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SWIFT GREAT MIAMI AQUIFER MODEL SUMMARY OF IMPROVEMENTS REPORT VOLUME II DRAFT FINAL REVISION B APRIL 1994

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SWIFT Great Miami Aquifer Model Summary of Improvements Report

Volume II
Illustrations

Fernald Environmental Management Project
April 1994
Draft Final Revision B

Submitted by:
U.S. Department of Energy
Fernald Office
P.O. Box 398705
Cincinnati, Ohio 45239-8705

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SWIFT Great Miami Aquifer Model
Summary of Improvements Report - Illustrations

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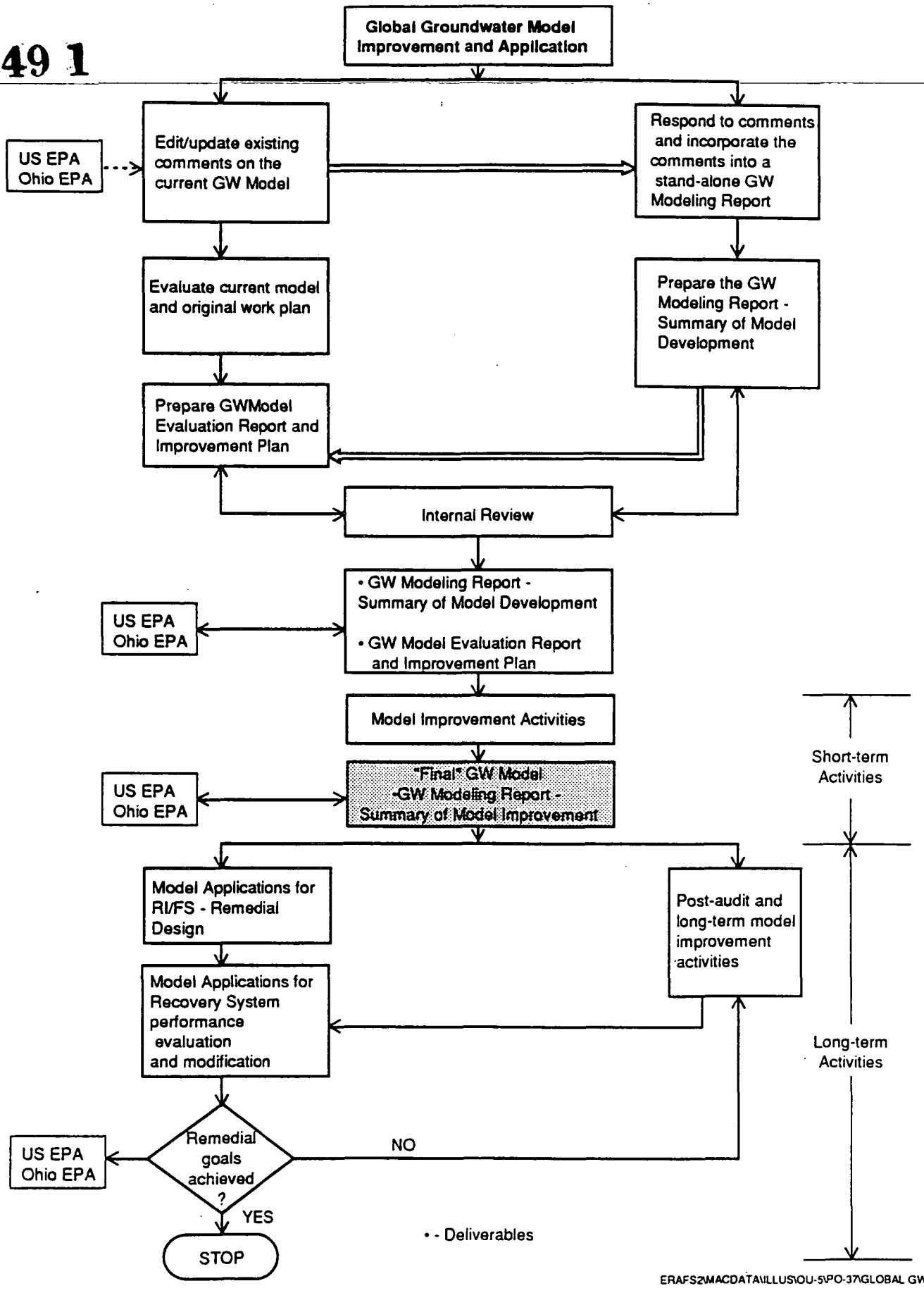

Figure 1-1 - Overall Model Improvement Program

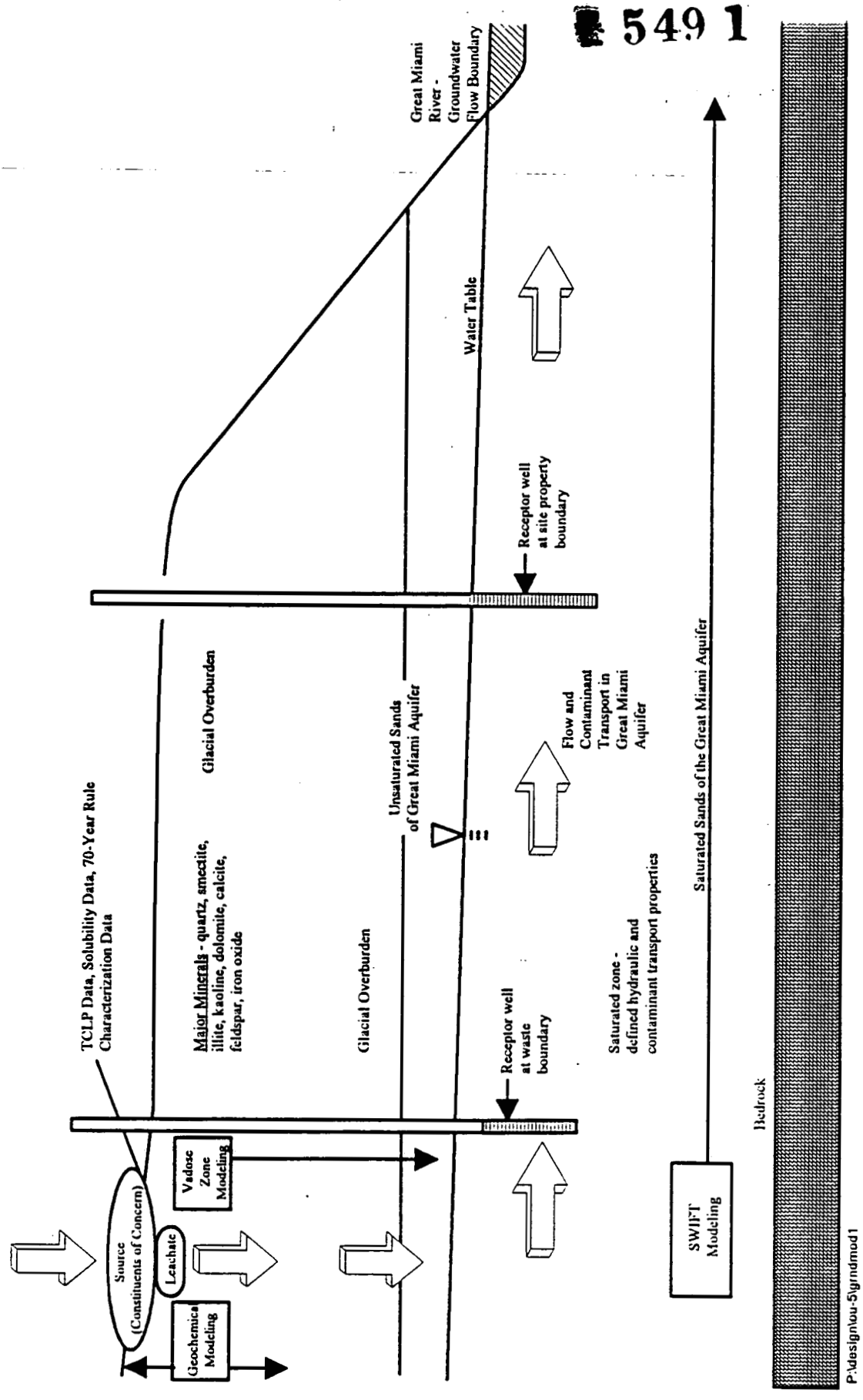

Figure 1.3-1 - Current Modeling Domain

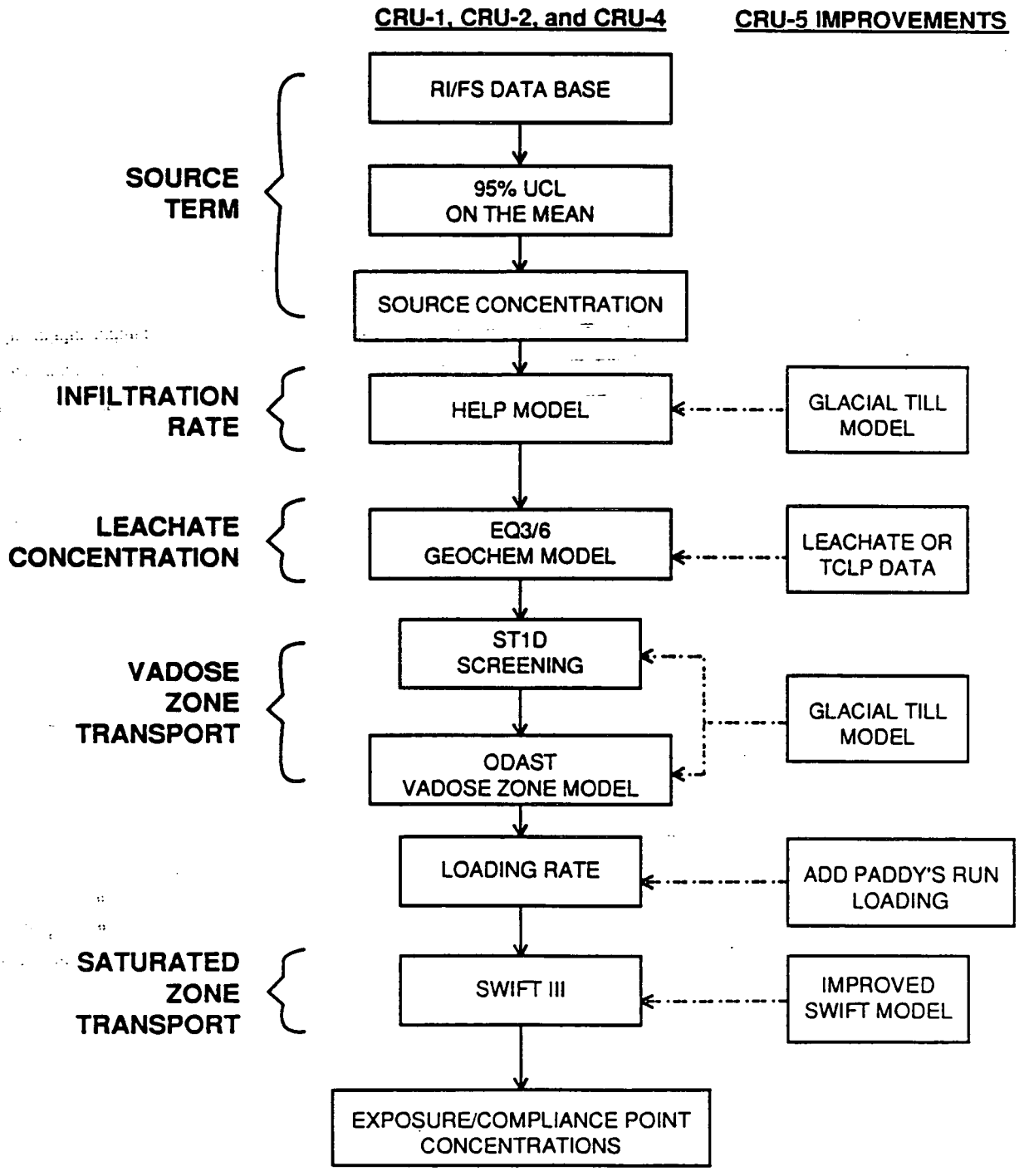

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Figure 1.3-2 - Groundwater Fate and Transport Modeling Approach

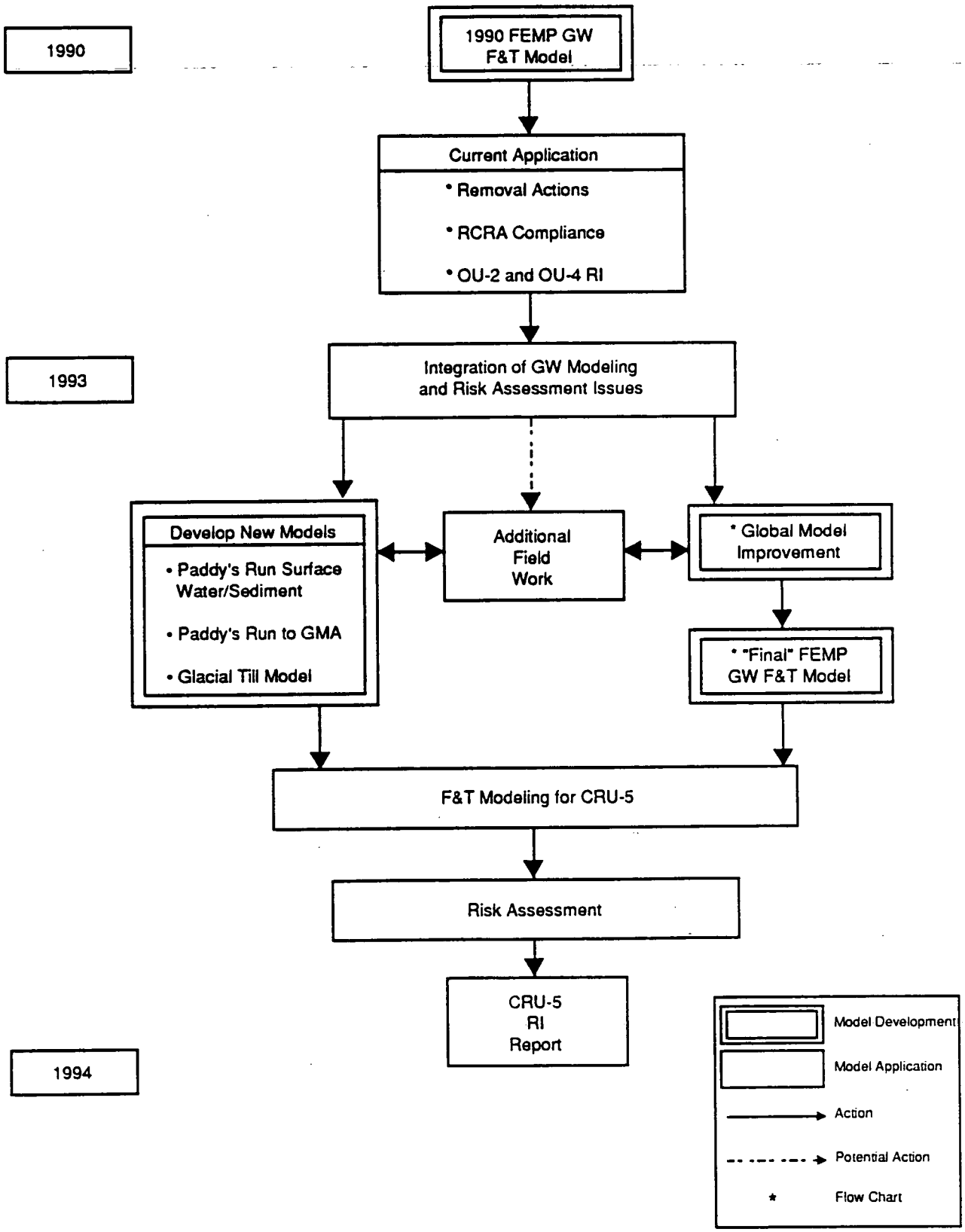

Figure 1.3-3 - Groundwater F&T Modeling for CRU-5

Table 1.2-1 - Comparison of Original and Revised Data Used for GMA Model Design and Calibration

Parameter	Original Data Set	Data Set in Improved Model
Steady-state groundwater elevations for boundaries and calibration targets	Single measurement event - April 1986	Kriged - average from January 1990 to present, wells installed since 1986 added to data set
Horizontal hydraulic conductivity	Historical studies in the region - refined during calibration	Historical studies in the region updated with South Plume Pumping Test and slug test results
Vertical hydraulic conductivity	Historical studies in the region and literature values	Historical studies in the region, literature values, and South Plume Pumping Test results
Pumping wells locations and rates	Data collected from users and recent studies - refined during calibration	Data collected from users and recent studies
Porosity	Literature	Transient calibration
Rock compressibility	Literature	Transient calibration
Bedrock surface configuration	Seismic study and well logs	Seismic study and well logs updated with recent 4000 series wells
Blue clay configuration and thickness	Well logs	Well logs
River elevations	HEC 2 modeling from Zone of Influence Study	River gauging data from 1990 to present
Uranium loading through glacial overburden	Site operations history - refined during calibration	GMA monitored uranium data defines initial conditions
Uranium concentrations in GMA for calibration targets	Average and confidence interval from compilation of all data from 1985 to 1989	Kriged - average for 1990, 1991, 1992, 1993 - modified to reflect recent trends seen in field, updated with wells installed since 1990
Kd	Results of geochemical study (miscalculated) - refined during calibration	Recalculated results from geochemical study and additional aquifer testing - refined during calibration

Table 1.2-1 - Comparison of Original and Revised Data Used for GMA Model Design and Calibration (Continued)

Parameter	Original Data Set	Data Set in Improved Model
Dispersivity	Literature - refined during calibration	Literature - refined during calibration
River leakage	Zone of Influence Study - refined during calibration	Zone of Influence Study - refined during calibration
Paddys Run hydraulic and uranium loading	Historical site operations data - refined during calibration	Paddys Run model output - GMA uranium data defines initial conditions
Recharge	Historical regional studies - refined during calibration	Historical regional studies, HELP* modeling, supplemental model output - refined during calibration

* HELP (Hydrologic Evaluation of Landfill Performance) is a computer modeling code developed by the U.S. Army Corps of Engineers to simulate water movement across, into, through, and out of landfills.

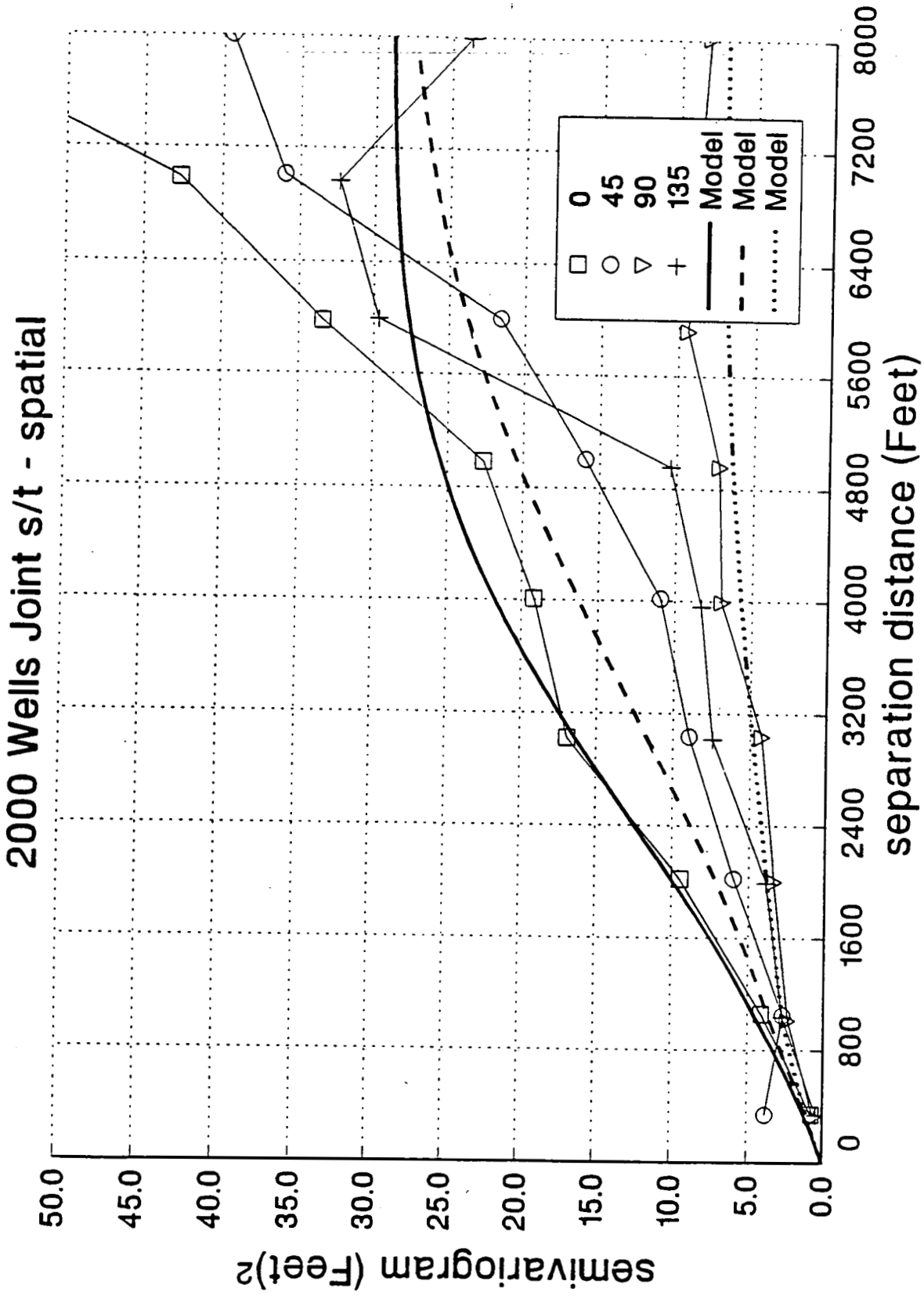

Figure 2.2-1 - Spatial Semivariograms for 2000 Series Joint Spatial-Temporal Analysis

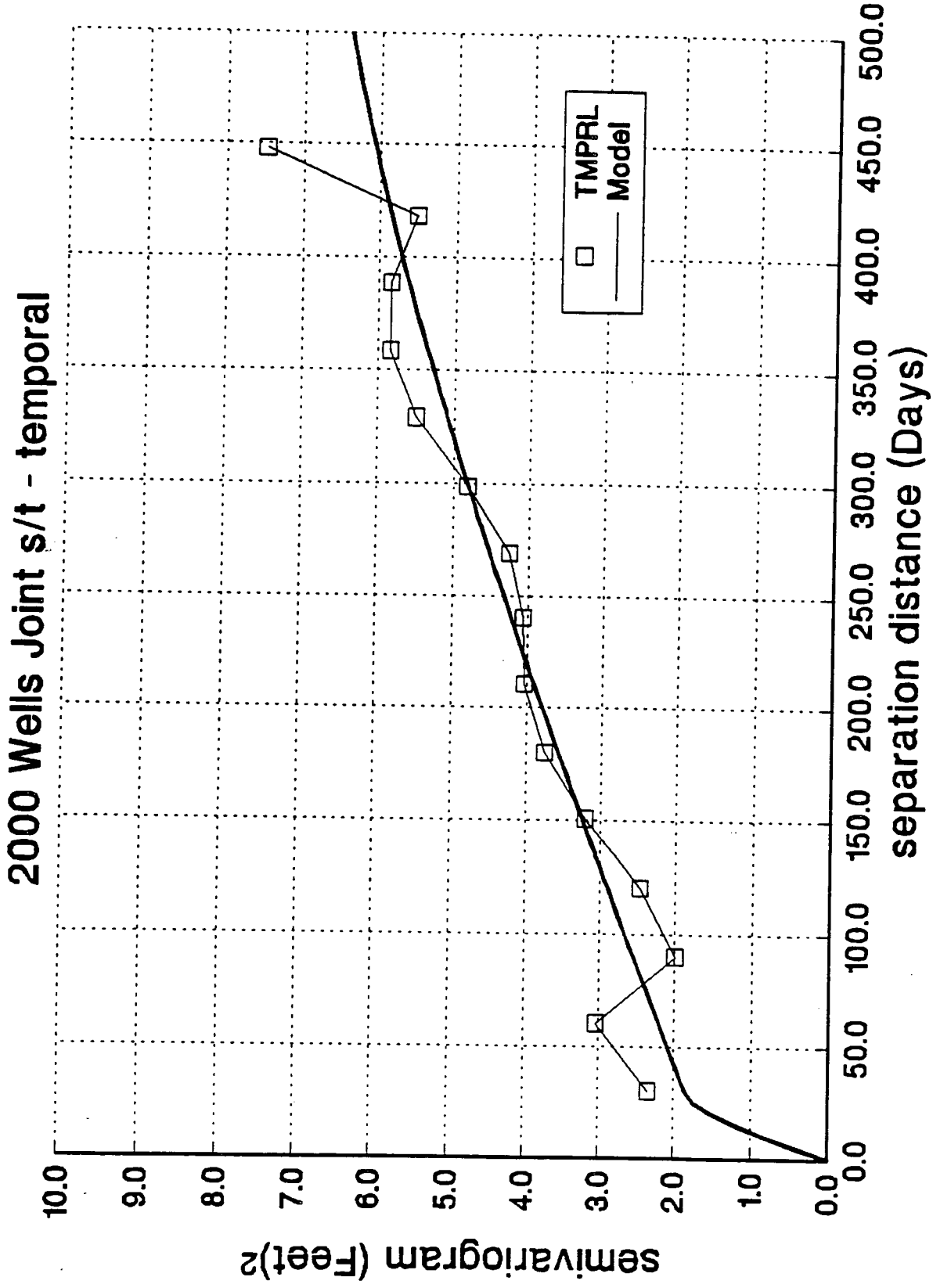

Figure 2.2-2 - Temporal Semivariograms for 2000 Series Joint Spatial Temporal Analysis

