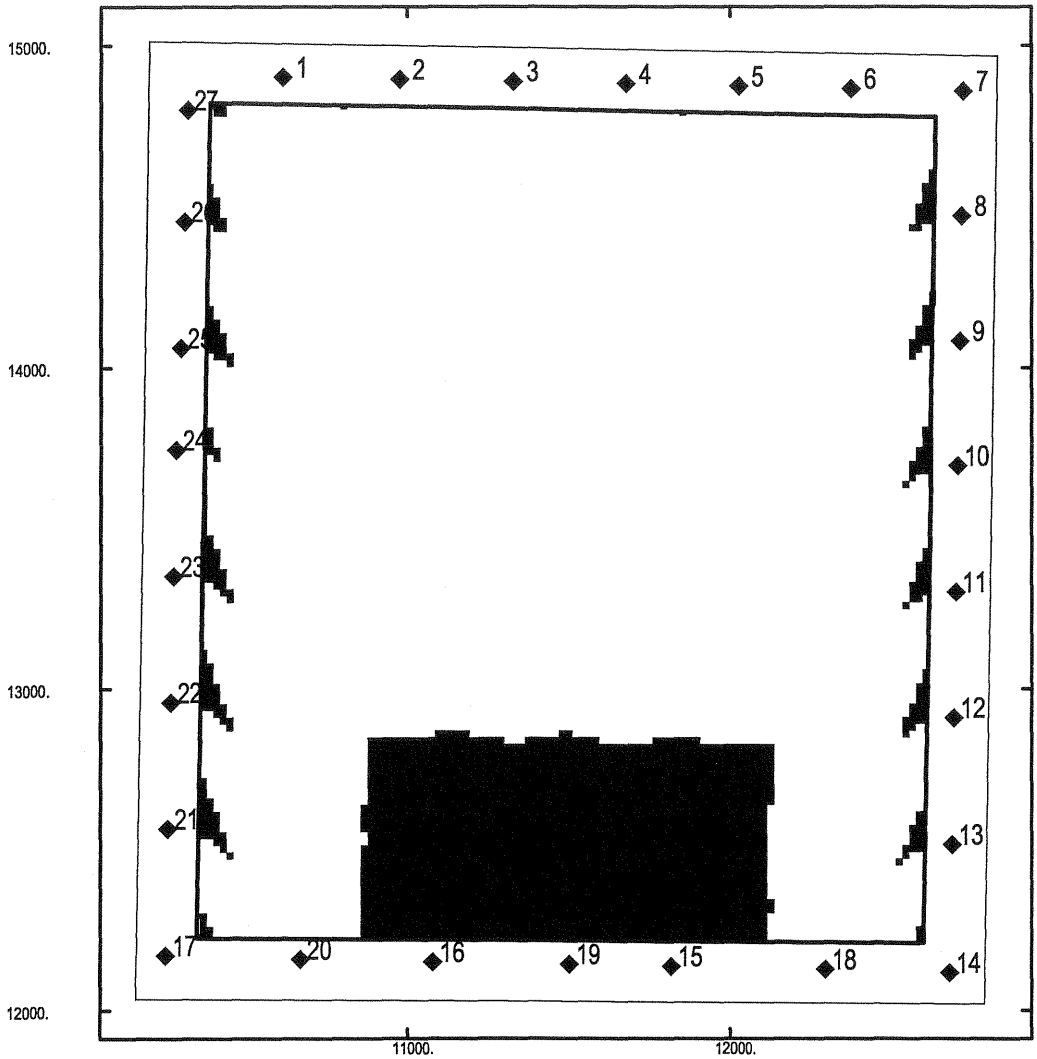
Hydraulic Gradient Zones (degrees)

↑

90.0

CAWTc99k.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N0E, Tc-99, AvgG, GeoMeanHC >

Solution time: 03/10/11 14:06:48

Monitoring Efficiency = 84.8 %

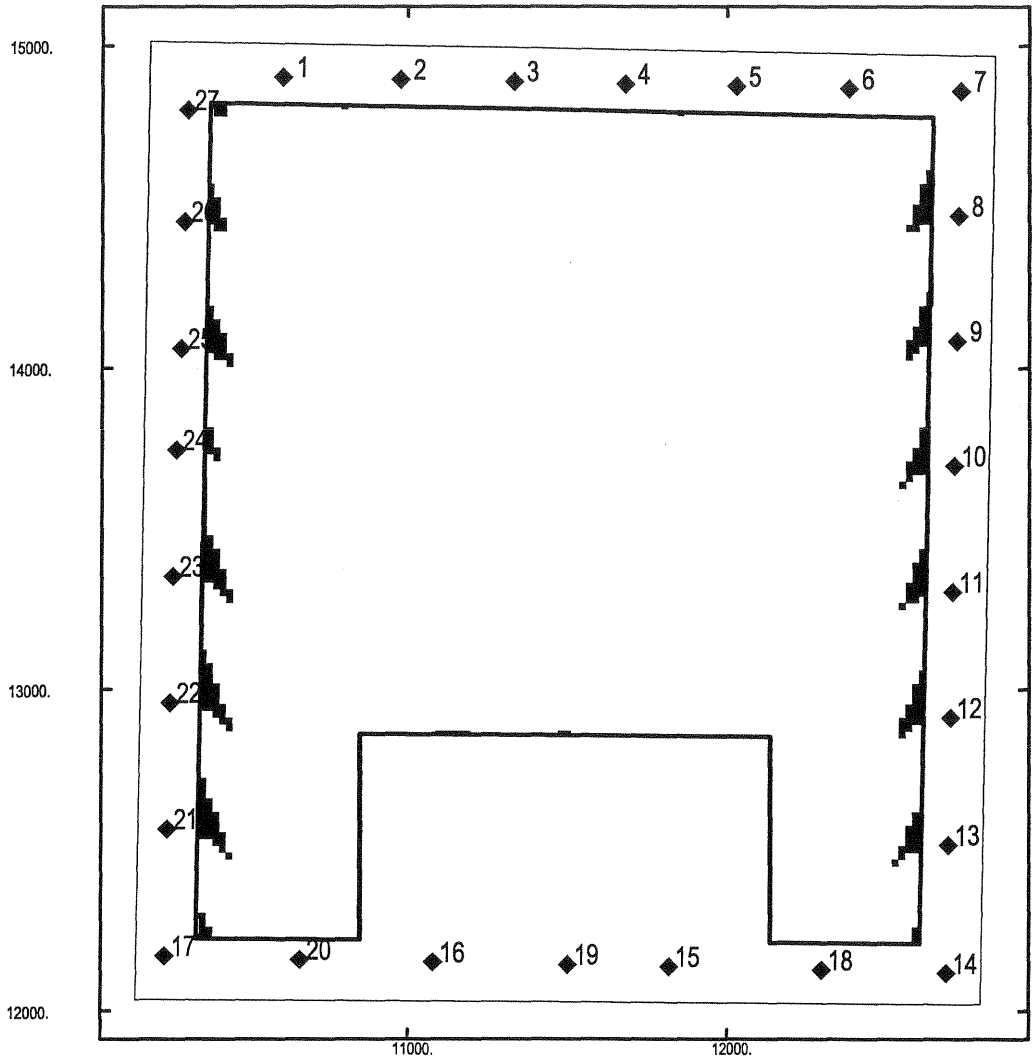
Hydraulic Gradient Zones (degrees)

↑

90.0

CAWTc99L.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW FPRev, N0E, Tc-99, AvgG, GeoMeanHC >