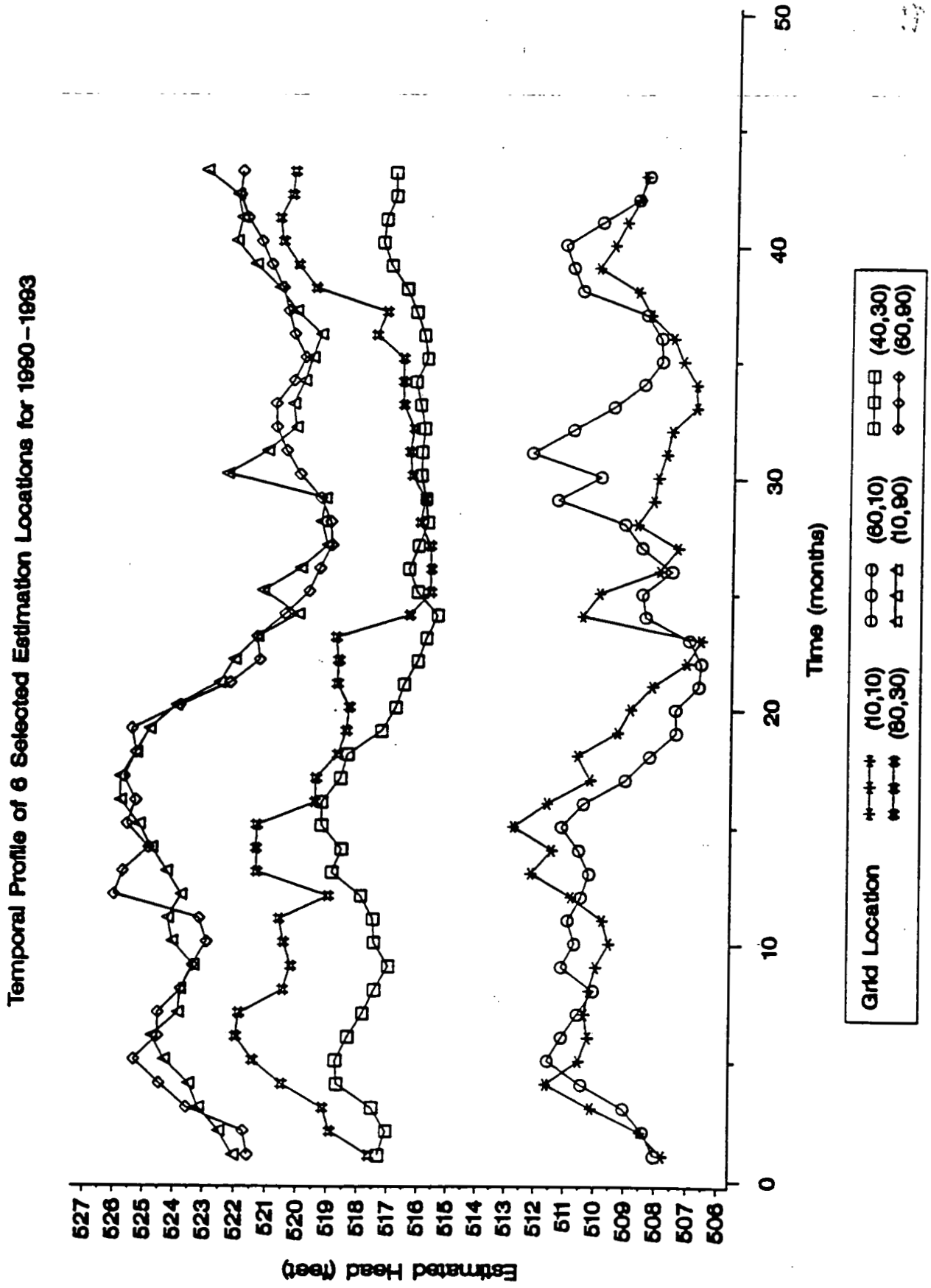

Figure 2.2-3 - Monthly 2000 Series Water Level Changes at Six Representative Locations

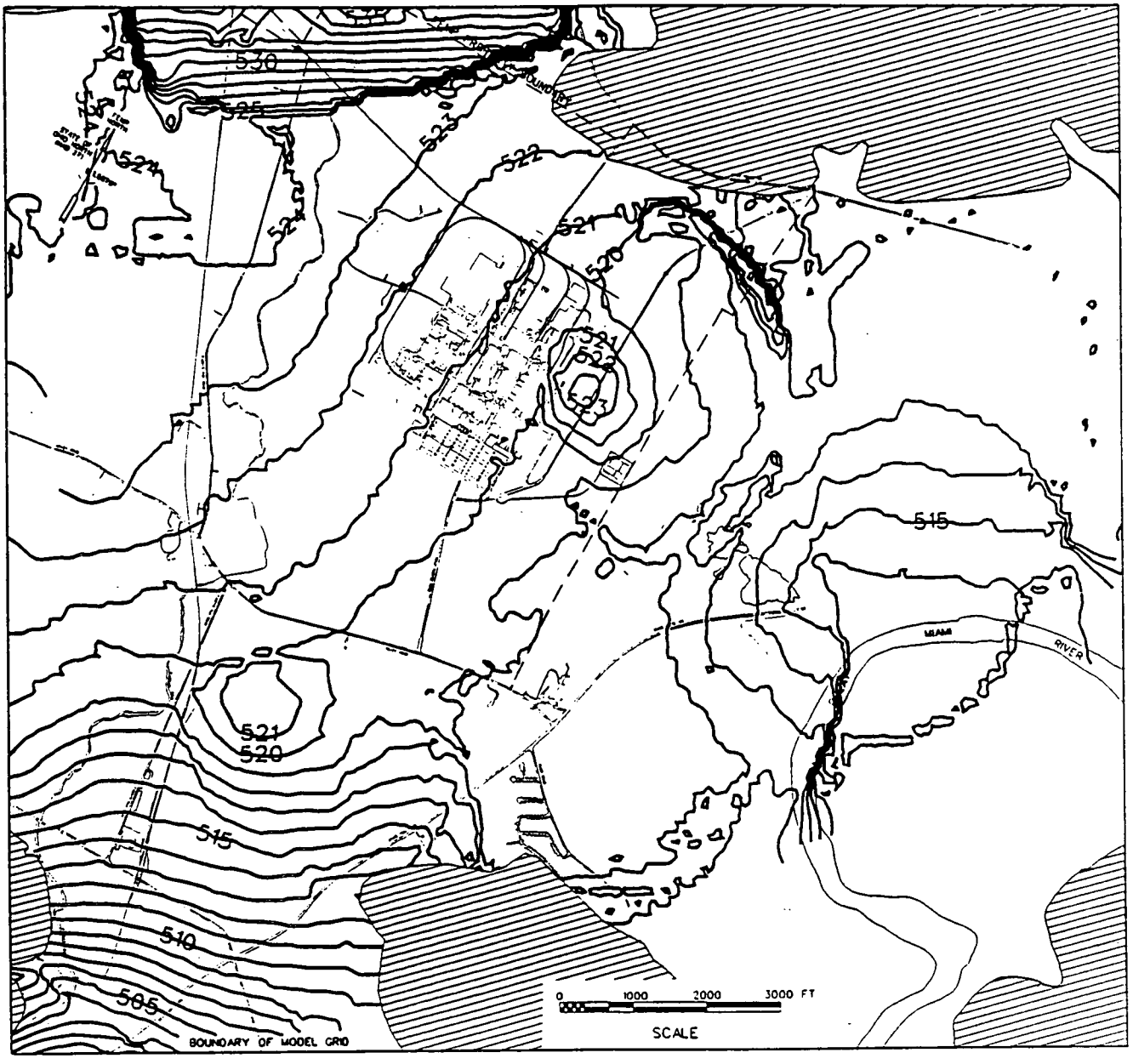

Figure 2.2-4 - Estimated April 1991 Water Levels (feet) in 2000 Series Wells

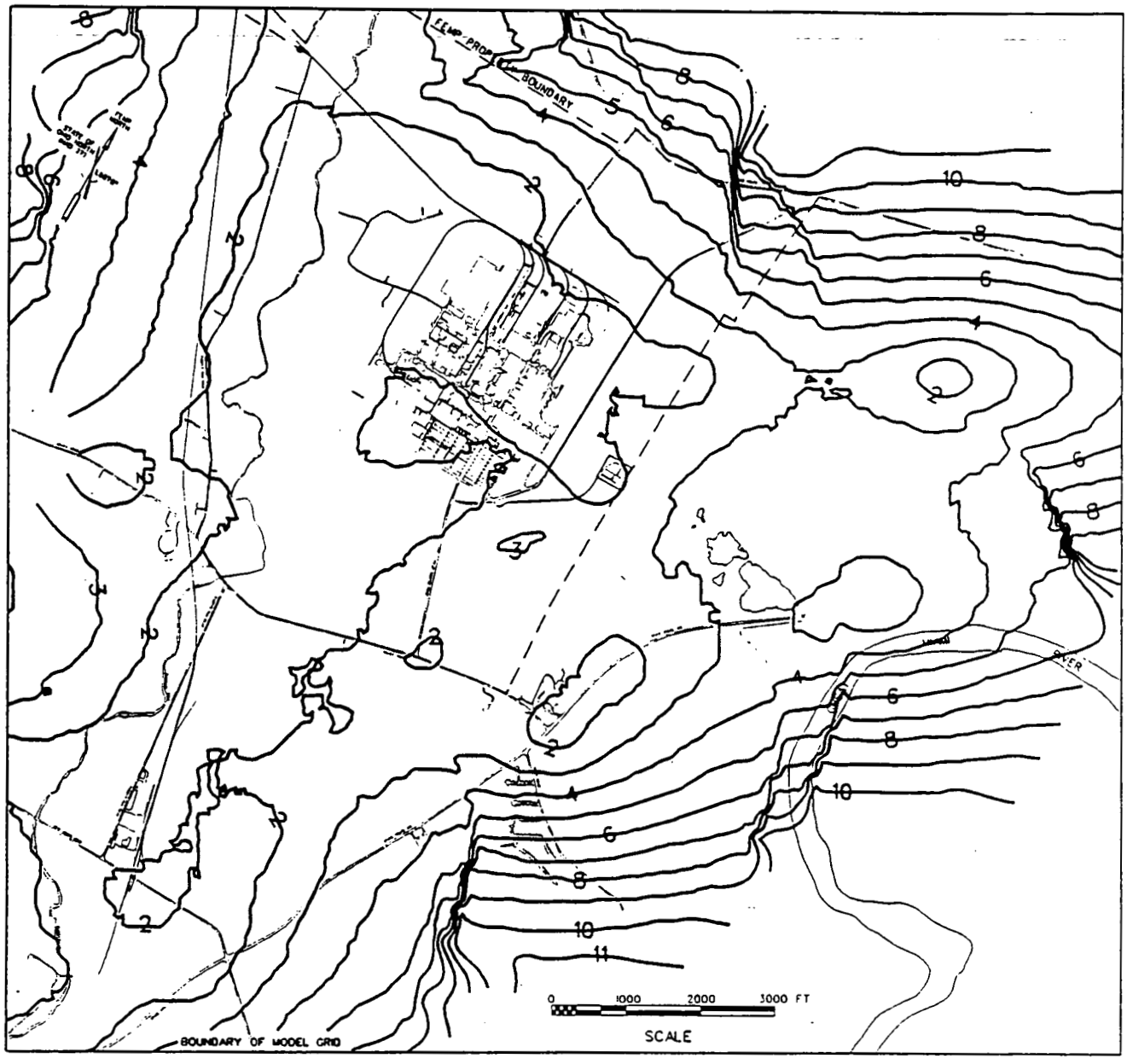

Figure 2.2-5 - Statistical Uncertainty (feet) Associated with Water Level Estimates in Figure 2.2-4

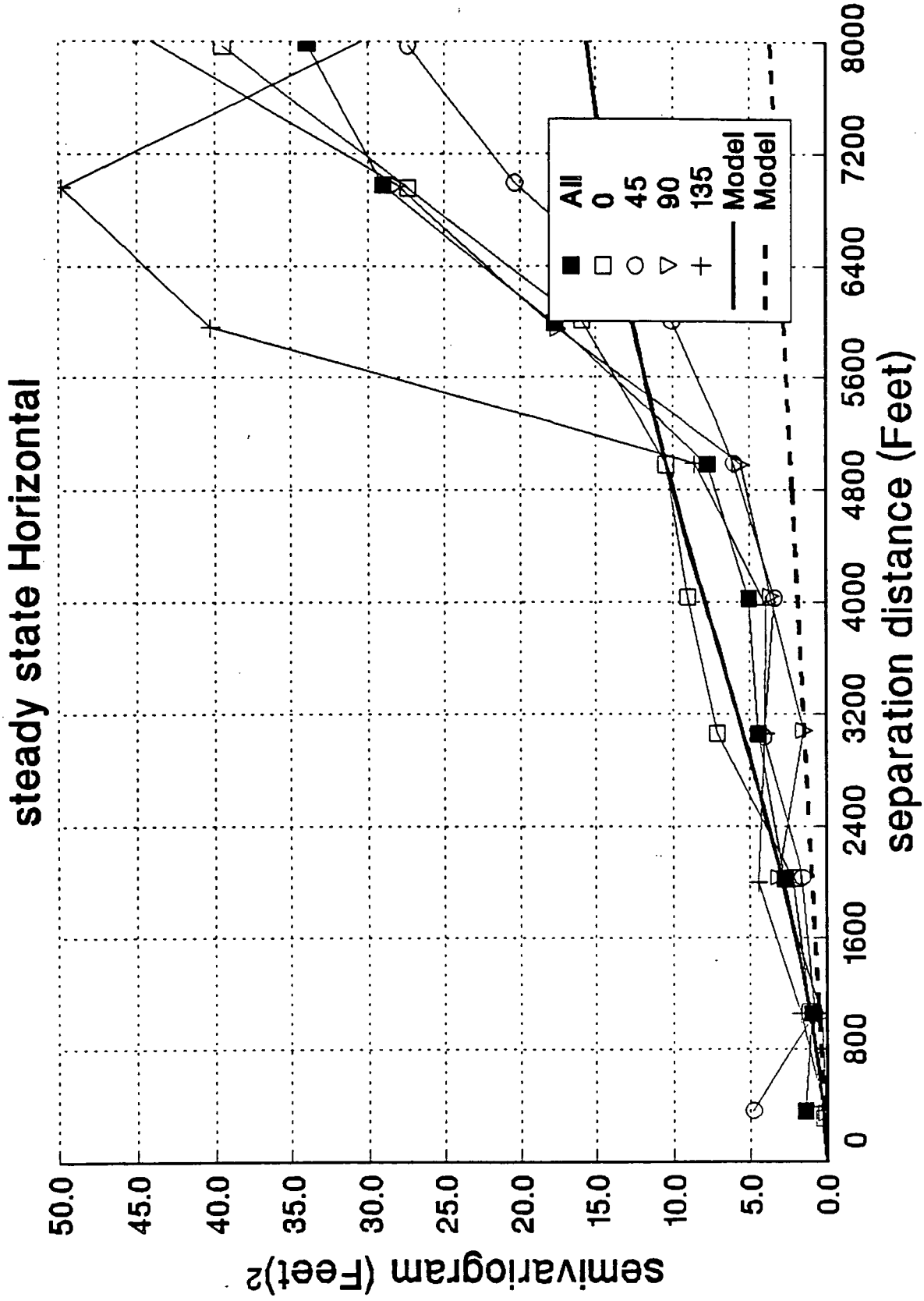

Figure 2.2-6 - Horizontal Semivariograms for Steady-State Analysis

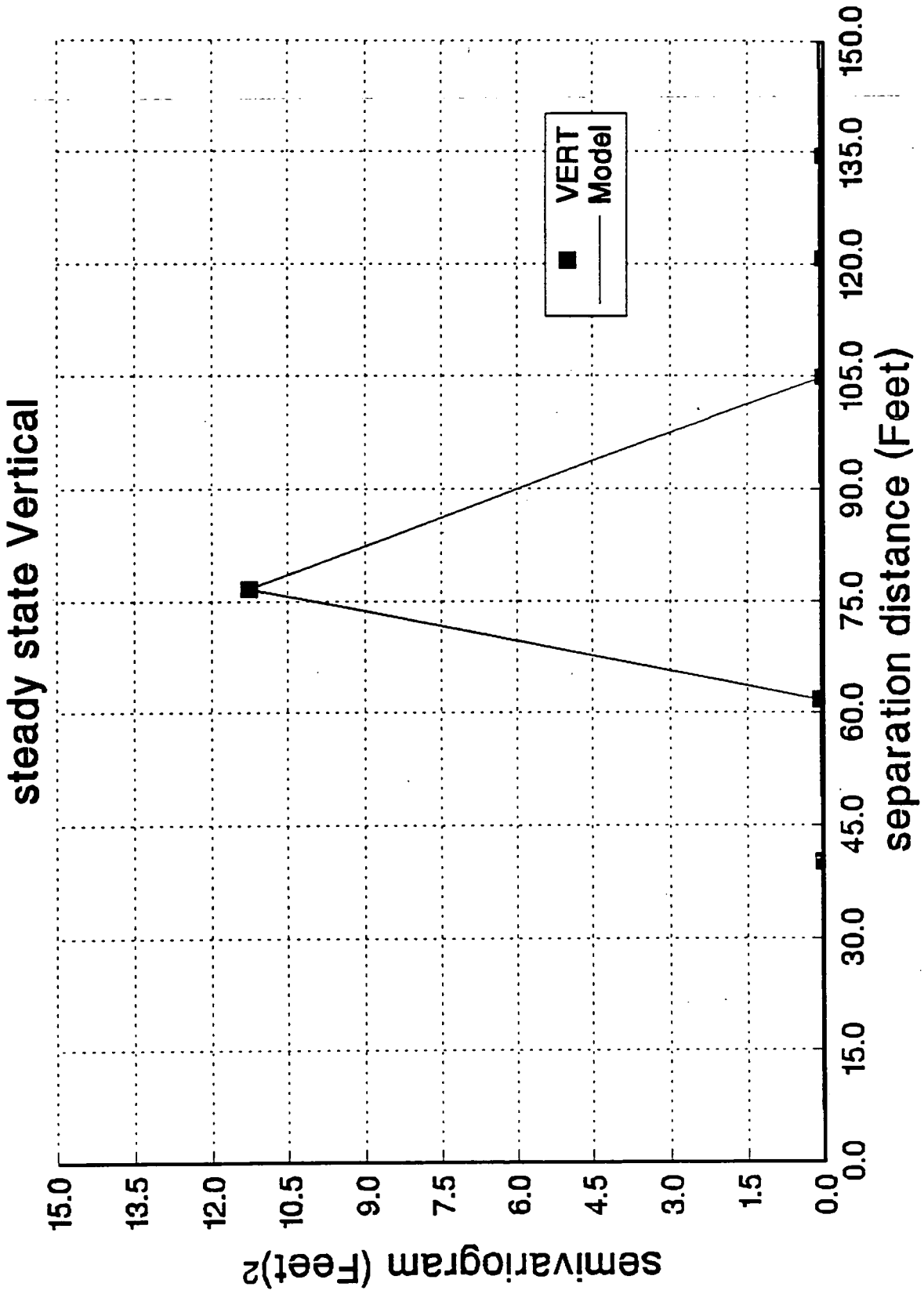

Figure 2.2-7 - Vertical Semivariogram for Steady-State Analysis

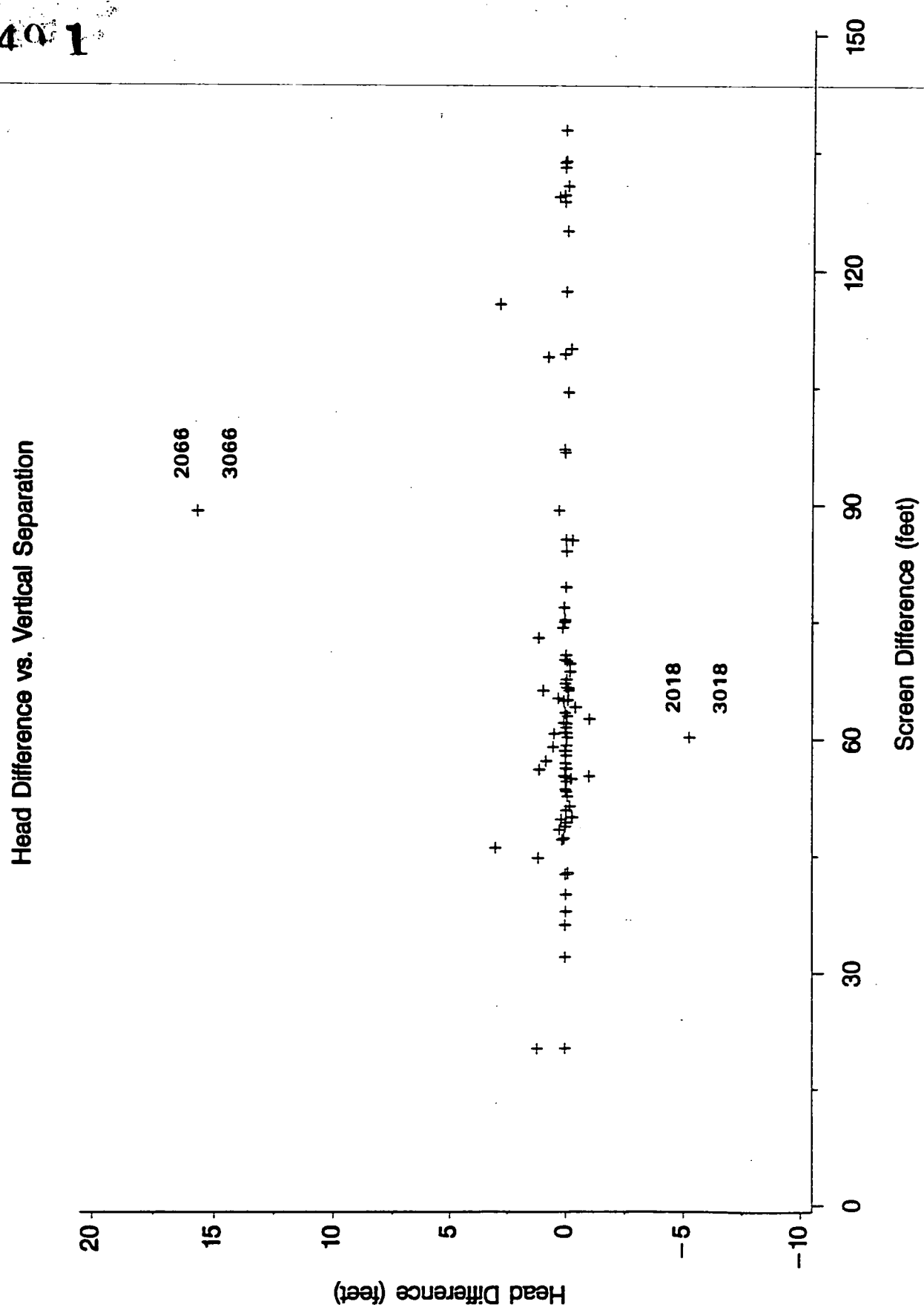

Figure 2.2-8 - June 1993 Head Difference Versus Vertical Separation for Spatially Clustered Wells