Solution time: 04/11/11 17:42:29

Monitoring Efficiency = 97.9 %

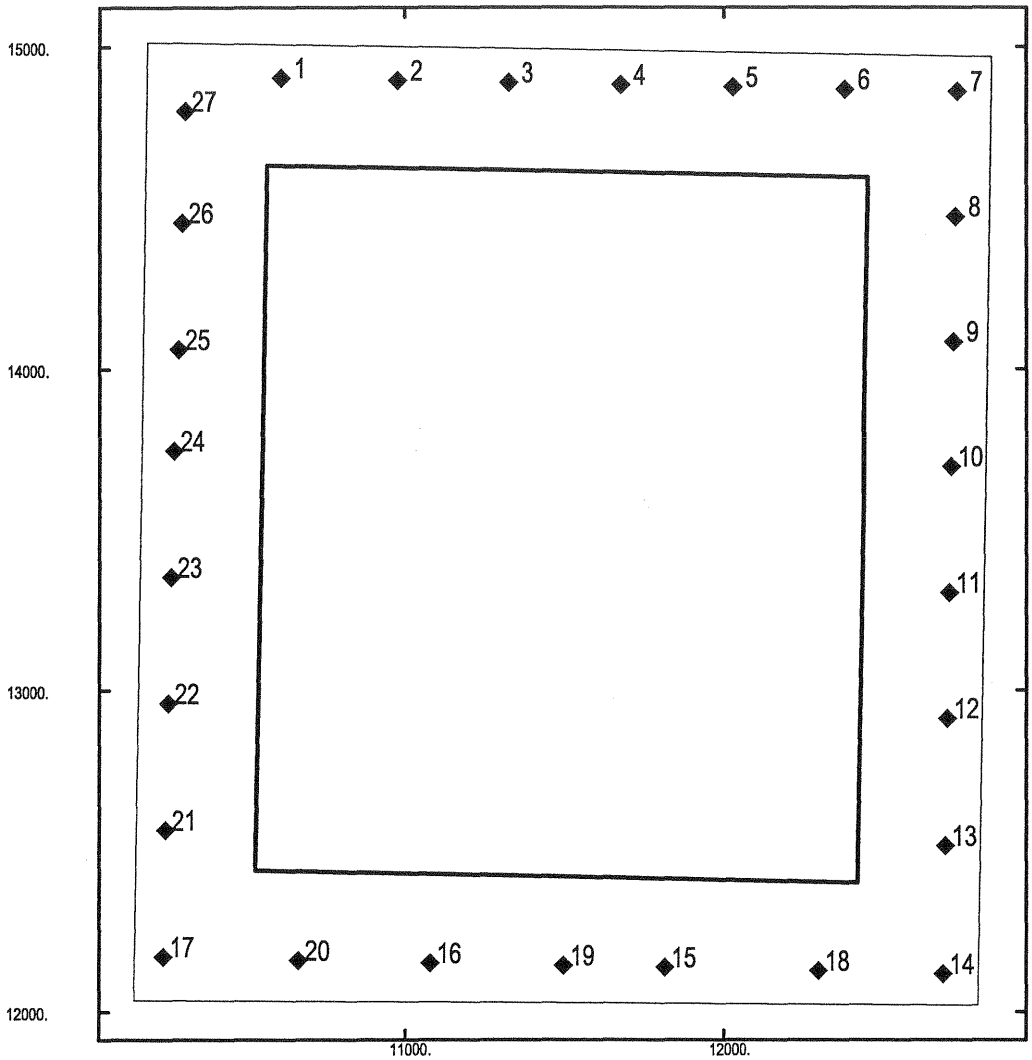
Hydraulic Gradient Zones (degrees)

↑

90.0

CAWTc99m.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N90E, Tc-99, MaxG, AMean+90%C