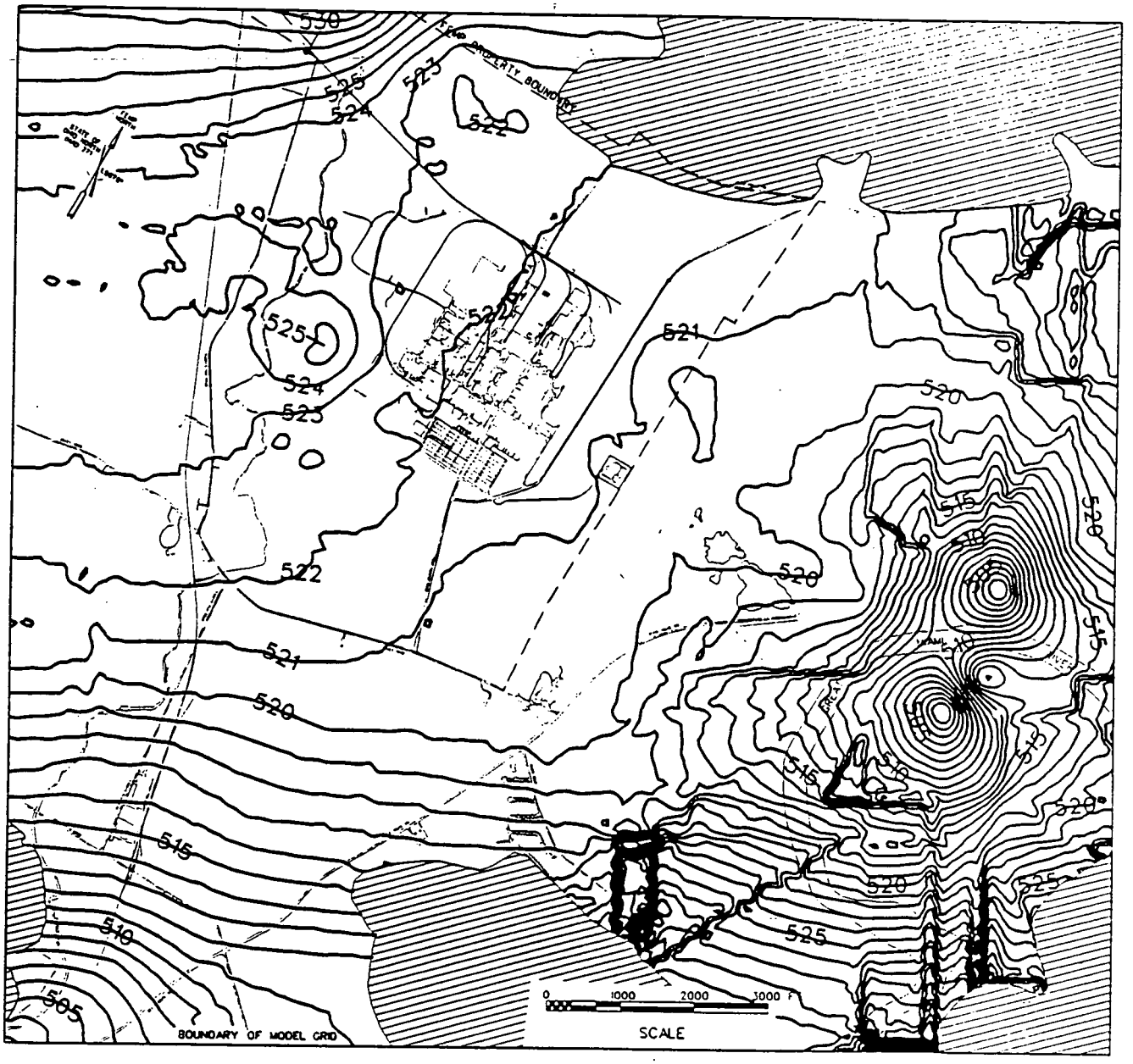

Figure 2.2-9 - Estimated Steady-State Water Levels (feet) at 2000 Series Well Level

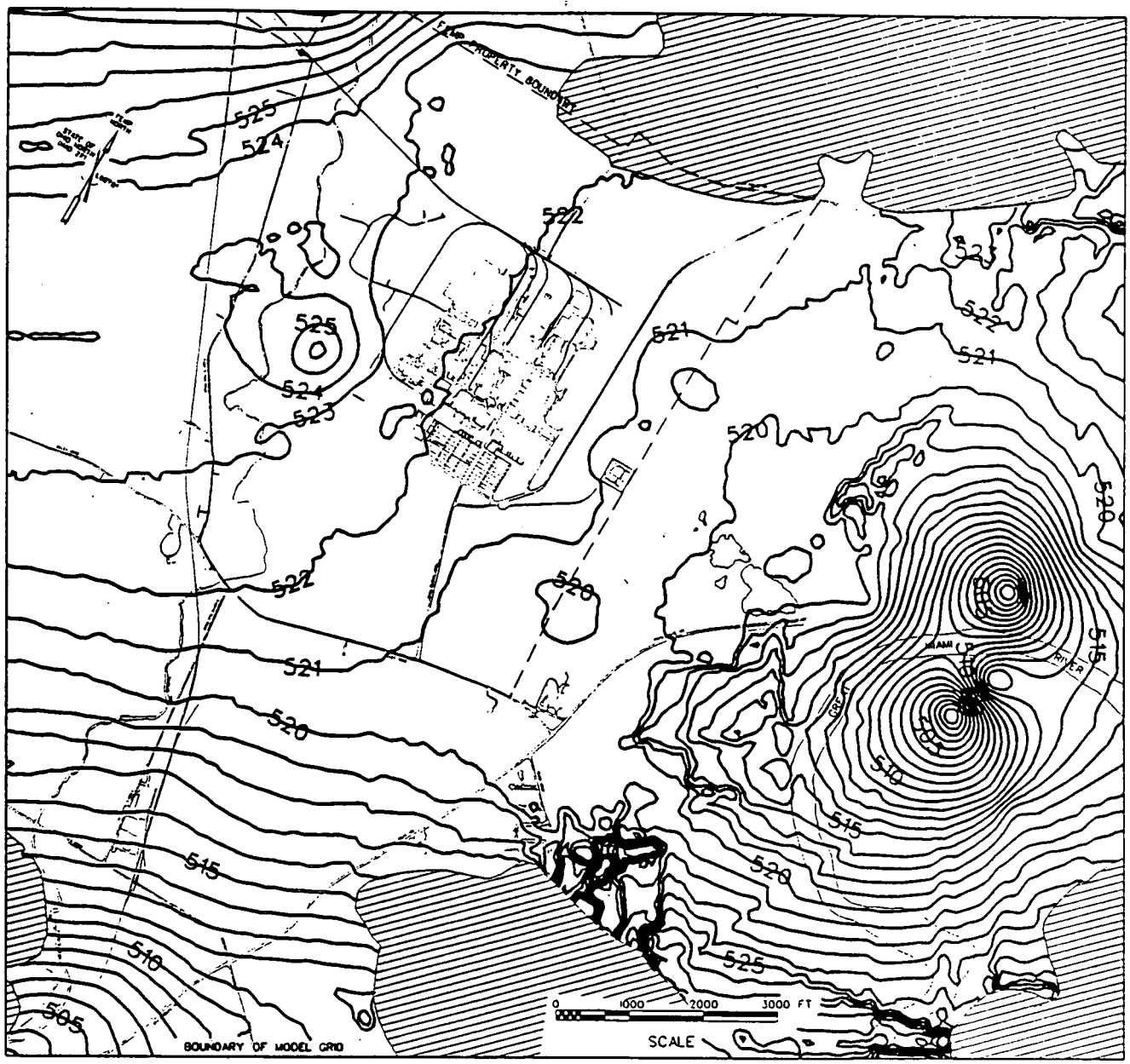

Figure 2.2-10 - Estimated Steady-State Water Levels (feet) at 3000 Series Well Level

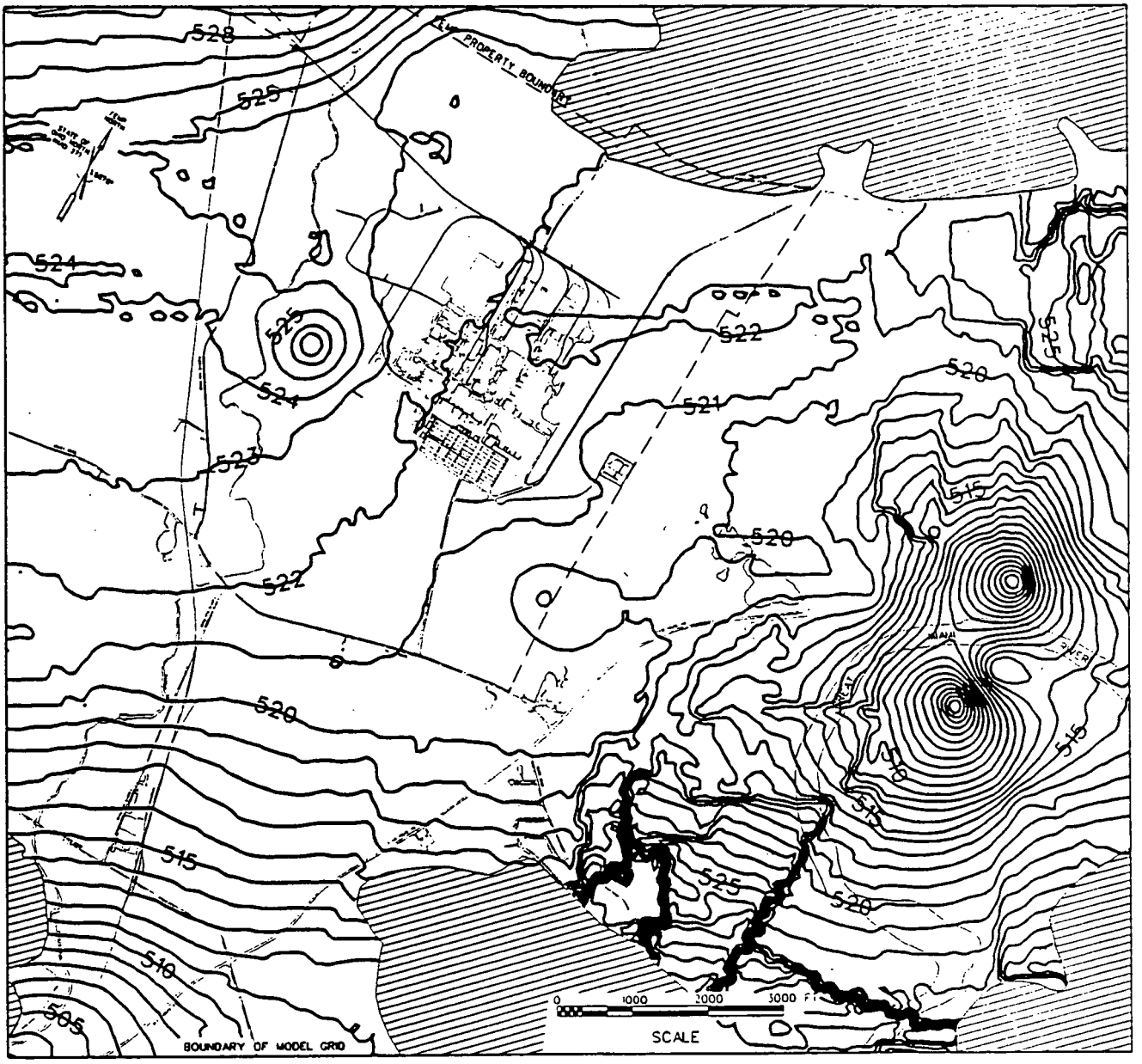

Figure 2.2-11 - Estimated Steady-State Water Levels (feet) at 4000 Series Well Level

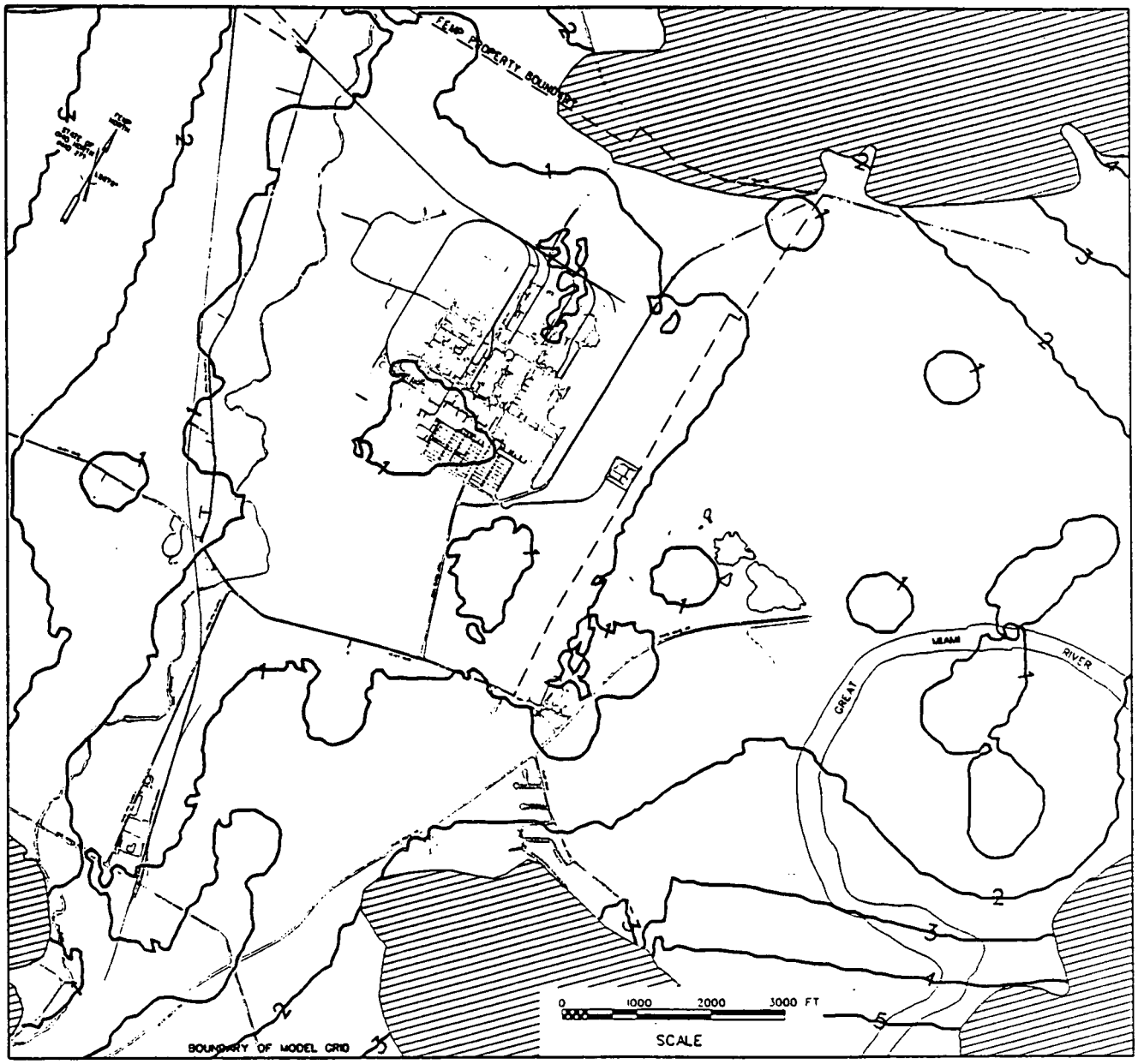

Figure 2.2-12 - Statistical Uncertainty (feet) Associated with Steady-State 2000 Series Well Level

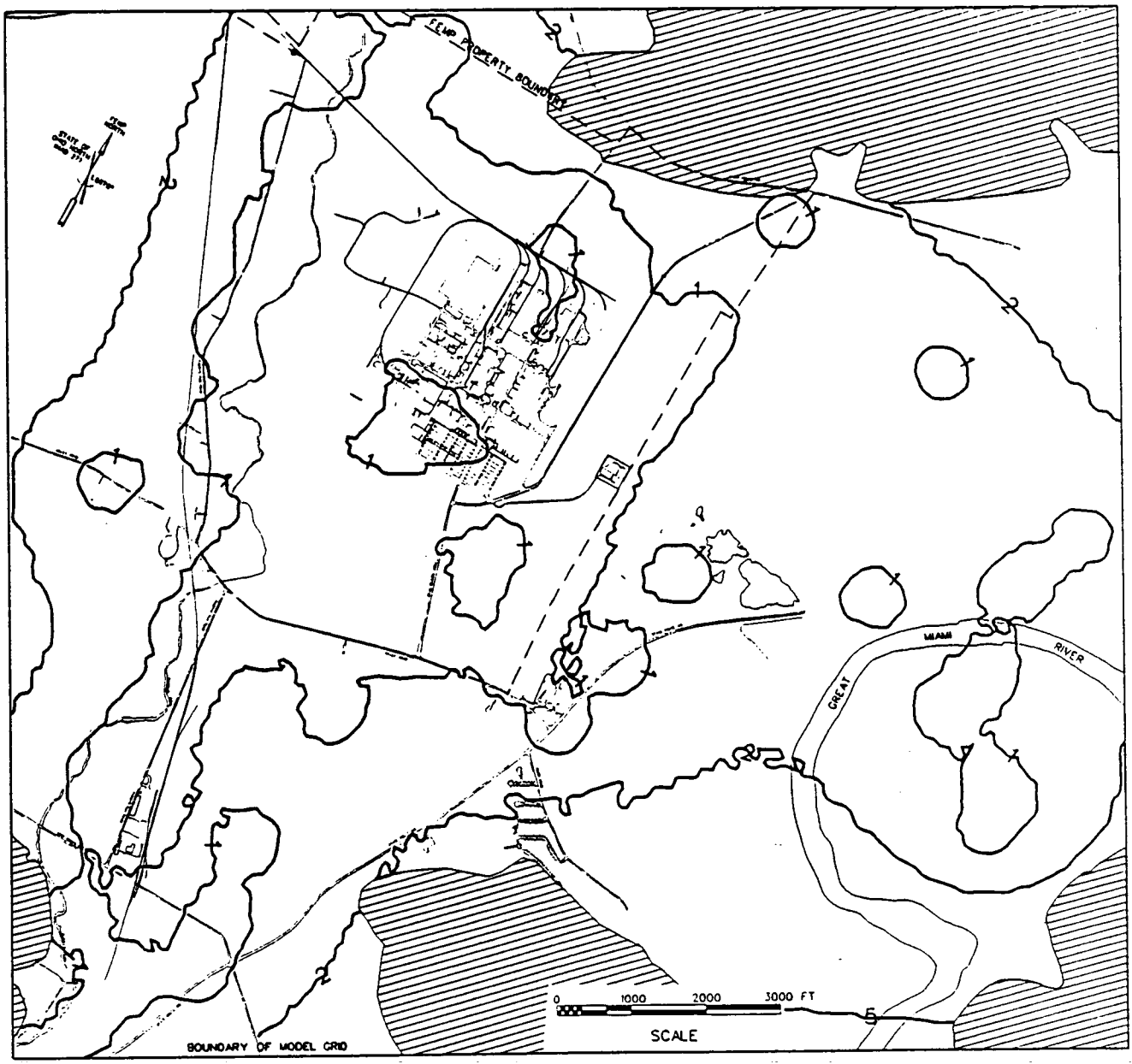

Figure 2.2-13 - Statistical Uncertainty (feet) Associated with Steady-State 3000 Series Well Level

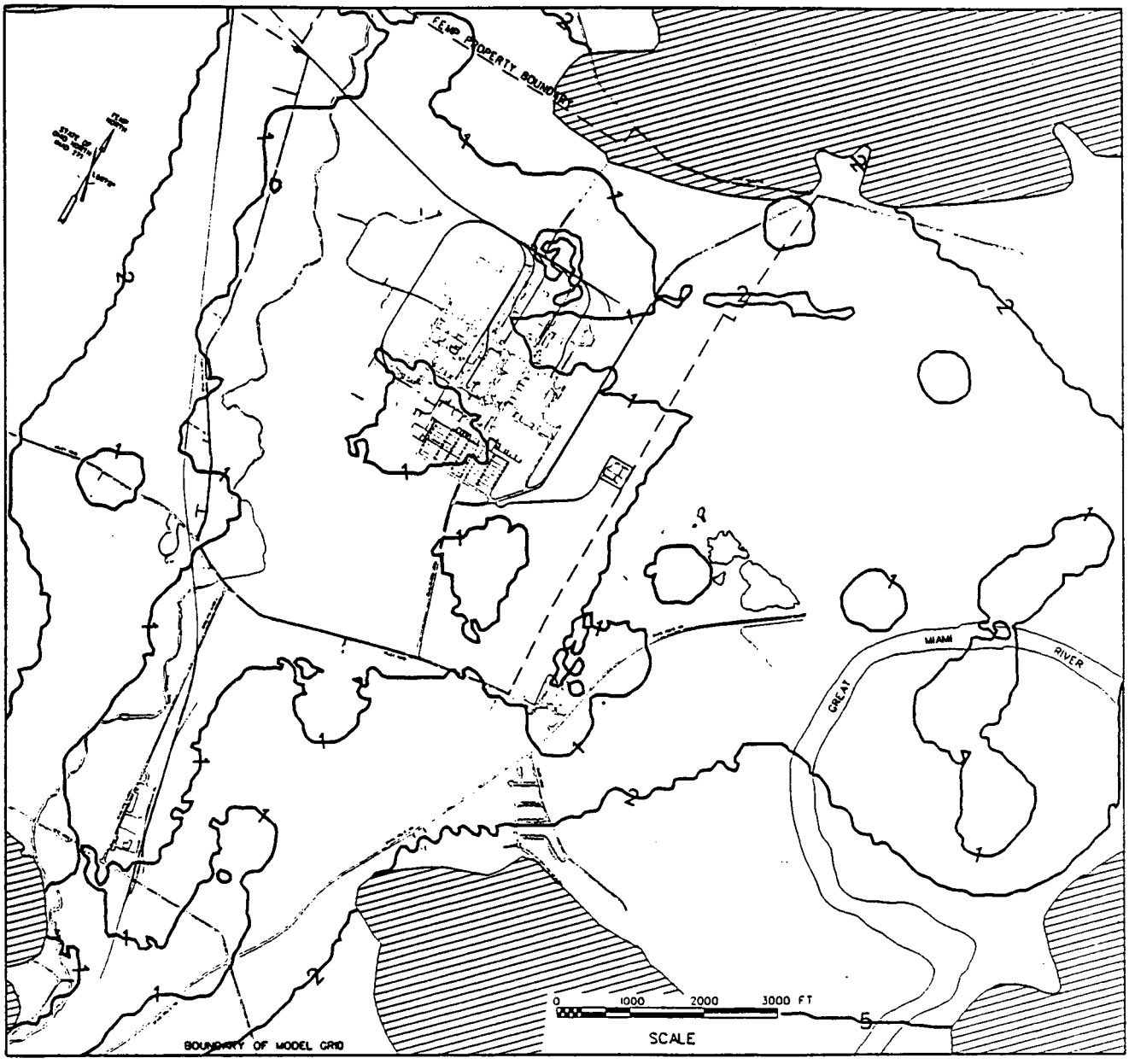

Figure 2.2-14 - Statistical Uncertainty (feet) Associated with Steady-State 4000 Series Well Level

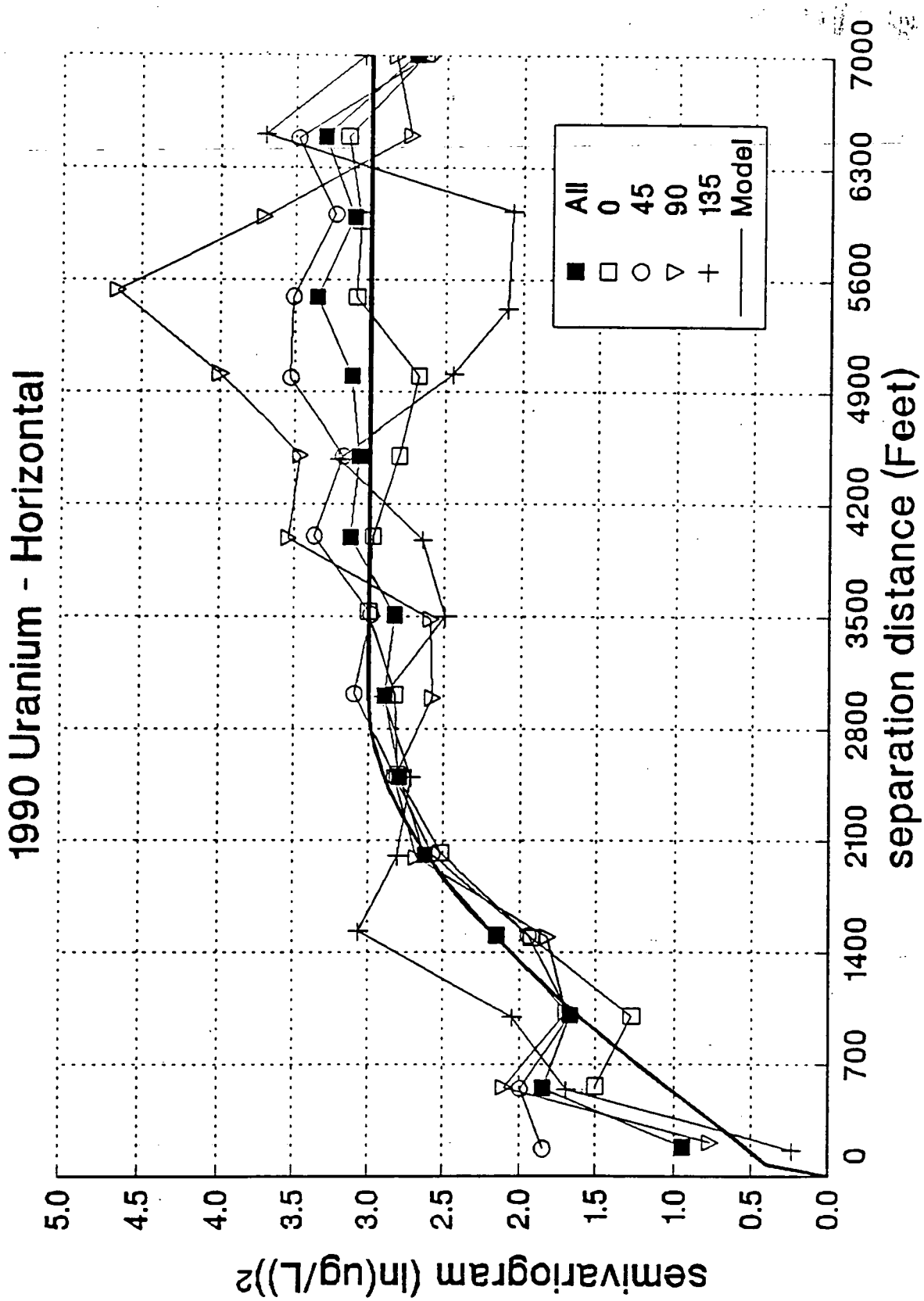

Figure 2.3-1 - Horizontal Semivariograms for
Log-Transformed 1990 Average Uranium Concentrations