Solution time: 04/11/11 15:43:55

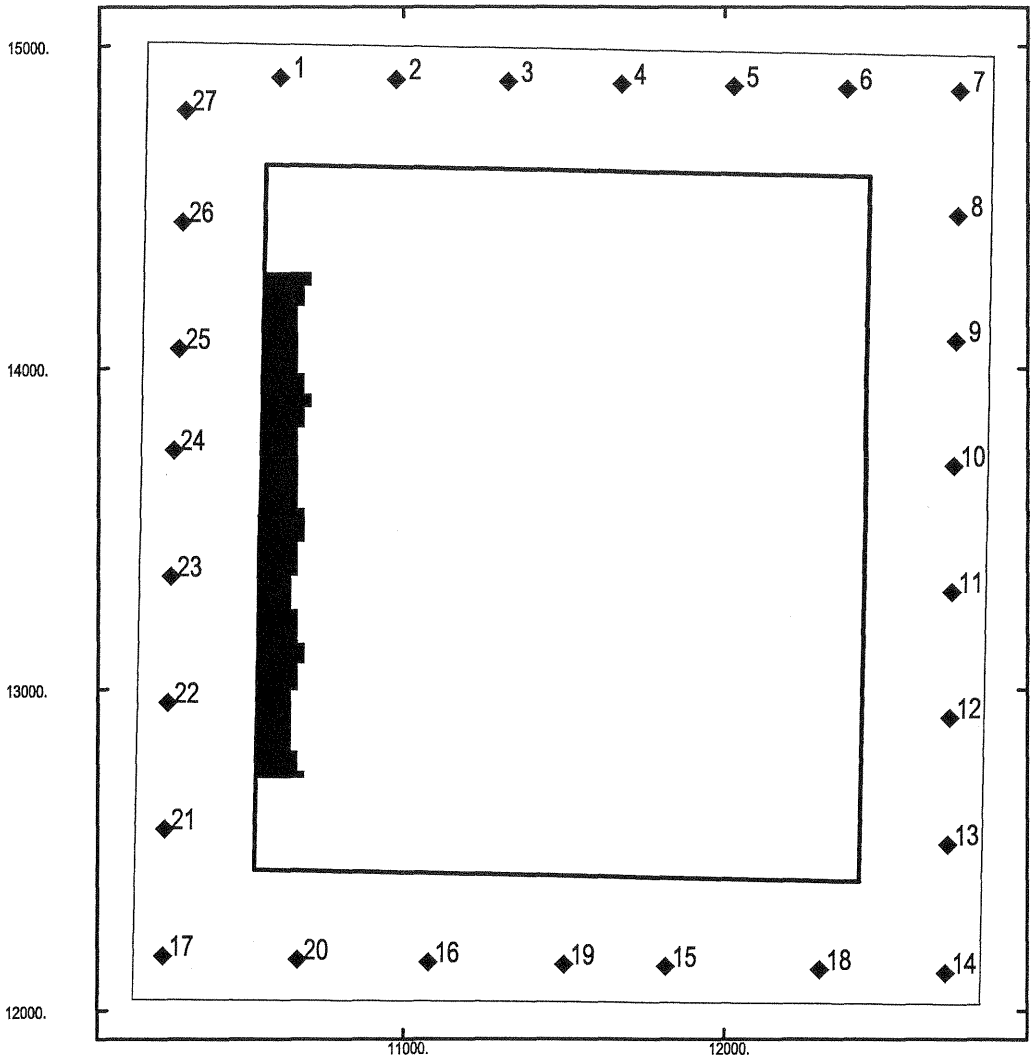
Monitoring Efficiency = 100.0 %

Hydraulic Gradient Zones (degrees)

.0

CAWTc99n.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N90E, Tc-99, AvgG, GMeanHC >