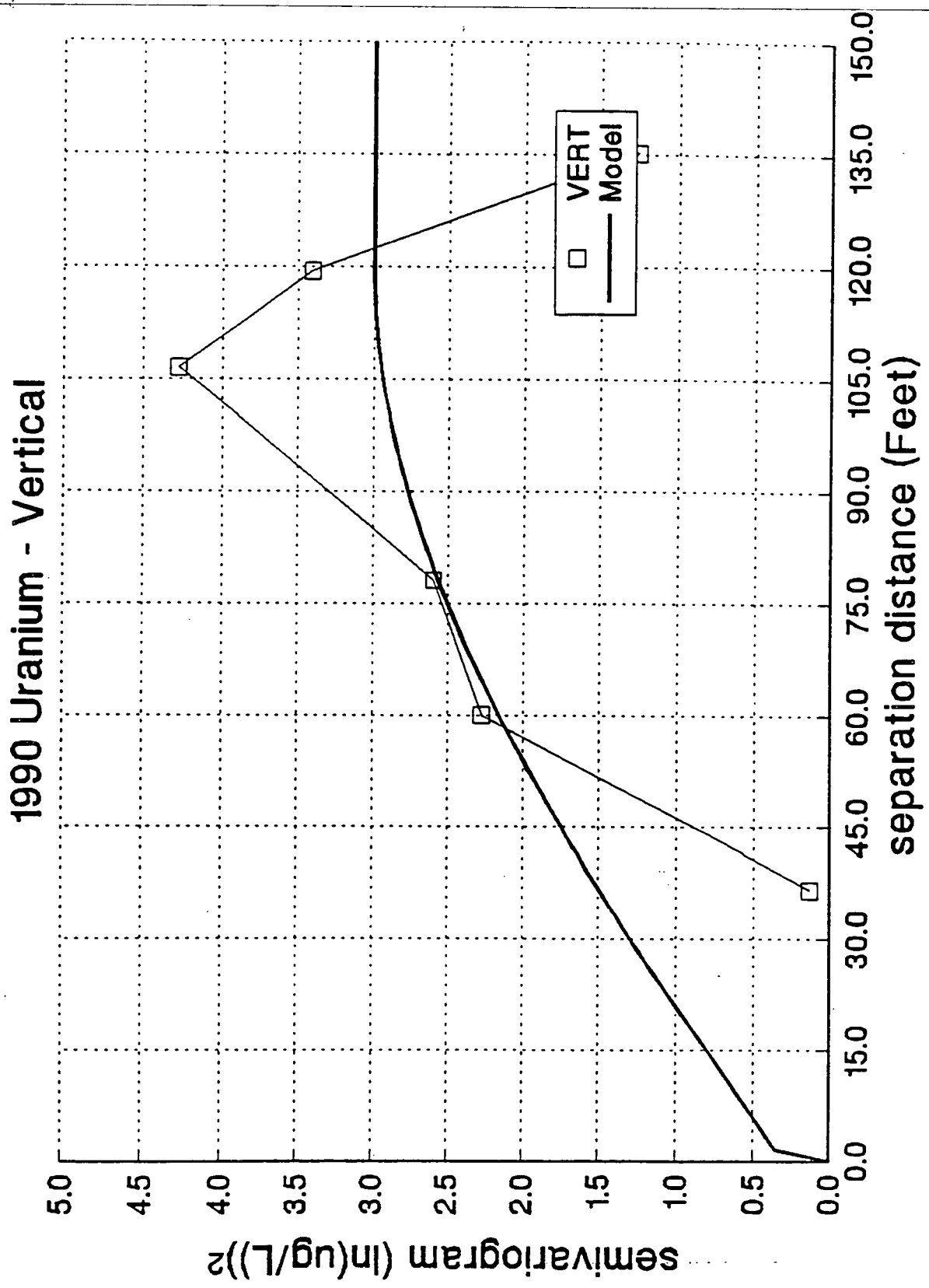

Figure 2.3-2 - Vertical Semivariogram for Log-Transformed 1990 Average Uranium Concentrations

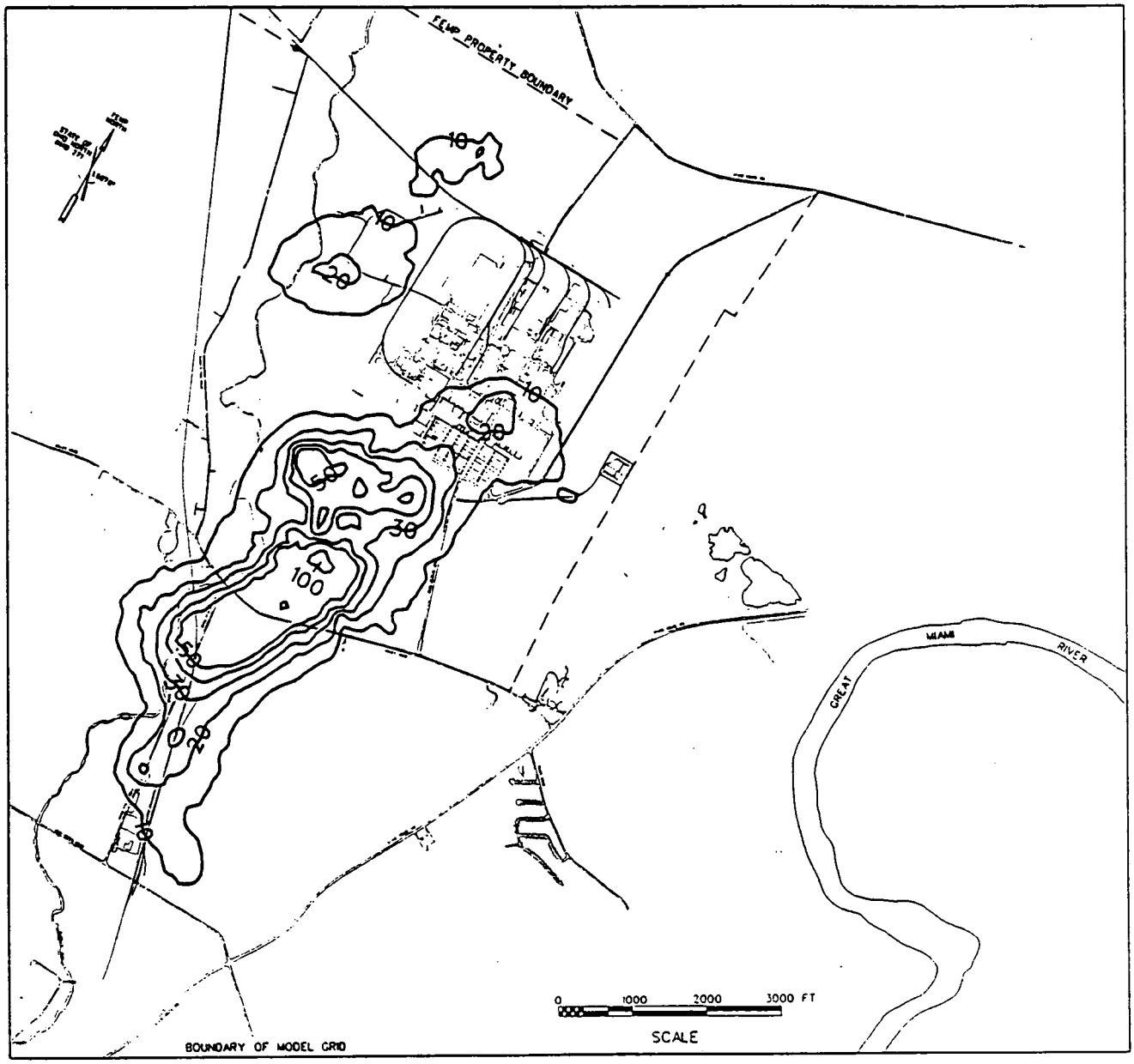

Figure 2.3-3 - Estimated 1990 Uranium Concentrations (μg/L) at 2000 Series Well Level

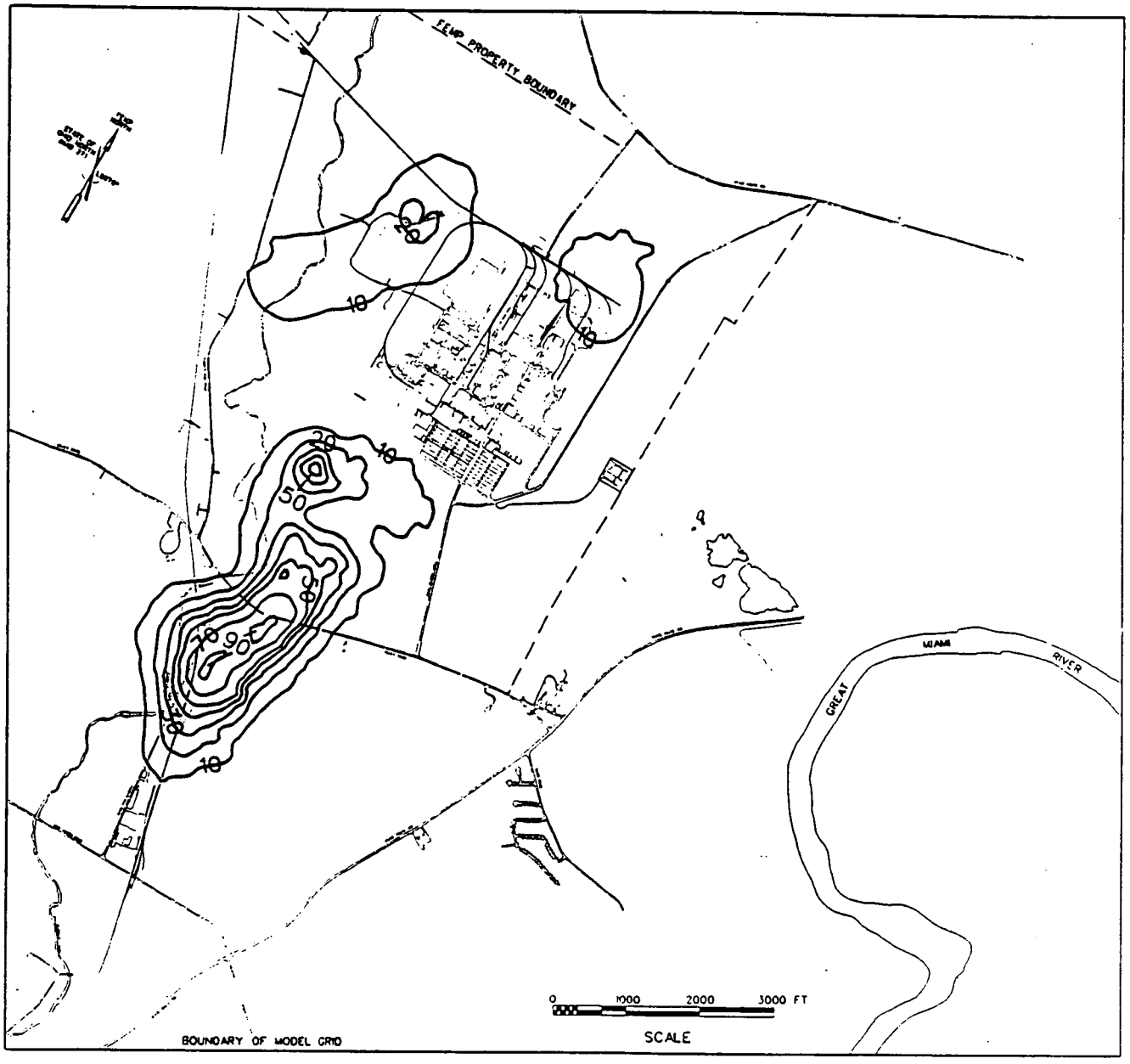

Figure 2.3-4 - Estimated 1990 Uranium Concentrations ($\mu g/L$) at 3000 Series Well Level

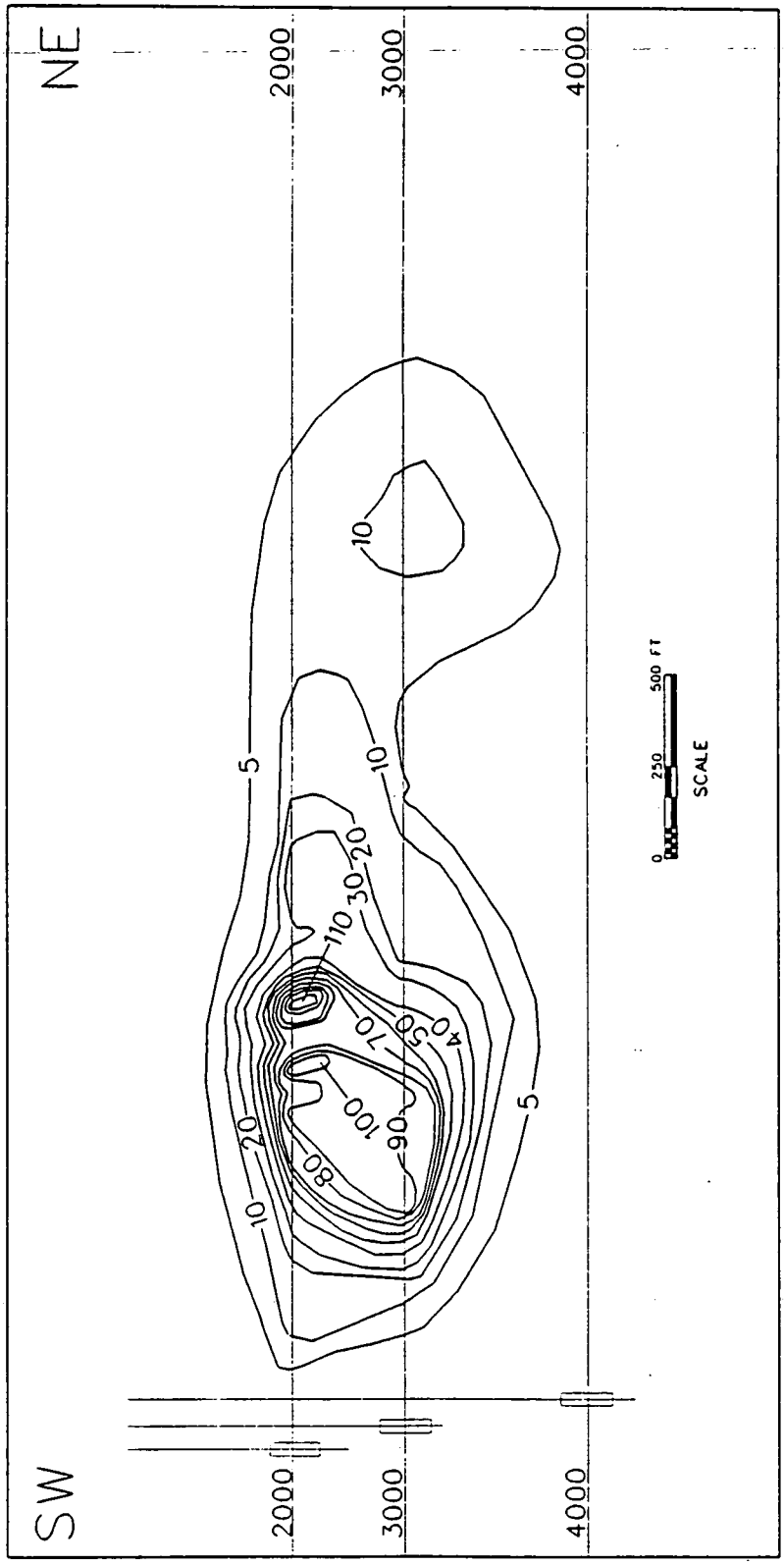

Figure 2.3-5 - Northeast-Southwest Vertical Cross-Section of 1990 Uranium Concentrations (μg/L)

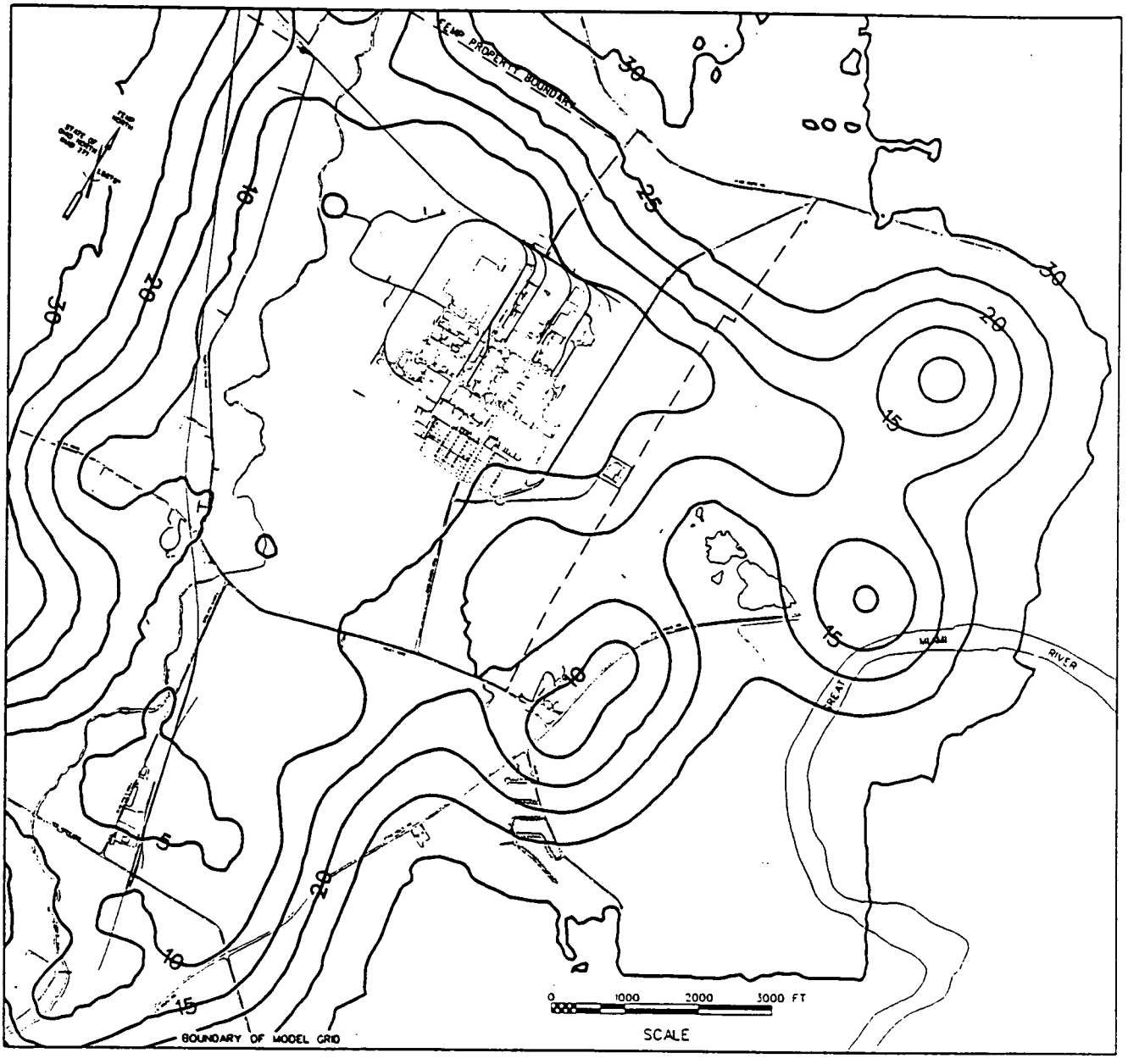

Figure 2.3-6 - Multiplicative Statistical Uncertainty Factor Associated with 1990 Uranium Concentration Estimates in 2000 Series Well Levels

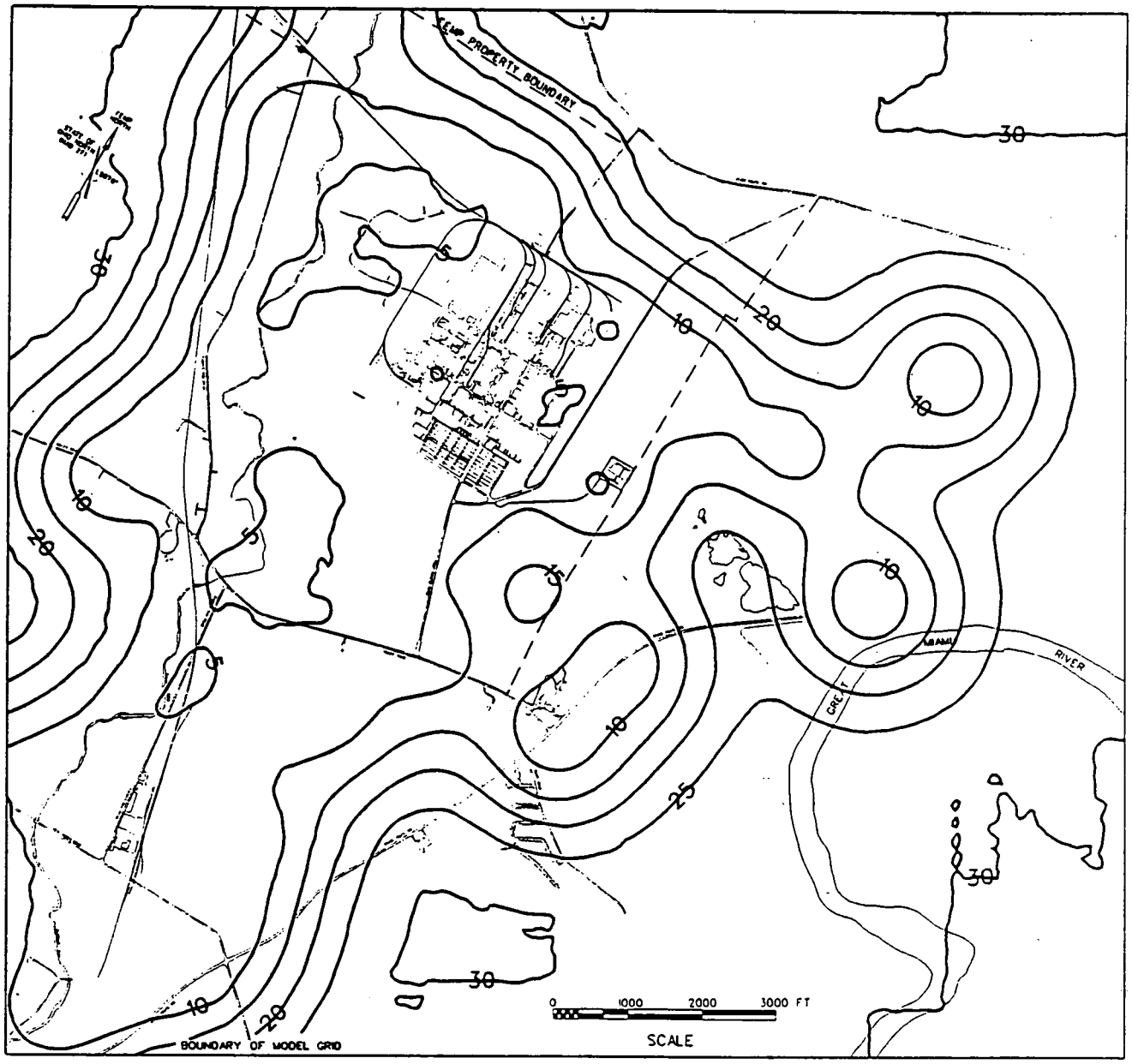

Figure 2.3-7 - Multiplicative Statistical Uncertainty Factor Associated with 1990 Uranium Concentration Estimates in 3000 Series Well Levels

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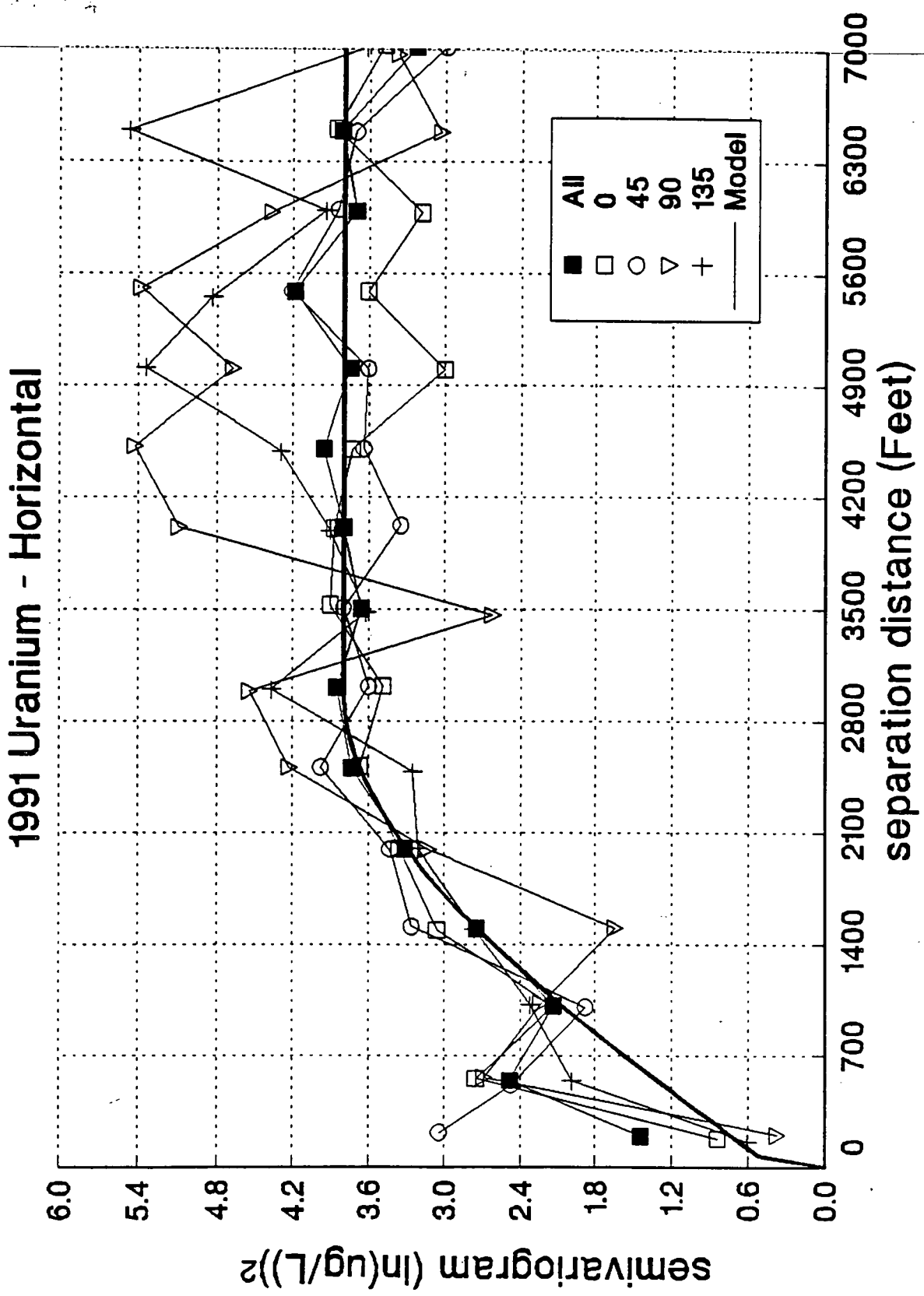

Figure 2.3-8 - Horizontal Semivariograms for Log-Transformed 1991 Average Uranium Concentrations

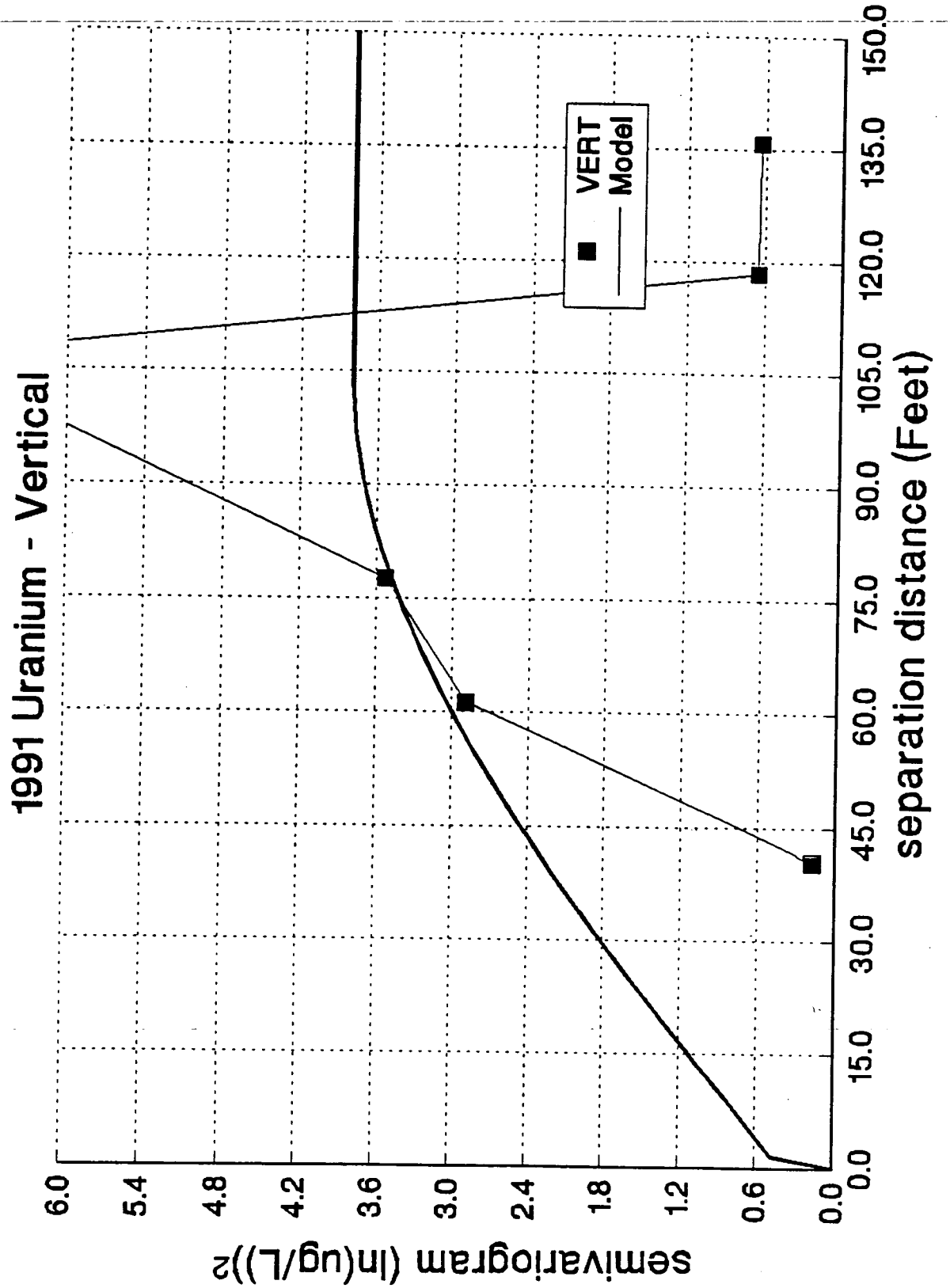

Figure 2.3-9 - Vertical Semivariogram for Log-Transformed 1991 Average Uranium Concentrations

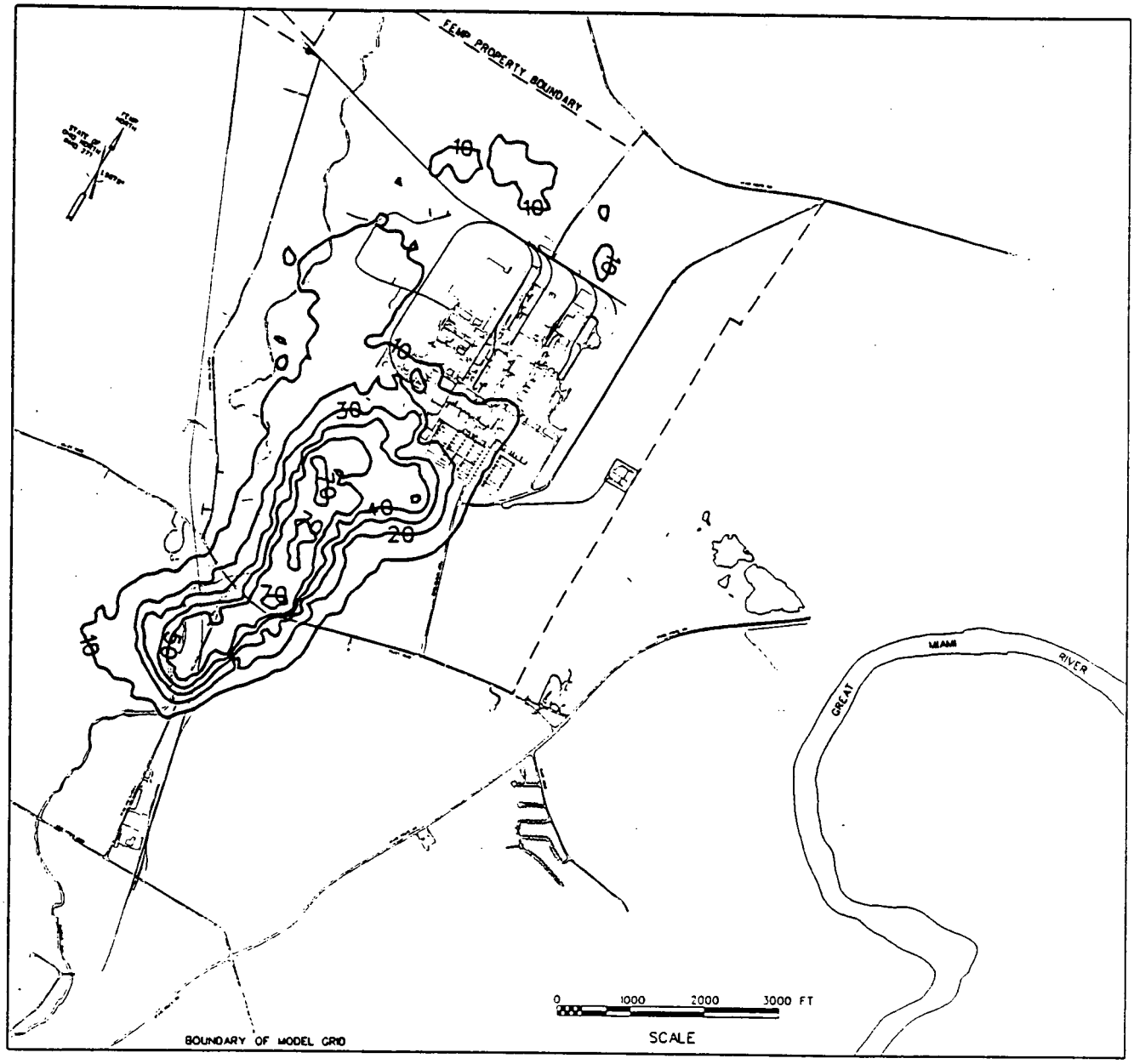

Figure 2.3-10 - Estimated 1991 Uranium Concentrations (μg/L) at 2000 Series Well Level

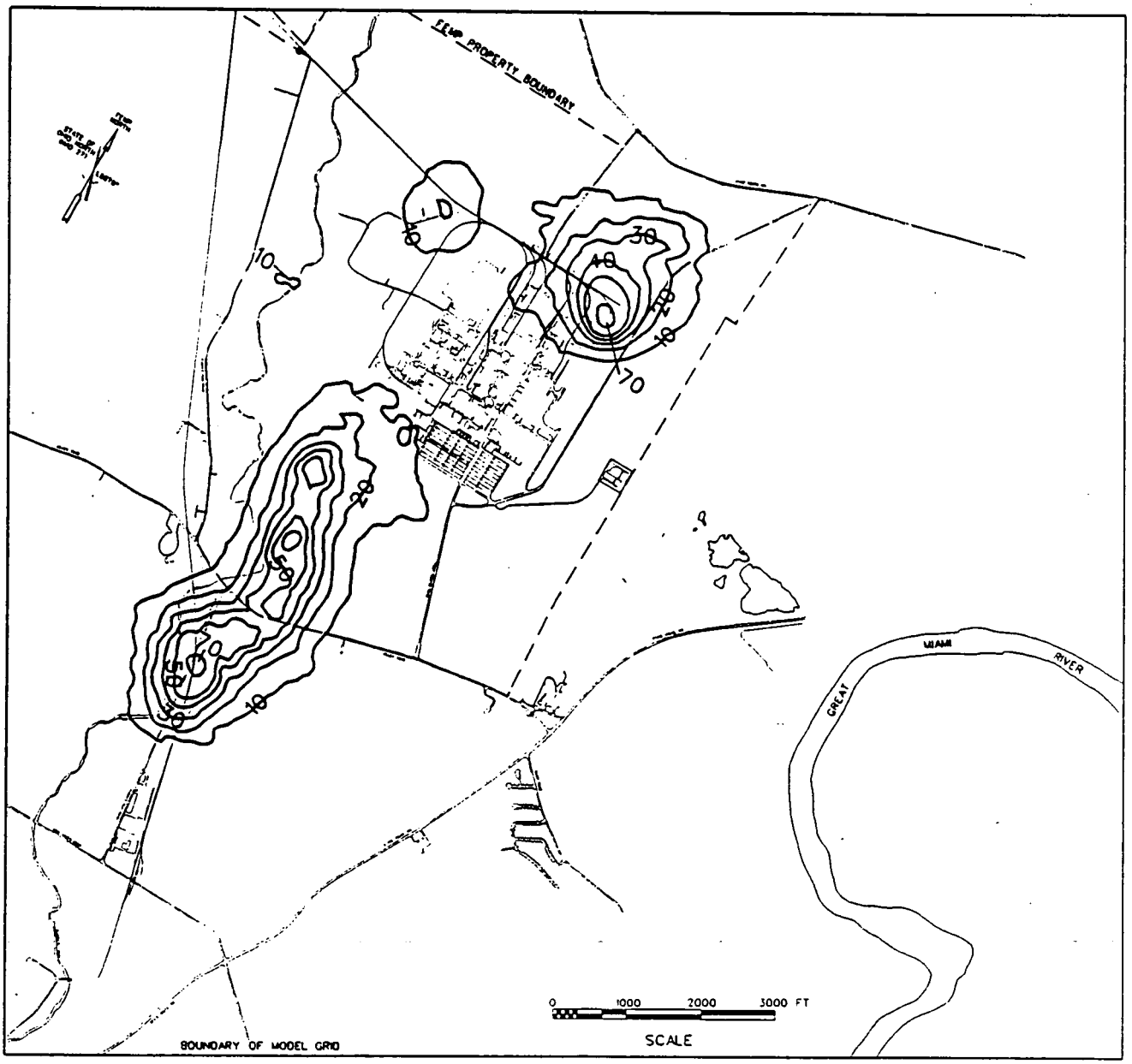

Figure 2.3-11 - Estimated 1991 Uranium Concentrations (μg/L) at 3000 Series Well Level

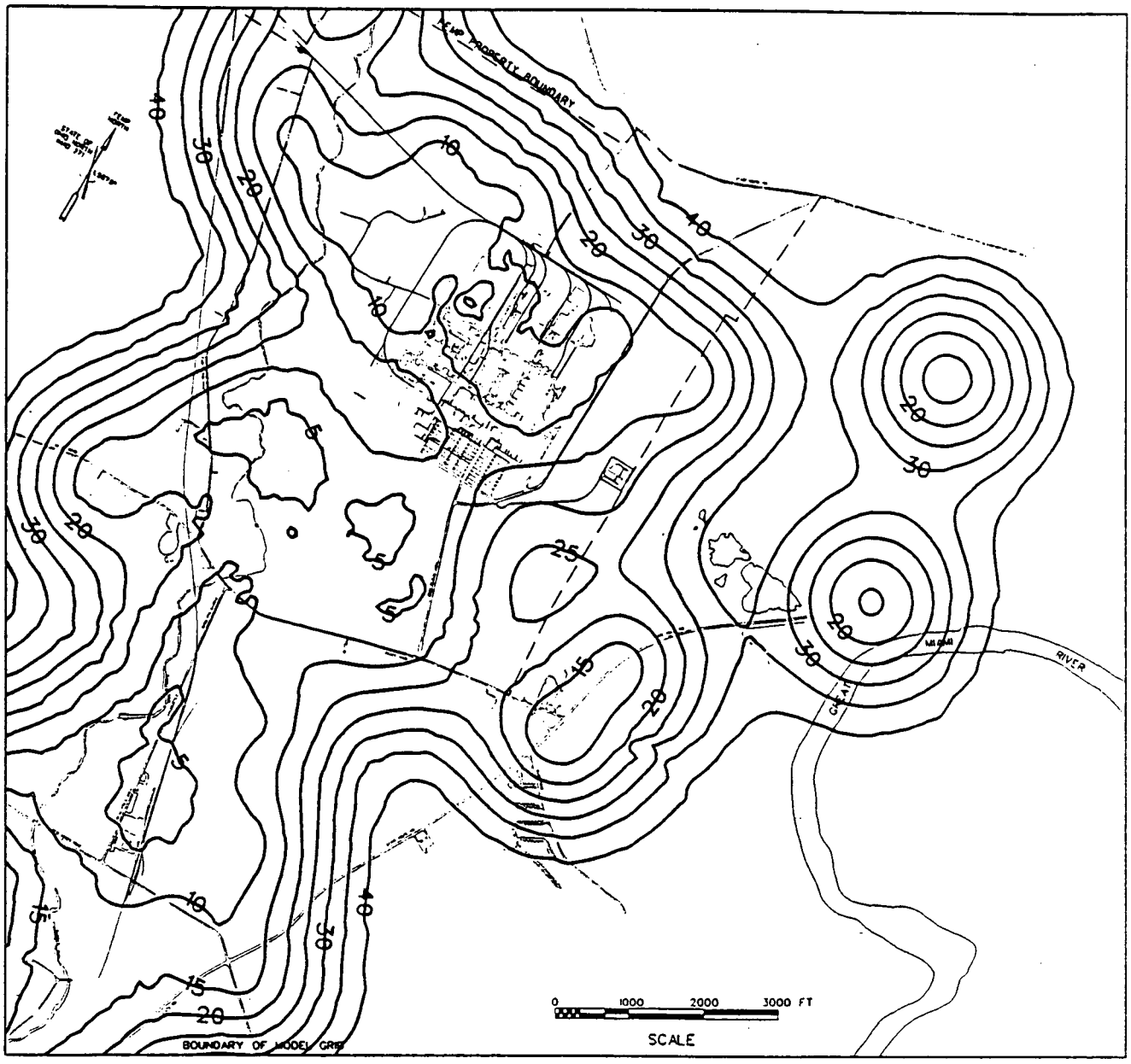

Figure 2.3-12 - Multiplicative Statistical Uncertainty Factor Associated with 1991 Uranium Concentration Estimates in 2000 Series Well Levels

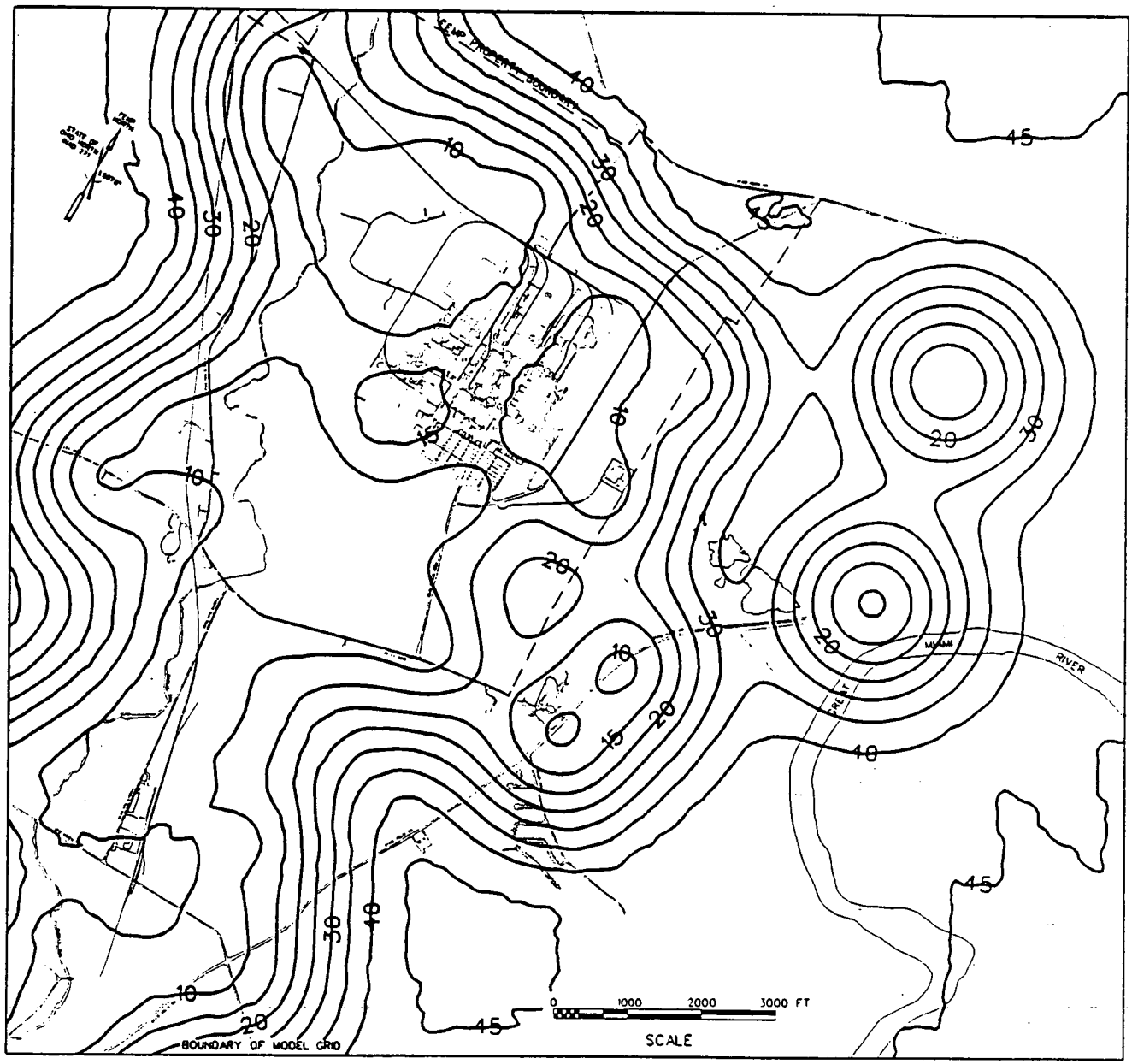

Figure 2.3-13 - Multiplicative Statistical Uncertainty Factor Associated with 1991 Uranium Concentration Estimates in 3000 Series Well Levels

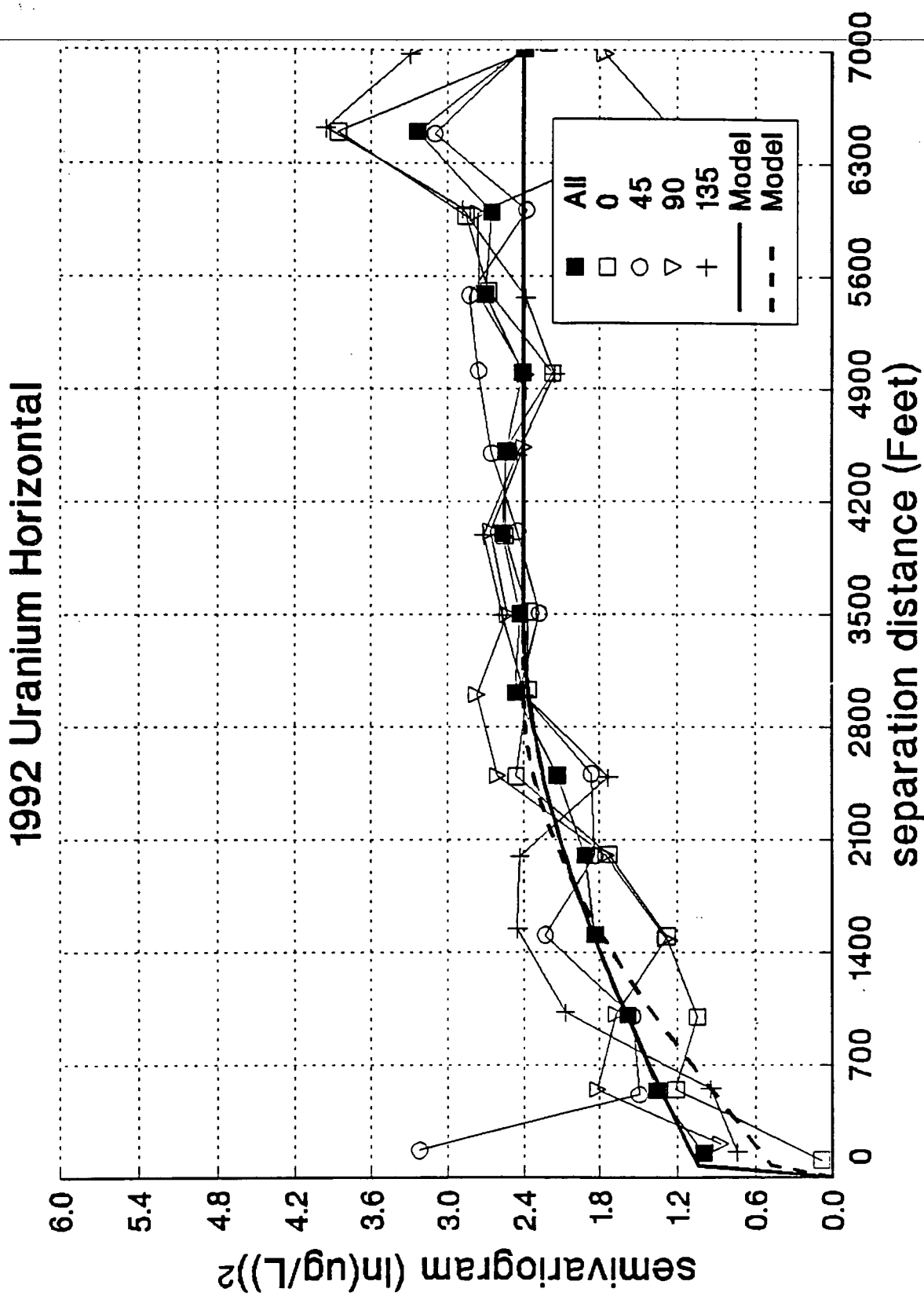

Figure 2.3-14 - Horizontal Semivariograms for
Log-Transformed 1992 Average Uranium Concentrations