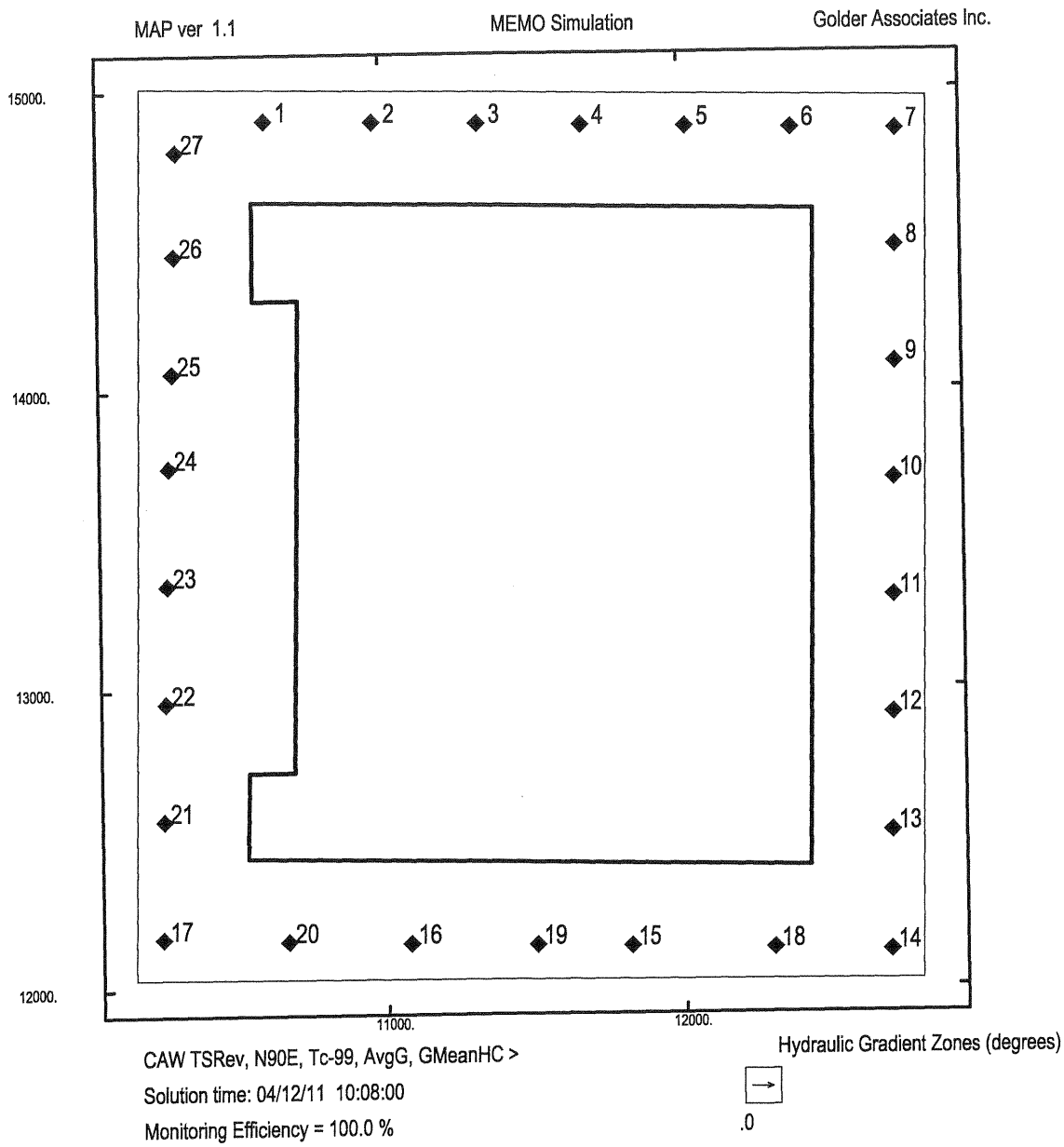
Solution time: 04/11/11 16:23:21

Monitoring Efficiency = 95.4 %

Hydraulic Gradient Zones (degrees)