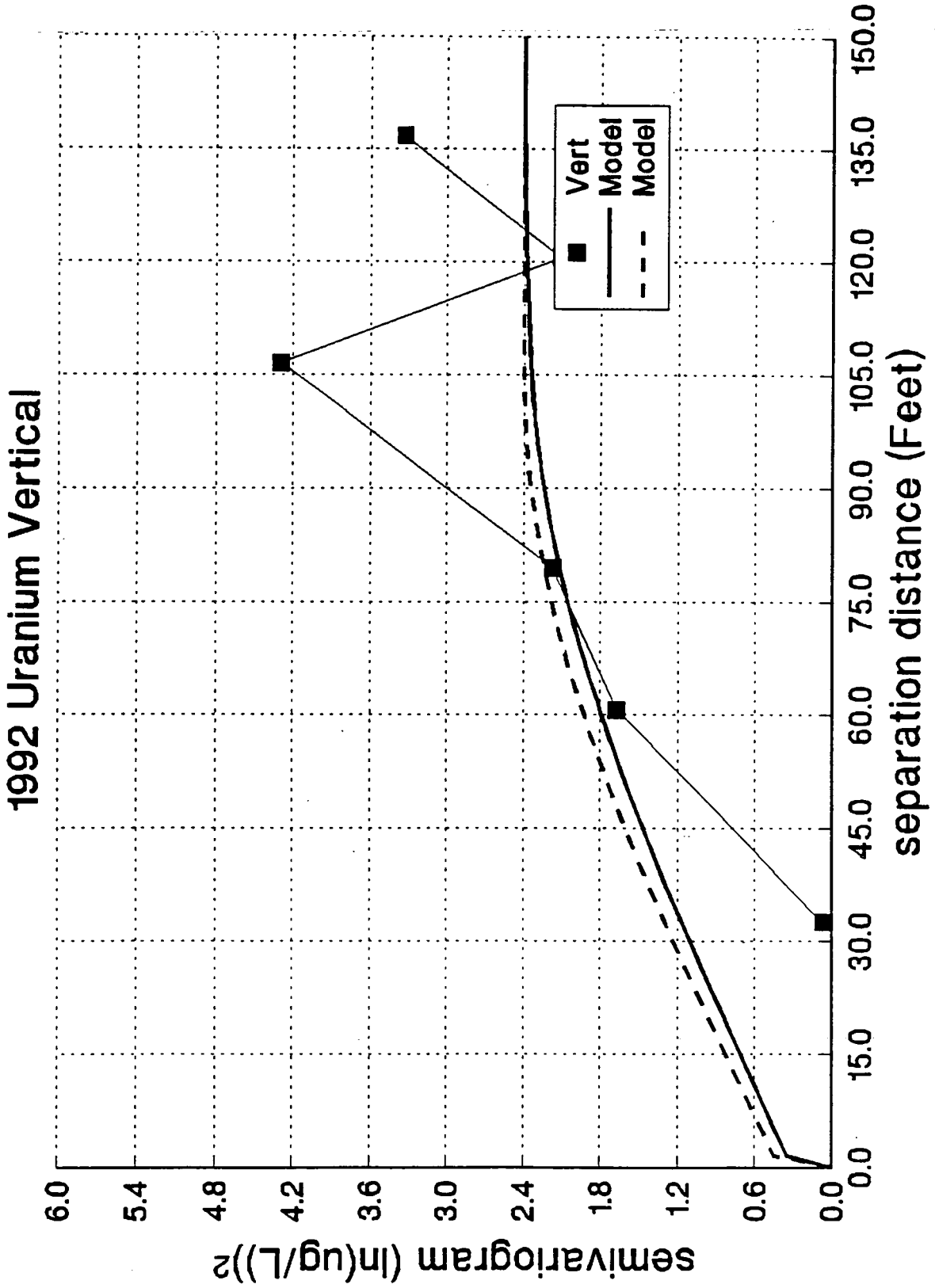

Figure 2.3-15 - Vertical Semivariogram for Log-Transformed 1992 Average Uranium Concentrations

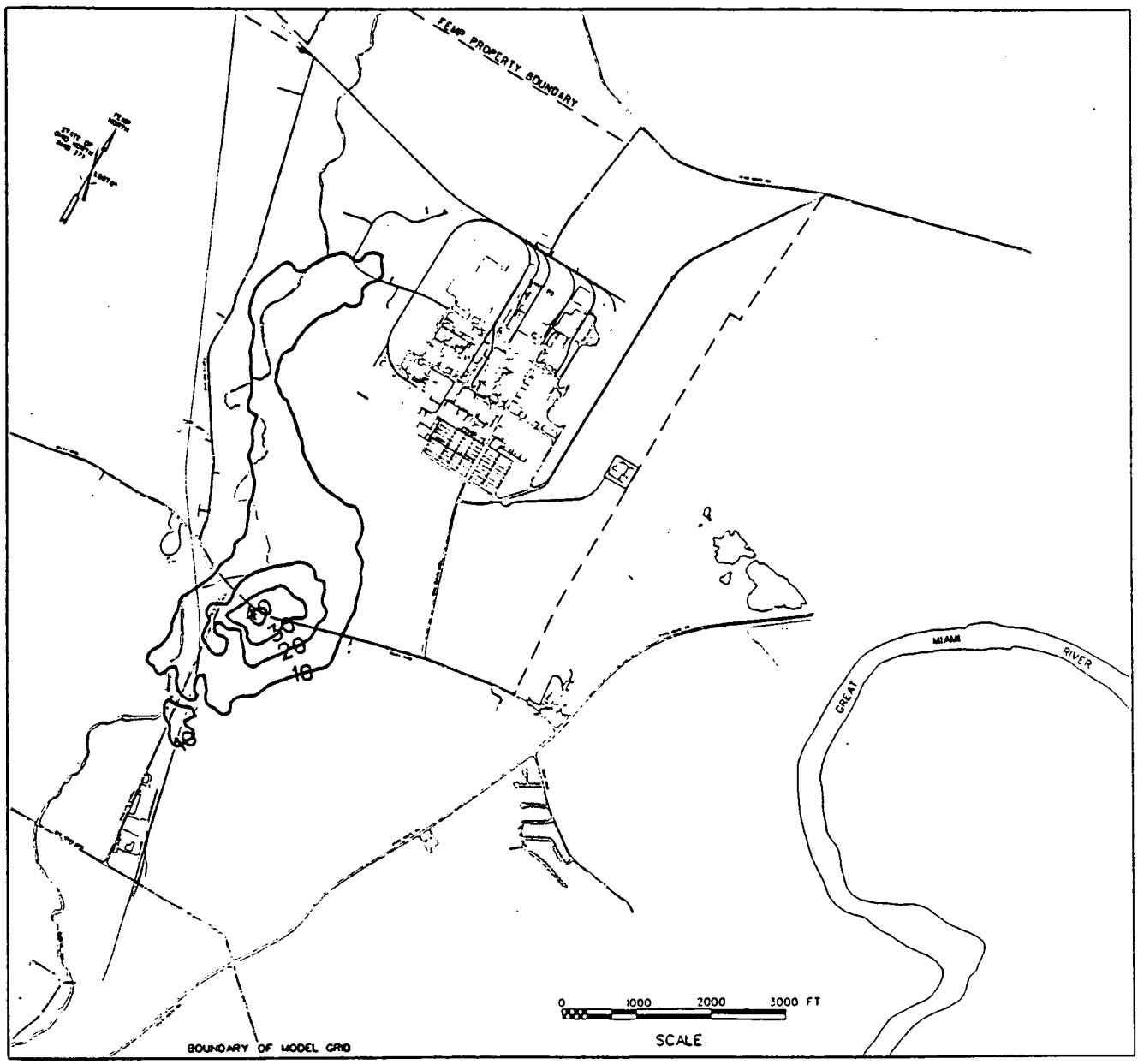

Figure 2.3-16 - Estimated 1992 Uranium Concentrations (μg/L) at 2000 Series Well Level

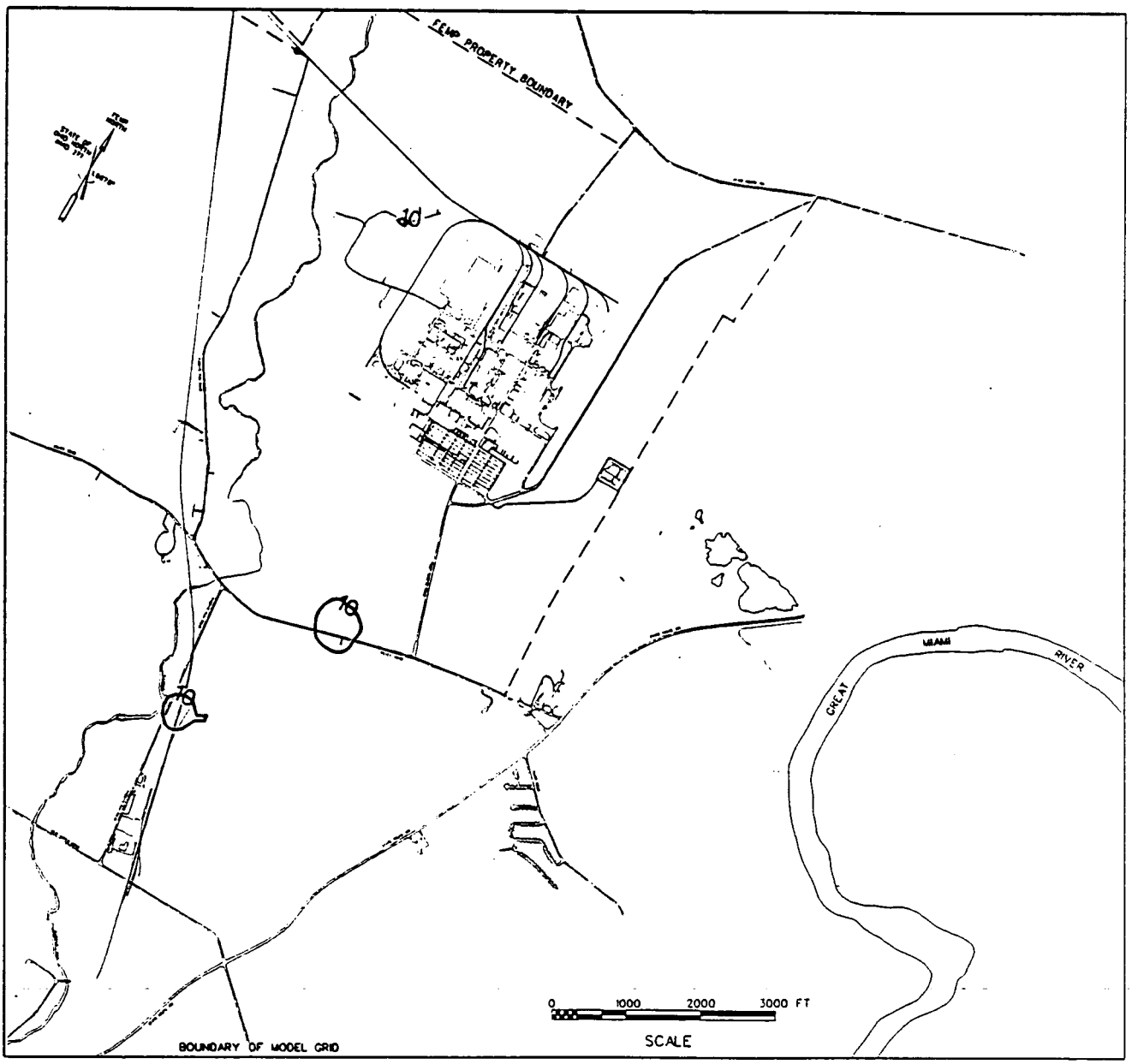

Figure 2.3-17 - Estimated 1992 Uranium Concentrations ($\mu g/L$) at 3000 Series Well Level

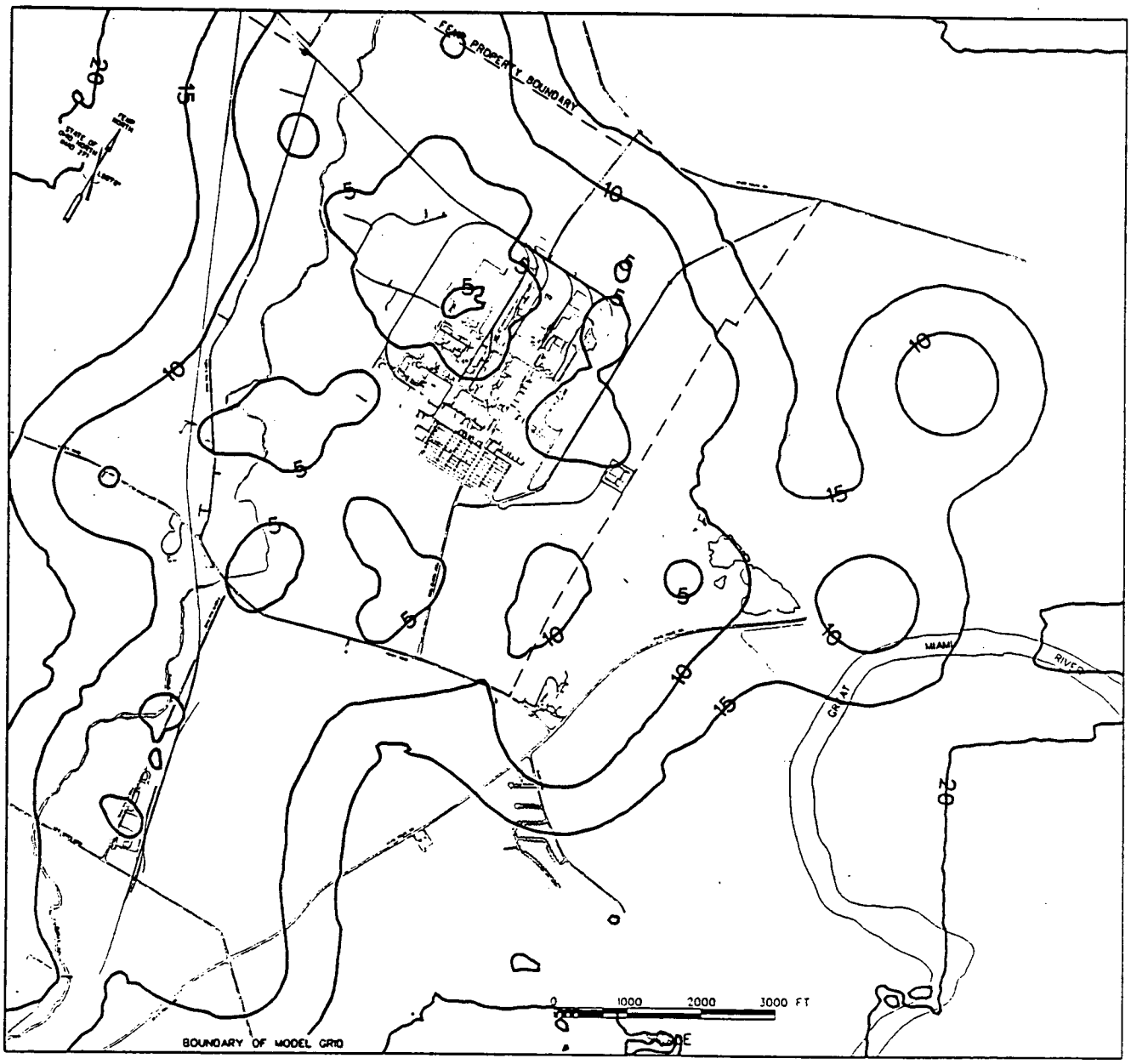

Figure 2.3-18 - Multiplicative Statistical Uncertainty Factor Associated with 1992 Uranium Concentration Estimates in 2000 Series Well Levels

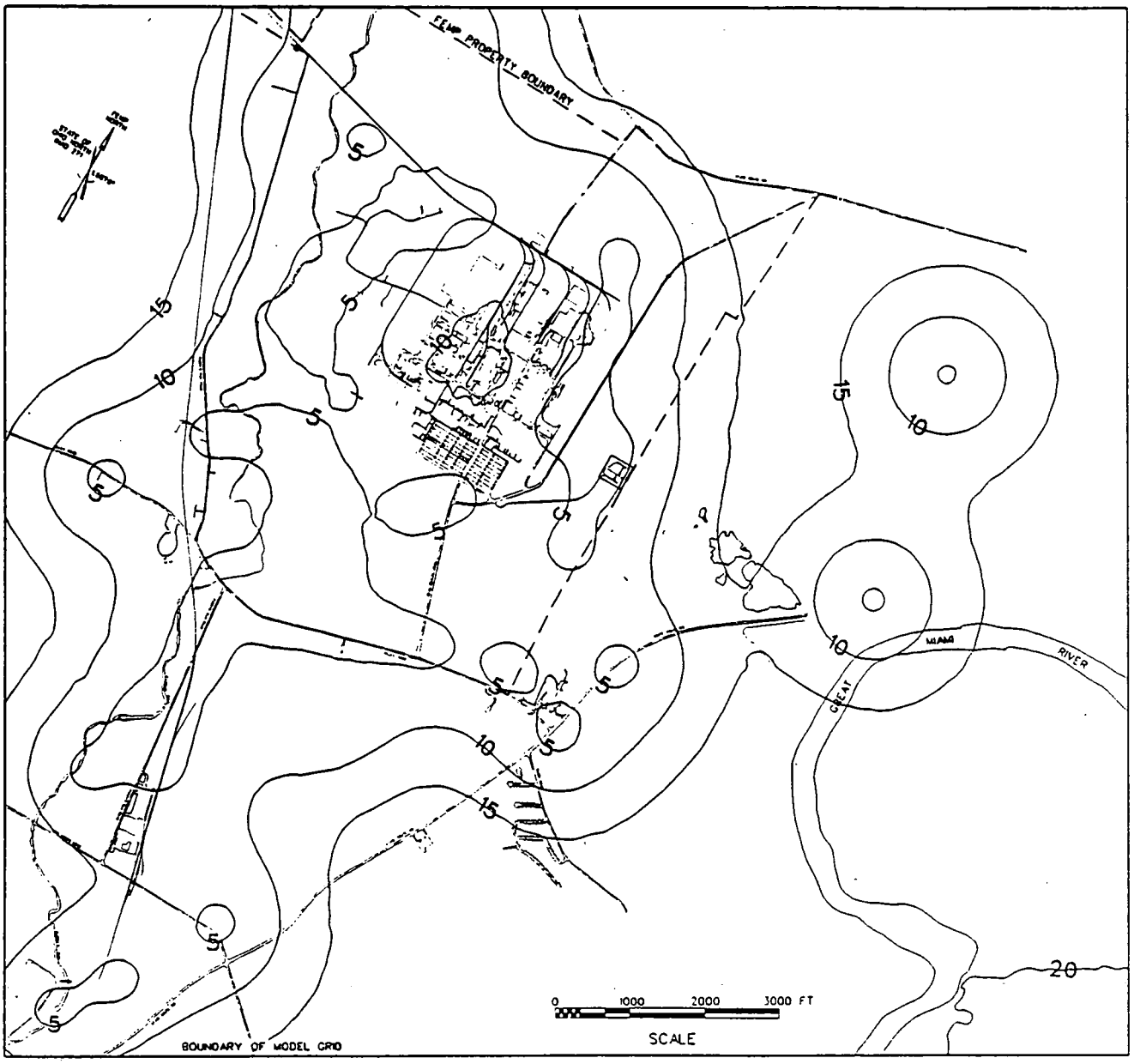

Figure 2.3-19 - Multiplicative Statistical Uncertainty Factor Associated with 1992 Uranium Concentration Estimates in 3000 Series Well Levels

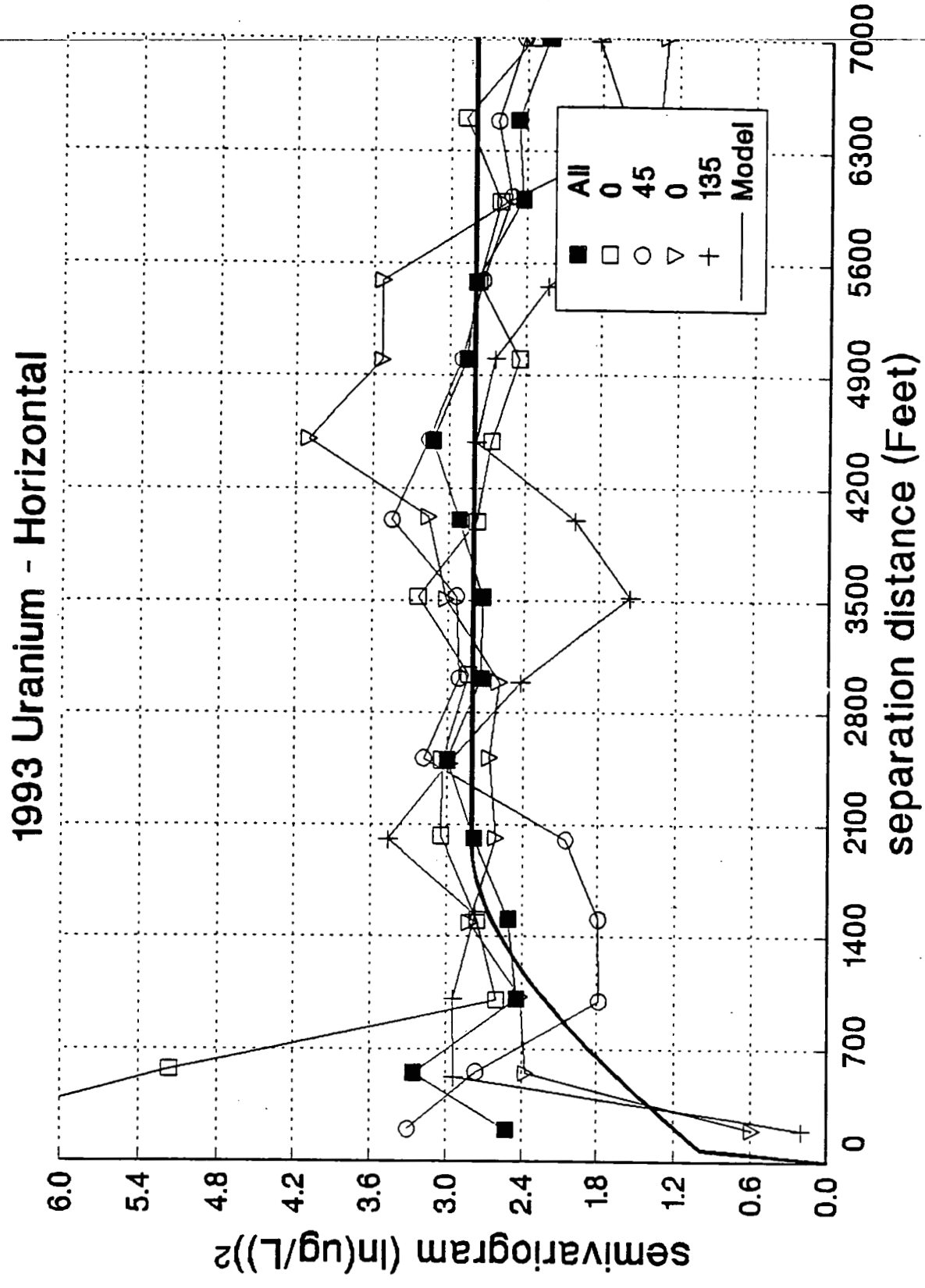

Figure 2.3-20 - Horizontal Semivariograms for
Log-Transformed 1993 Average Uranium Concentrations

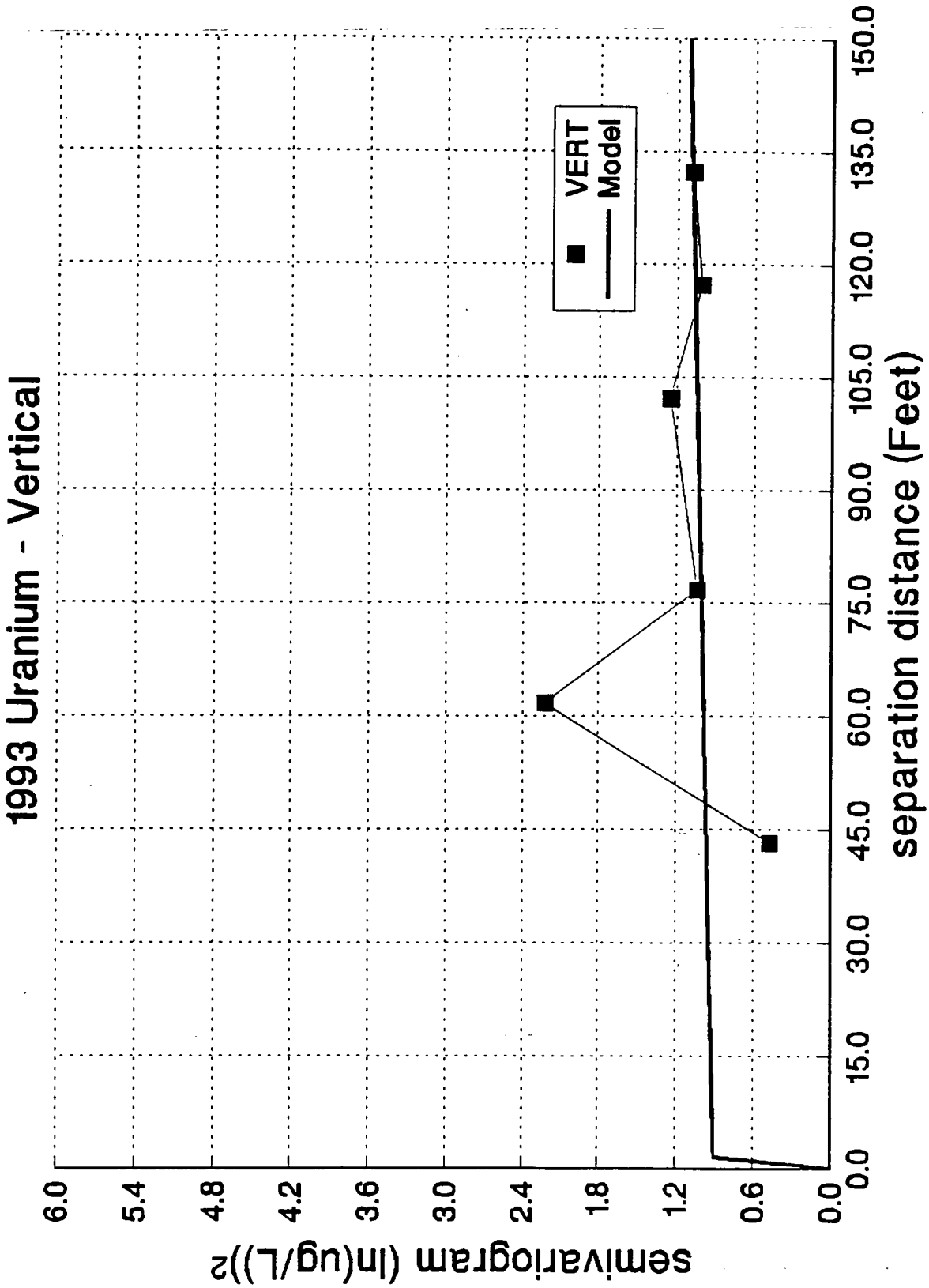

Figure 2.3-21 - Vertical Semivariogram for Log-Transformed 1993 Average Uranium Concentrations

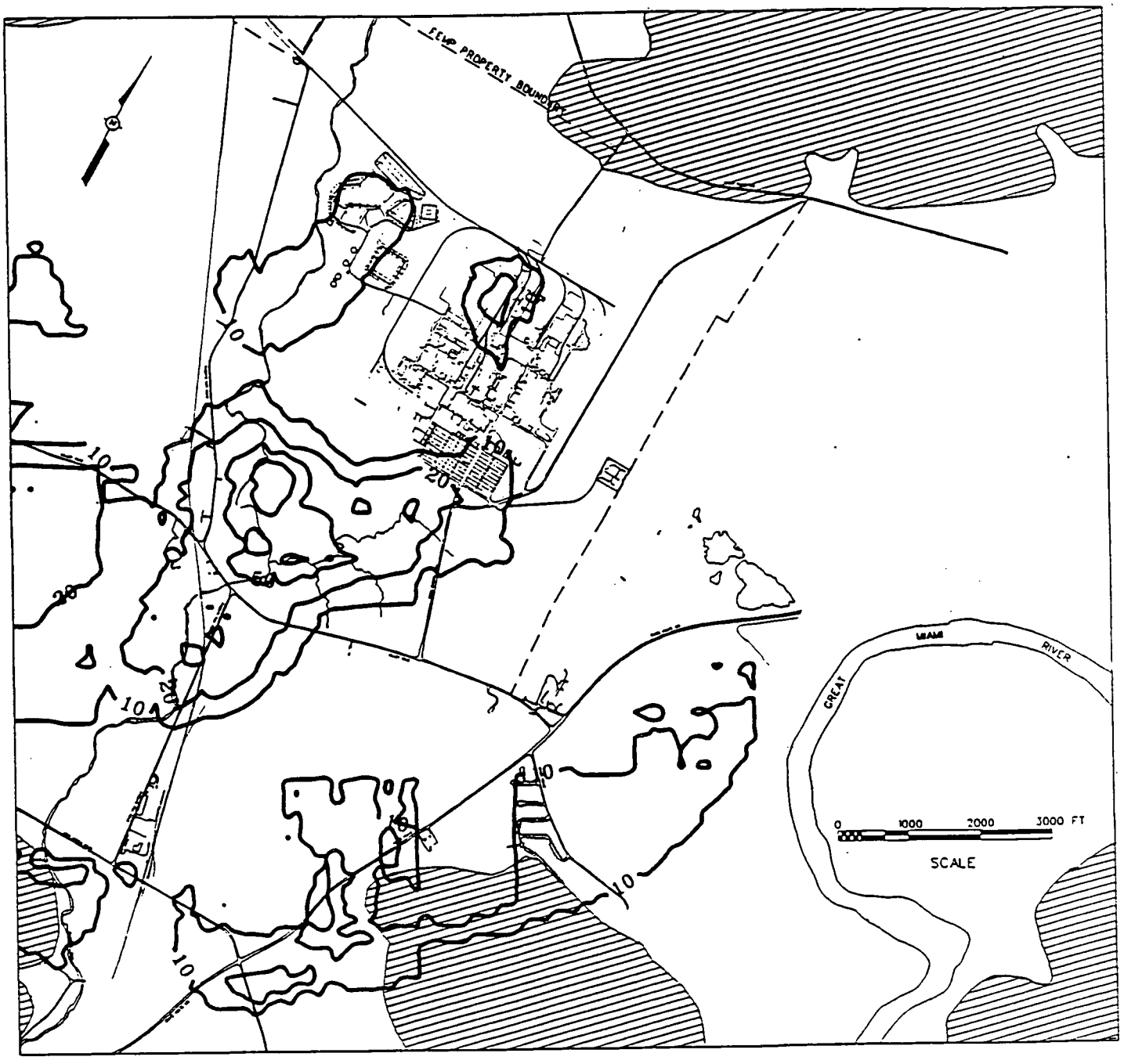

Figure 2.3-22 - Estimated 1993 Uranium Concentrations ($\mu g/L$) at 2000 Series Well Level

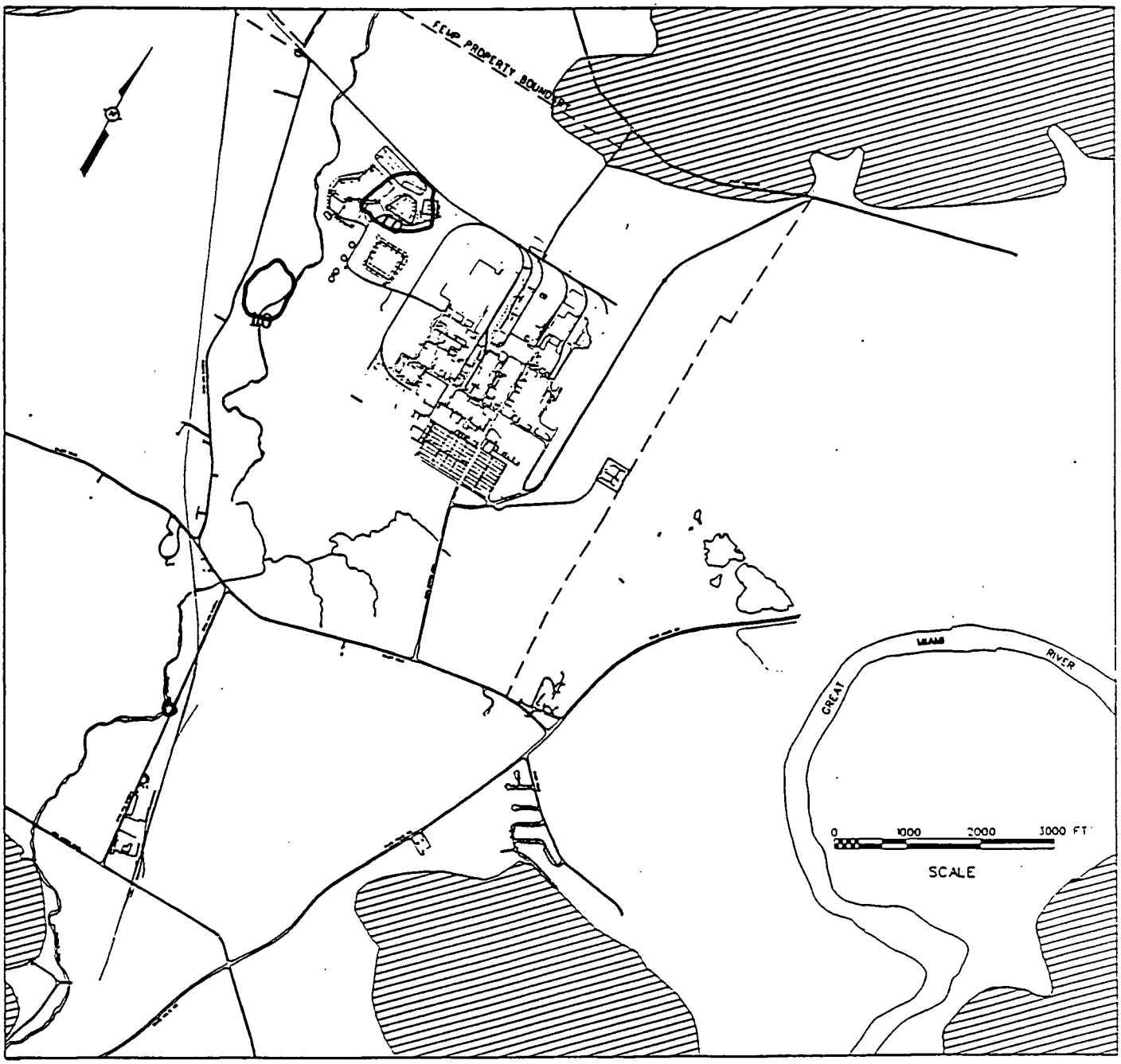

Figure 2.3-23 - Estimated 1993 Uranium Concentrations (μg/L) at 3000 Series Well Level

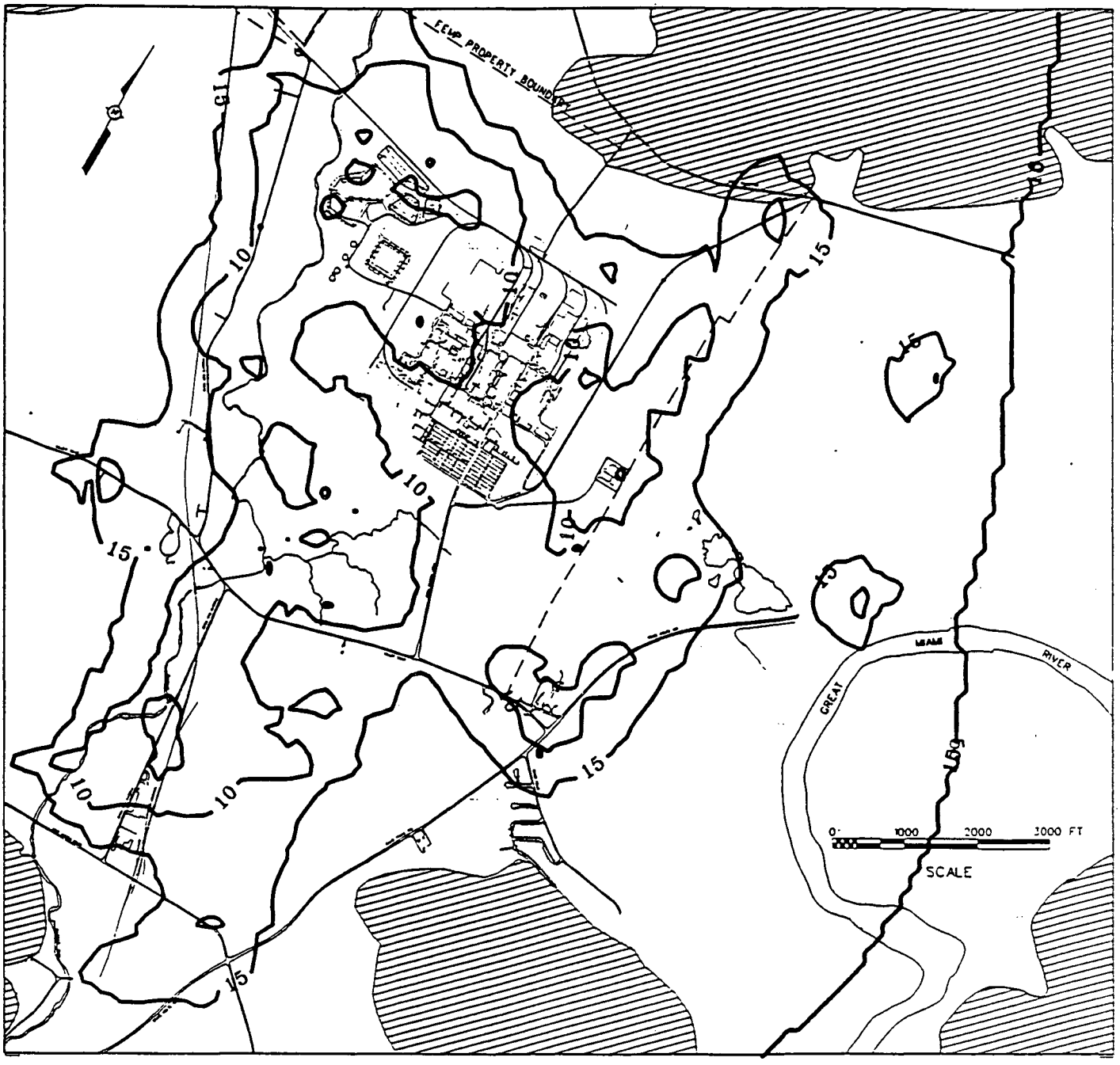

Figure 2.3-24 - Multiplicative Statistical Uncertainty Factor Associated with 1993 Uranium Concentration Estimates in 2000 Series Well Levels

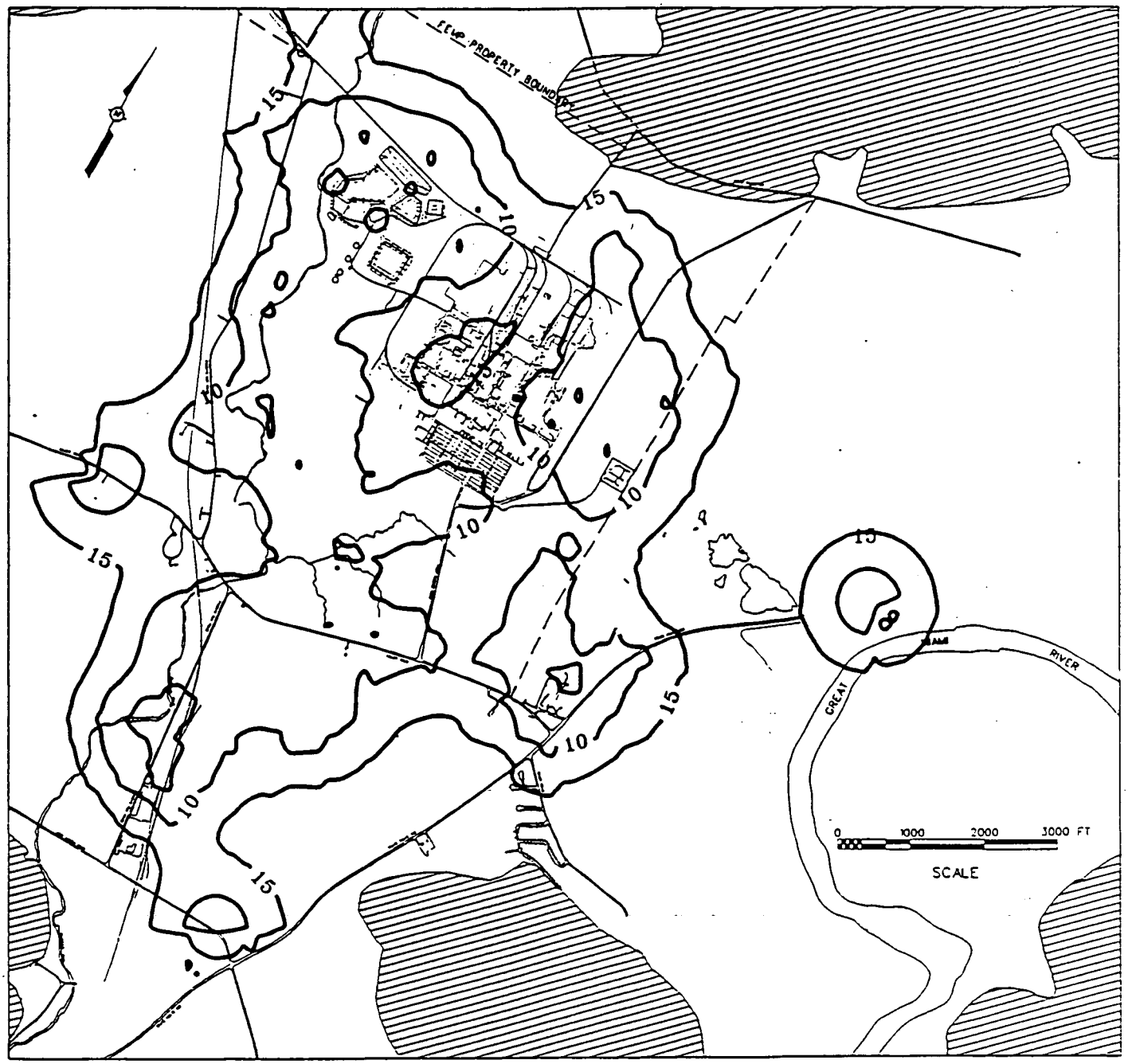

Figure 2.3-25 - Multiplicative Statistical Uncertainty Factor Associated with 1993 Uranium Concentration Estimates in 3000 Series Well Levels

Table 2.2-1 - Summary of Analyzed Data Sets

Data Set	Number of Data	Minimum Value	Maximum Value	Mean	Standard Deviation	Coefficient of Variation
2000 Series Wells Joint Spatial-Temporal Water Levels in ft.	3791	493.7 ft.	568.9 ft.	519.9 ft.	5.3 ft.	0.01
Steady-State Water Levels in ft. (June 1993 Data)	202	497.4 ft.	539.1 ft.	520.8 ft.	4.4 ft.	0.01
1990 Uranium Levels in μg/L	169	0.25 μg/L	691 μg/L	29.3 μg/L	85.1 μg/L	2.90
1991 Uranium Levels in μg/L	163	0.05 μg/L	1572.6 μg/L	35.1 μg/L	162.3 μg/L	4.62
1992 Uranium Levels in μg/L	153	0.08 μg/L	149.2 μg/L	6.7 μg/L	15.3 μg/L	2.28
1993 Uranium Levels in μg/L	209	0.30 μg/L	2097.9 μg/L	35.5 μg/L	174.5 μg/L	4.92

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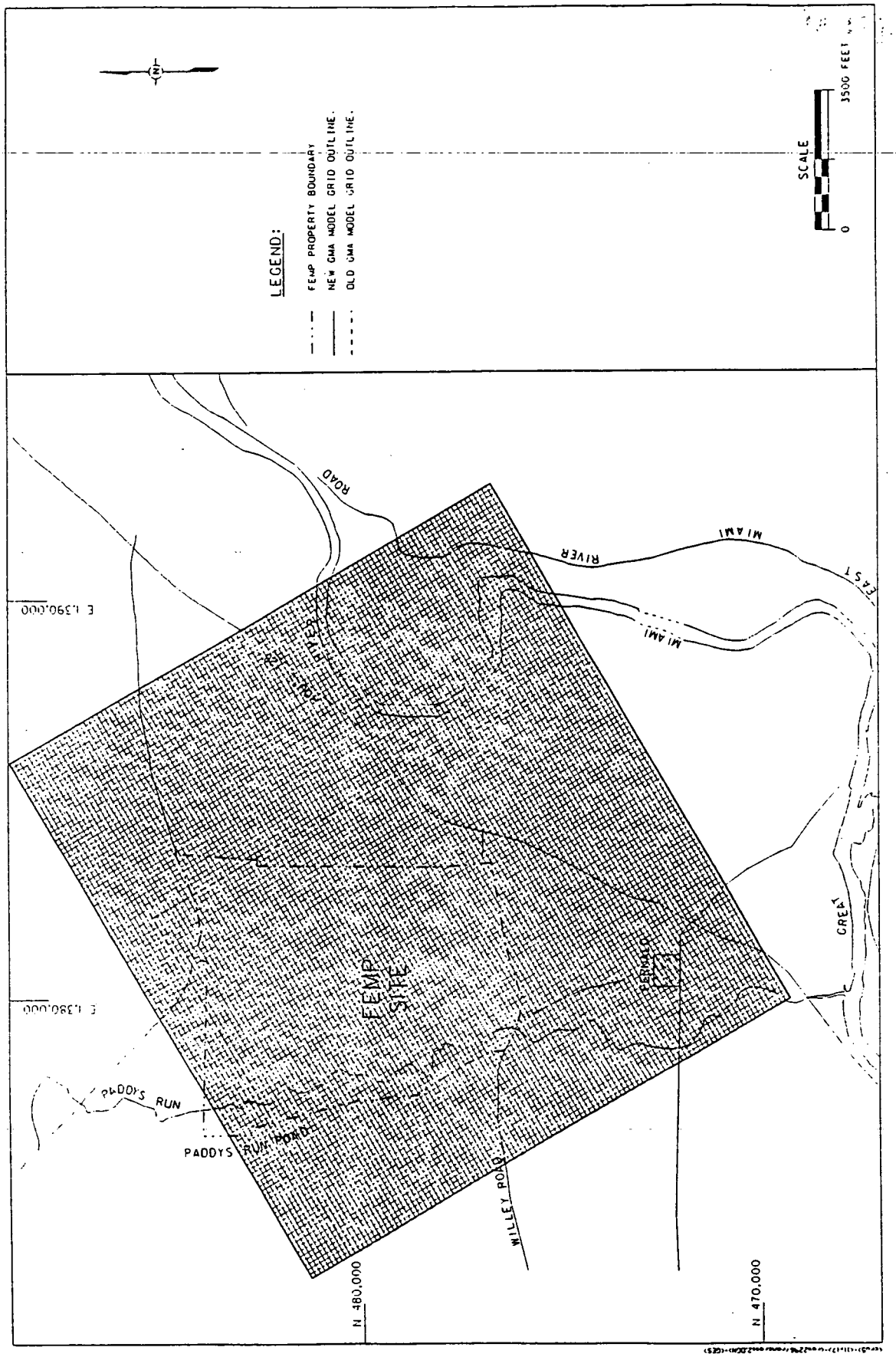
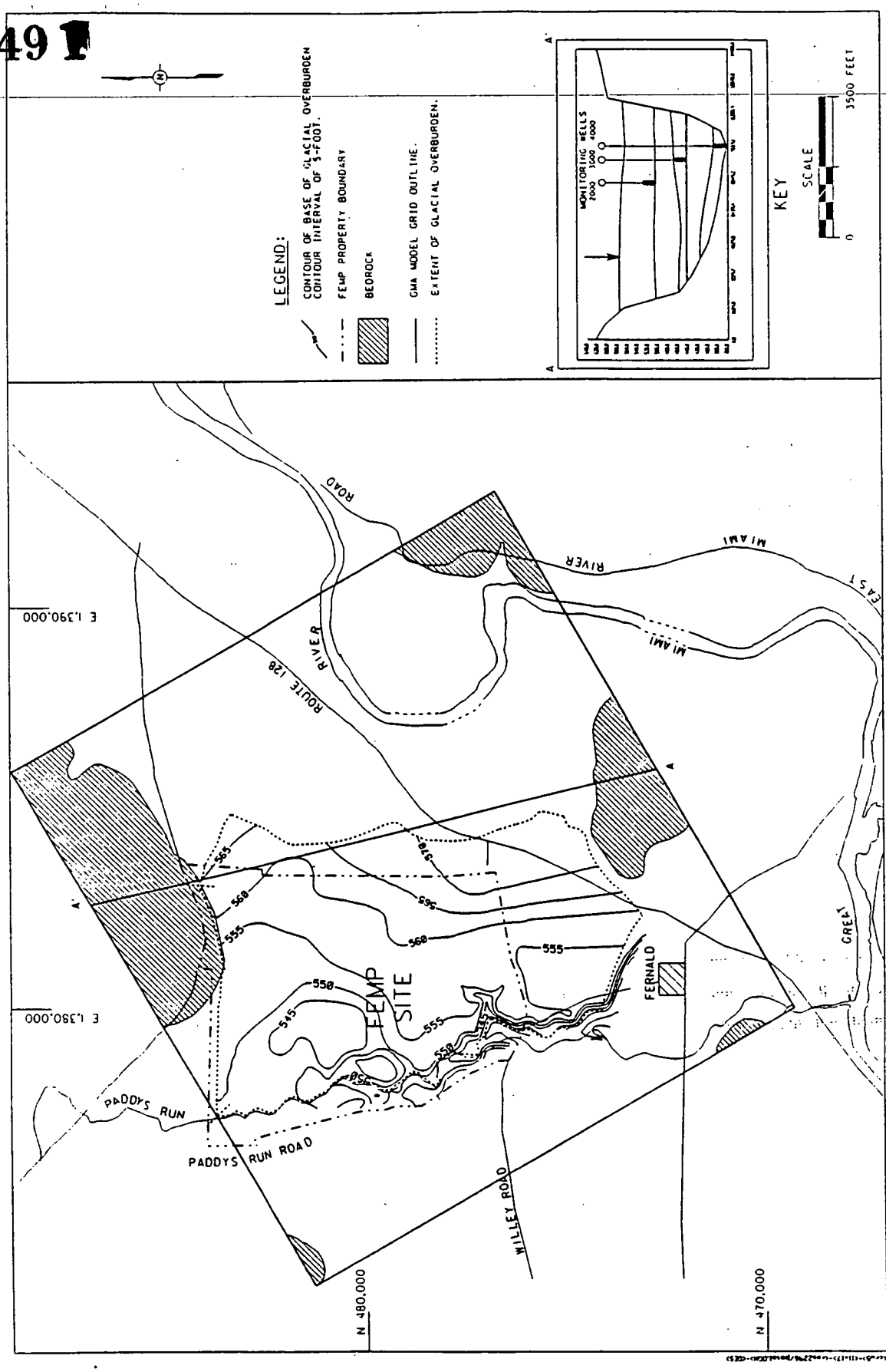
Table 2.2-2 - Fitted Semivariogram Models of Spatial and Temporal Correlation