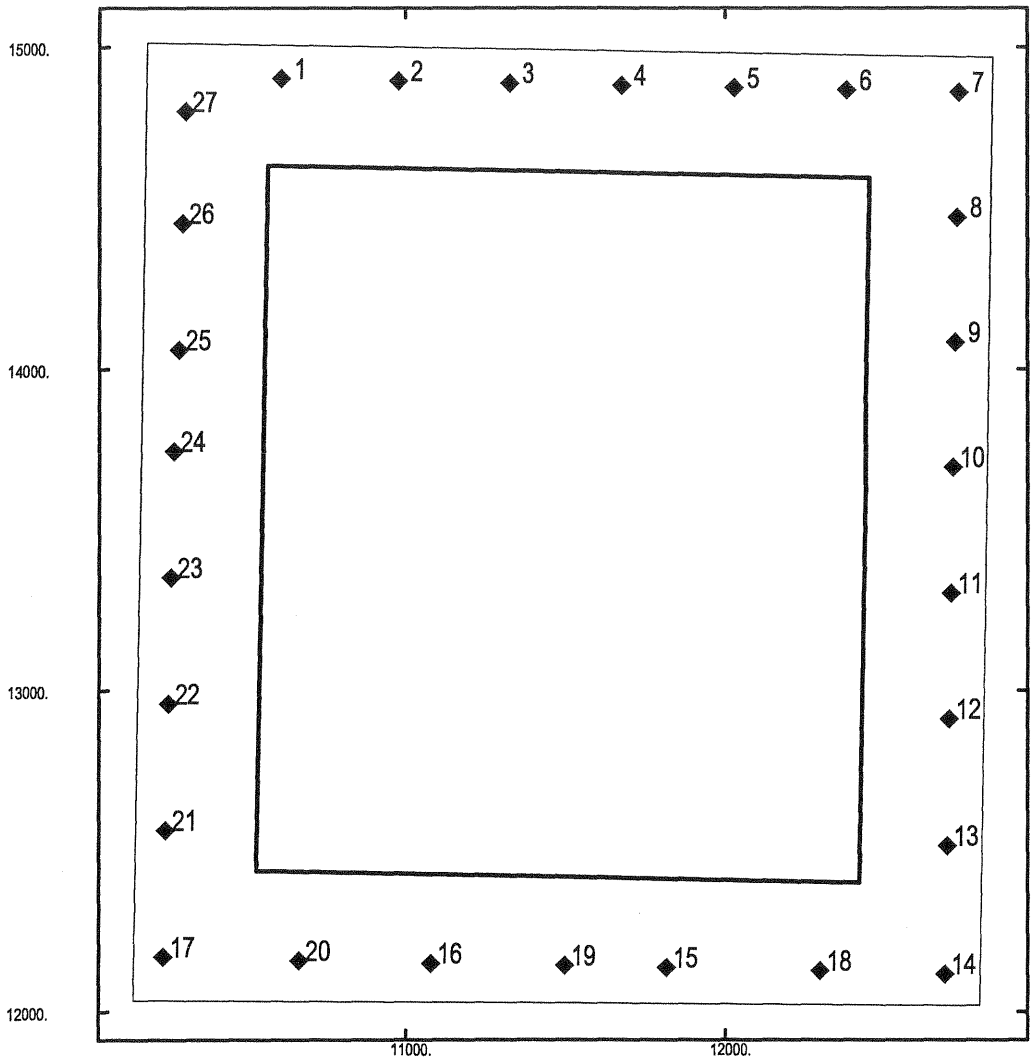
.0

CAWTc99o.PLT



CAWTc99p.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N0E, Tc-99, MaxG, AMean+90%C>

Solution time: 04/11/11 17:08:41

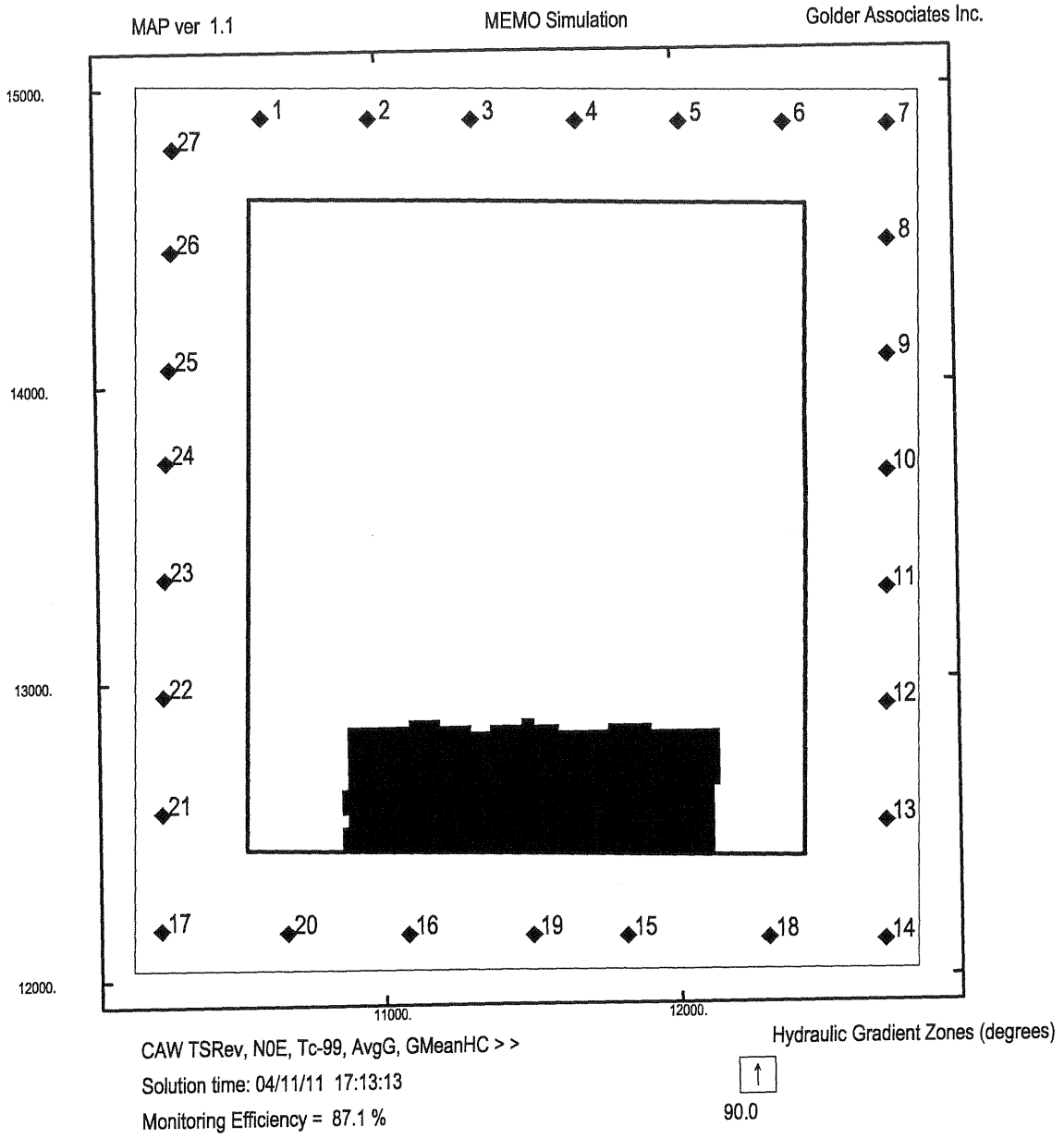
Monitoring Efficiency = 100.0 %

Hydraulic Gradient Zones (degrees)

↑

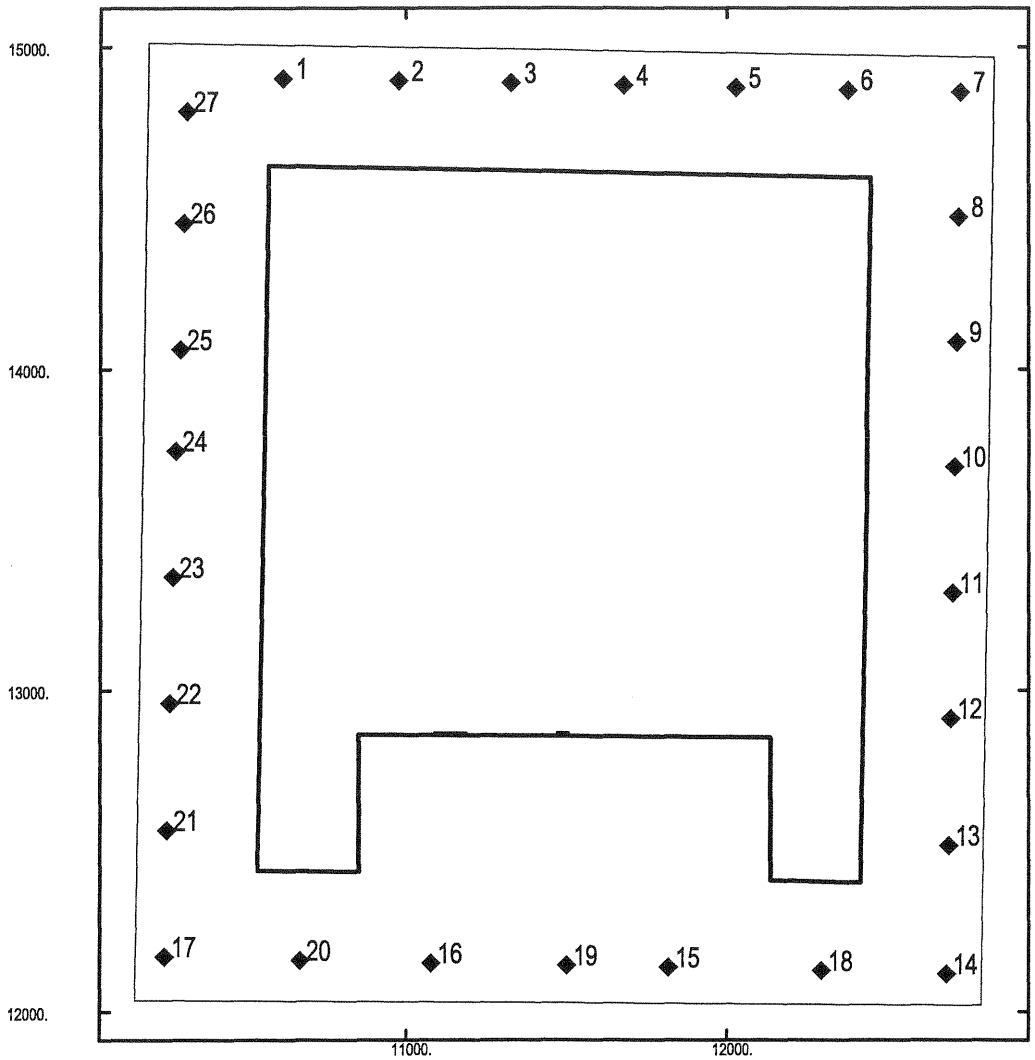
90.0

CAWTc99q.PLT



CAWTc99r.PLT

MAP ver 1.1 MEMO Simulation Golder Associates Inc.



CAW TSRev, N0E, Tc-99, AvgG, GMeanHC > >

Solution time: 04/11/11 17:20:53

Monitoring Efficiency = 99.9 %

Hydraulic Gradient Zones (degrees)

↑

90.0