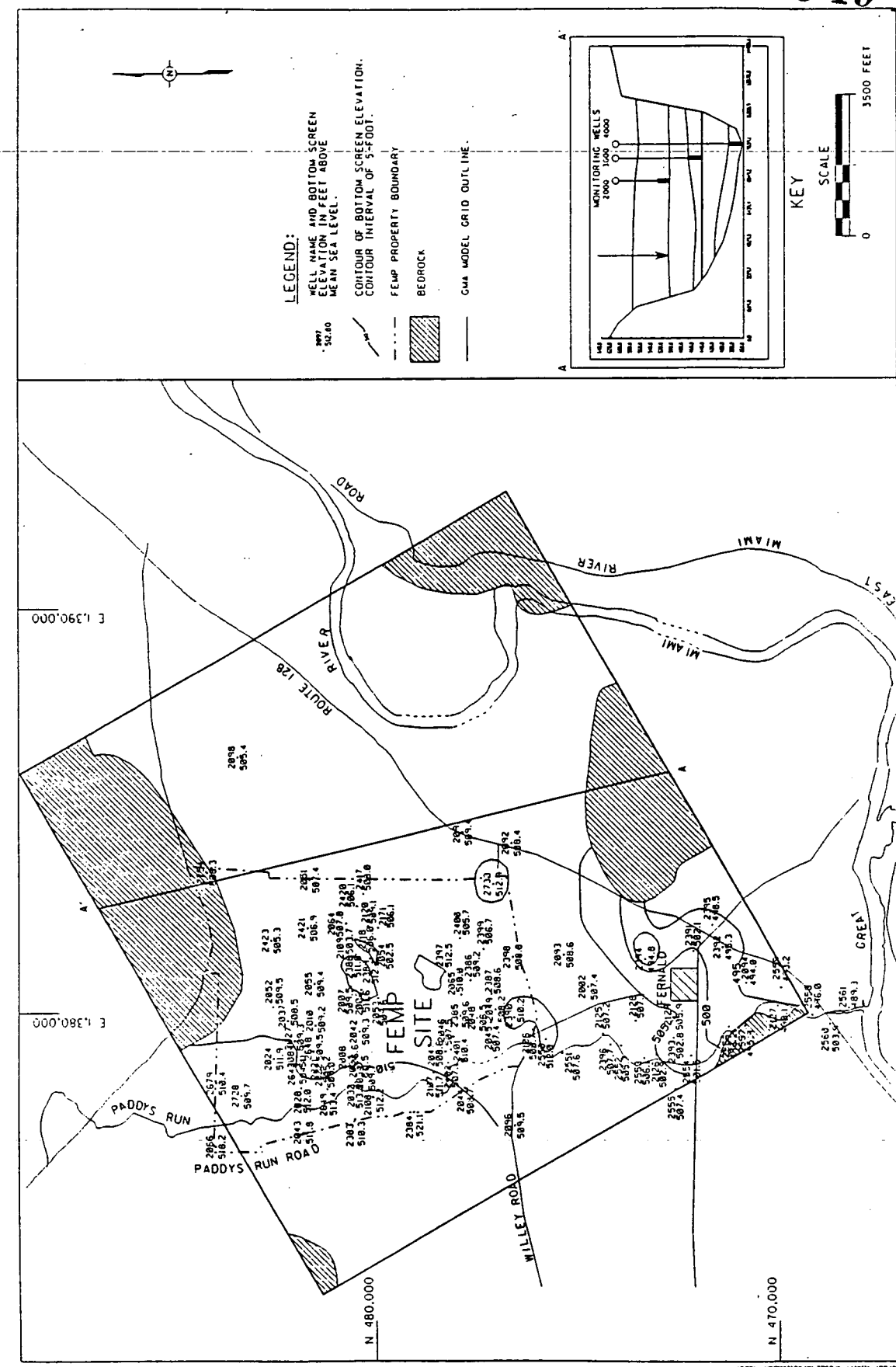
Data Set	Semivariogram Model
2000 Series Wells Joint Spatial-Temporal Water Levels in ft.	K = 3 Nested Structures, Nugget Variance = 0 ft.^{2} 1. Geometric Anisotropic Spherical, Variance = 1.5 ft.^{2}, Spatial Range = 1200 ft., Temporal Range = 30 days (represented by solid line on Figure 2.2-1) 2. Geometric Anisotropic Spherical, Variance = 5.5 ft.^{2}, Spatial Range = 7000 ft., Temporal Range = 700 days (represented by dashed line on Figure 2.2-1) 3. Zonal Gaussian in Spatial NS Direction, Variance = 22 ft.^{2}, Spatial NS Range = 6060 ft. (represented by dotted line on Figure 2.2-1)
Steady-State Water Levels in ft. (June 1993 Data)	K = 2 Nested Structures, Nugget Variance = 0 ft.^{2} 1. Isotropic Linear, Slope = 0.00045 ft.^{2}/ft. (represented by solid line on Figure 2.2-6) 2. Zonal Gaussian in Horizontal NS Direction, Variance = 13 ft.^{2}, NS Range = 8660 ft. (represented by dashed line on Figure 2.2-6)
1990 Uranium Levels in μg/L	K = 1 Structure, Nugget Variance = 0.3 $[\ln(\mu g/L)]^2$ 1. Geometric Anisotropic Spherical, Variance = 2.7 $[\ln(\mu g/L)]^2$, Horizontal Range = 3000 ft., Vertical Range = 120 ft.
1991 Uranium Levels in μg/L	K = 1 Structure, Nugget Variance = 0.4 $[\ln(\mu g/L)]^2$ 1. Geometric Anisotropic Spherical, Variance = 3.4 $[\ln(\mu g/L)]^2$, Horizontal Range = 3000 ft., Vertical Range = 105 ft.
1992 Uranium Levels in μg/L	K = 1 Structure, Nugget Variance = 0.4 $[\ln(\mu g/L)]^2$ 1. Geometric Anisotropic Spherical, Variance = 2.0 $[\ln(\mu g/L)]^2$, Horizontal Range = 3000 ft., Vertical Range = 105 ft.
1993 Uranium Levels in μg/L	K = 1 Structure, Nugget Variance = 0.9 $[\ln(\mu g/L)]^2$ 1. Isotropic Spherical, Variance = 1.9 $[\ln(\mu g/L)]^2$, Horizontal and Vertical Range = 2,000 ft.



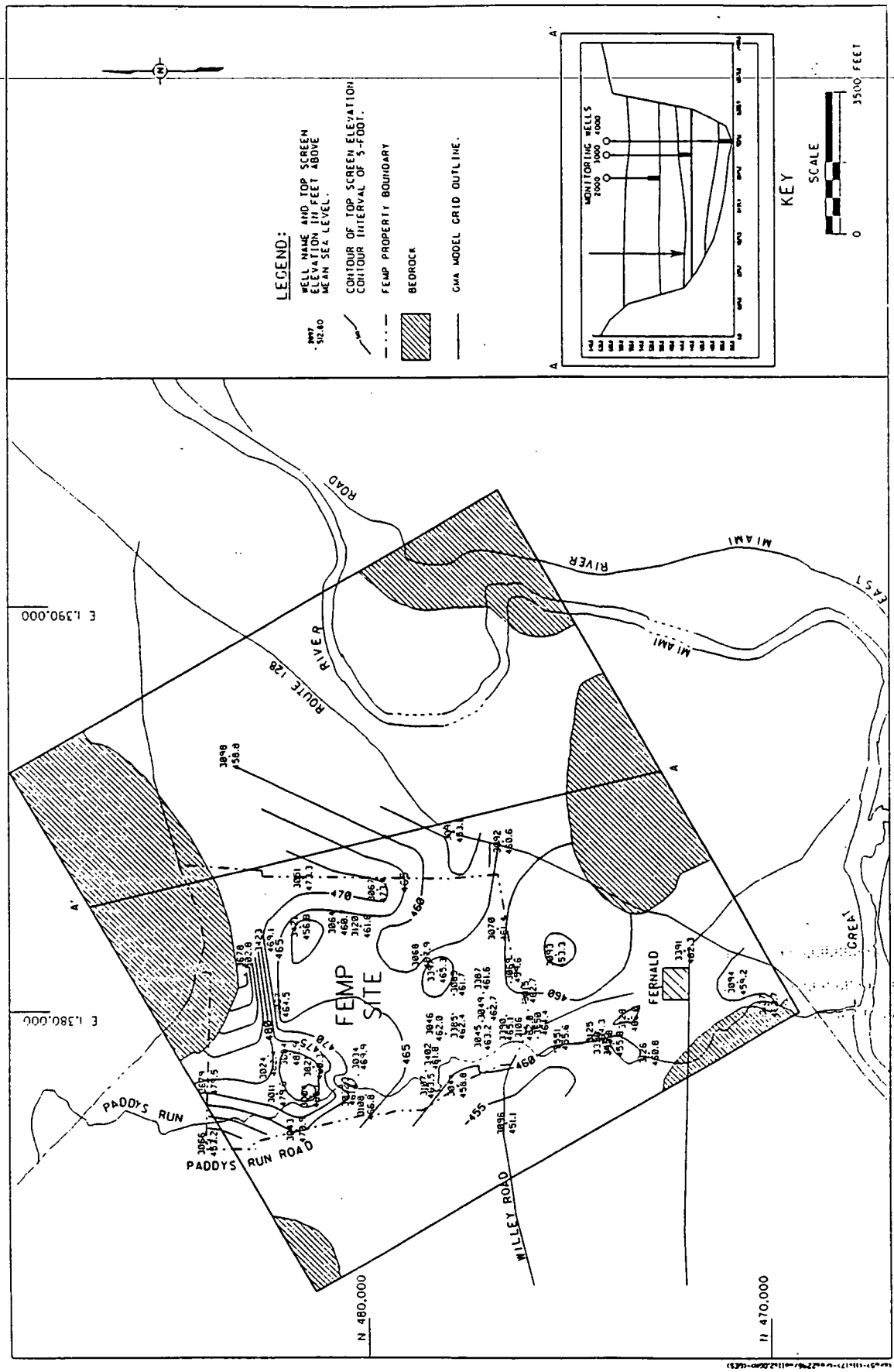
3.1-1 - Location of Model Grids



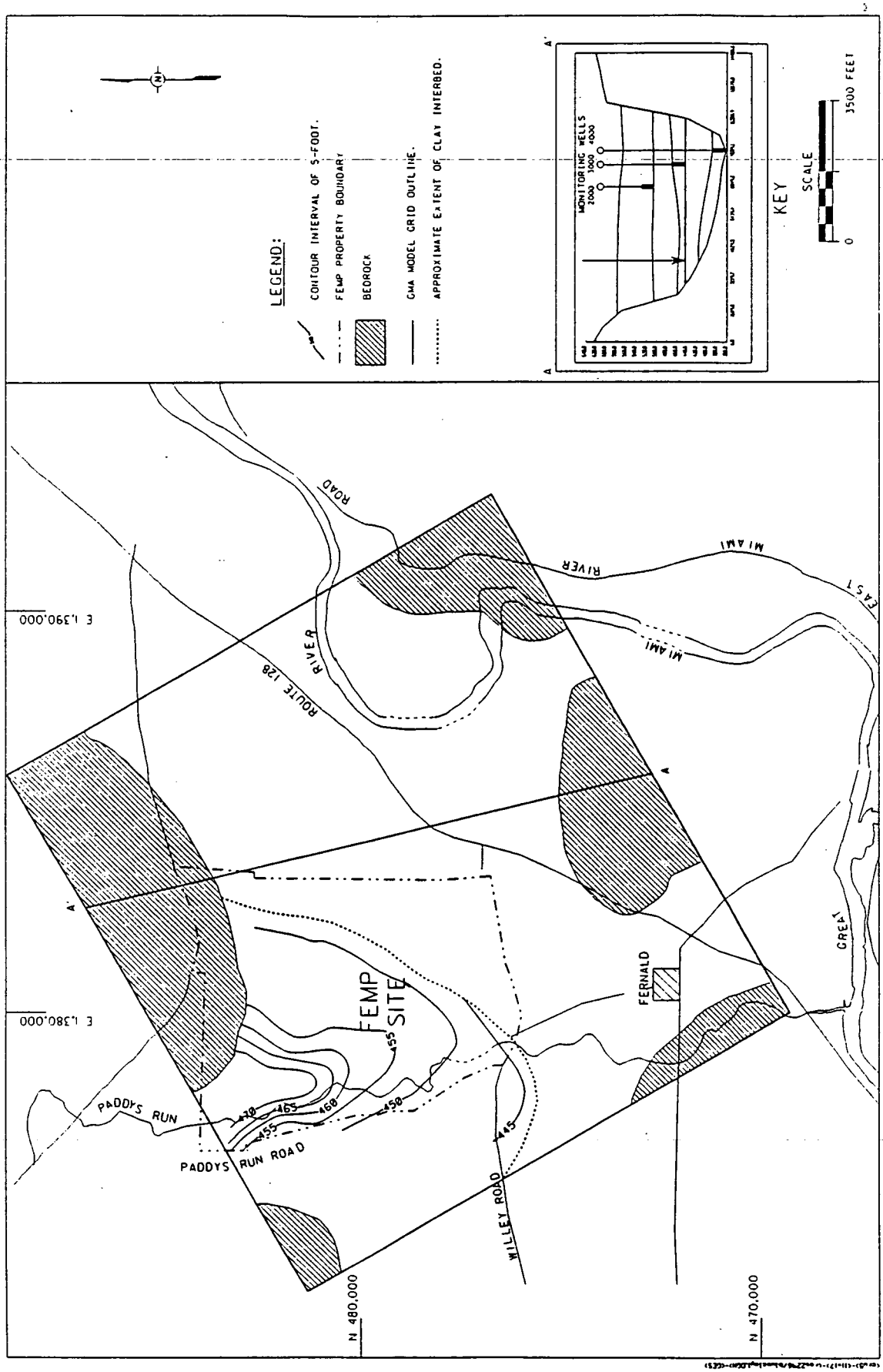
3.2-1 - Base of Glacial Overburden Structure



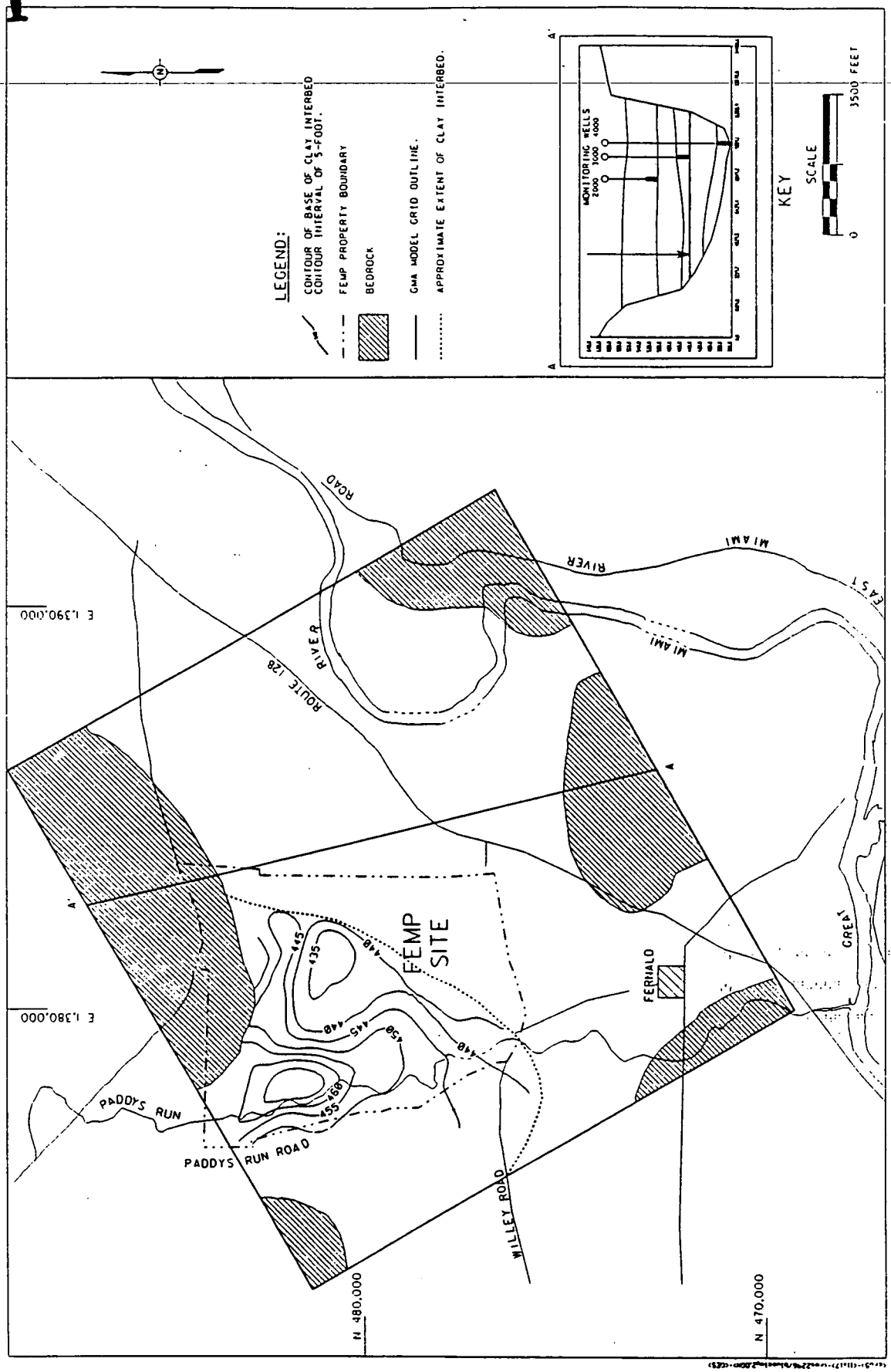
3.2-2 - Well Screen Bottom Elevations 2000 Series Monitoring Wells



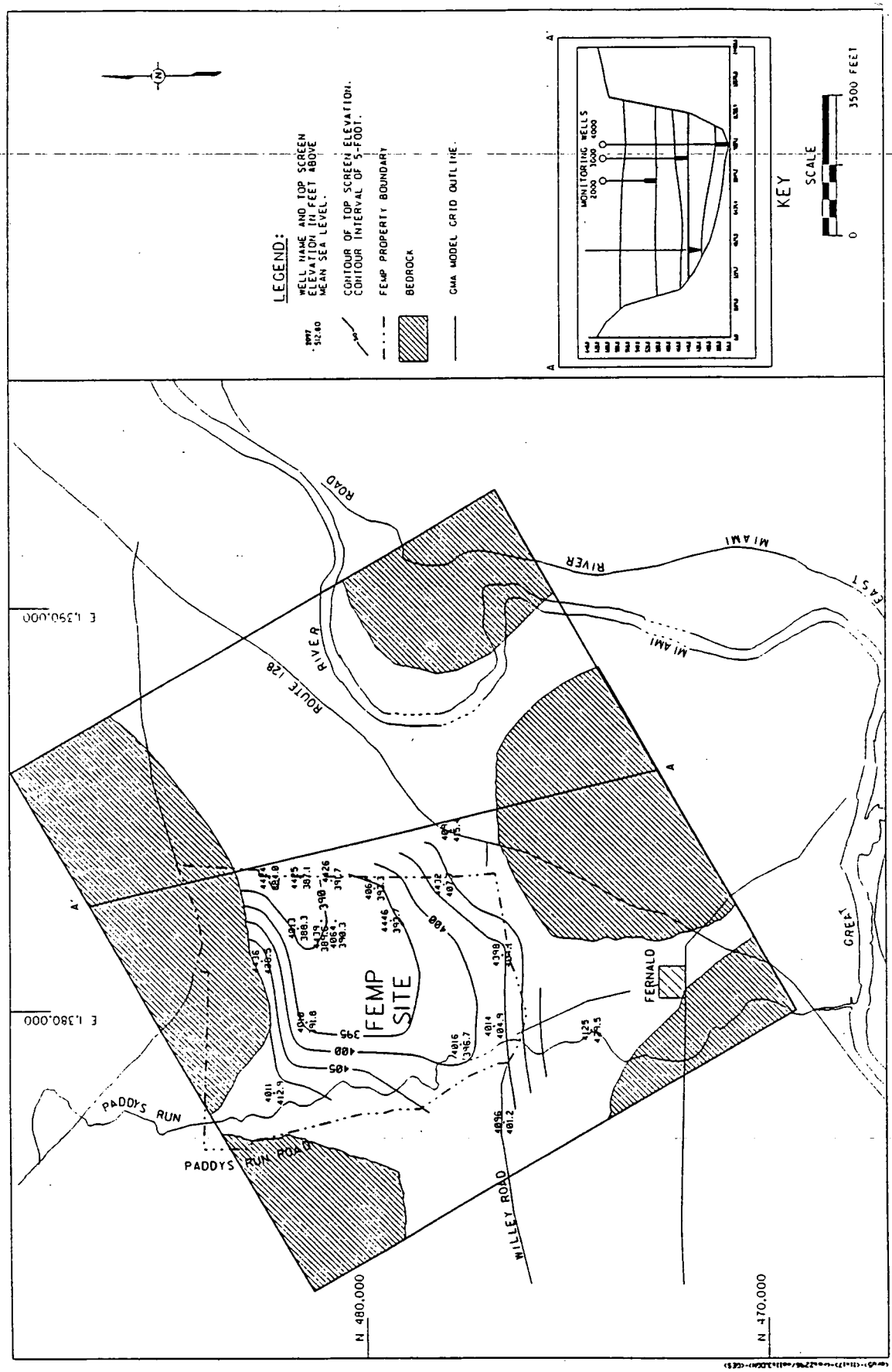
3.2-3 - Well Screen Top Elevations 3000 Series Monitoring Wells



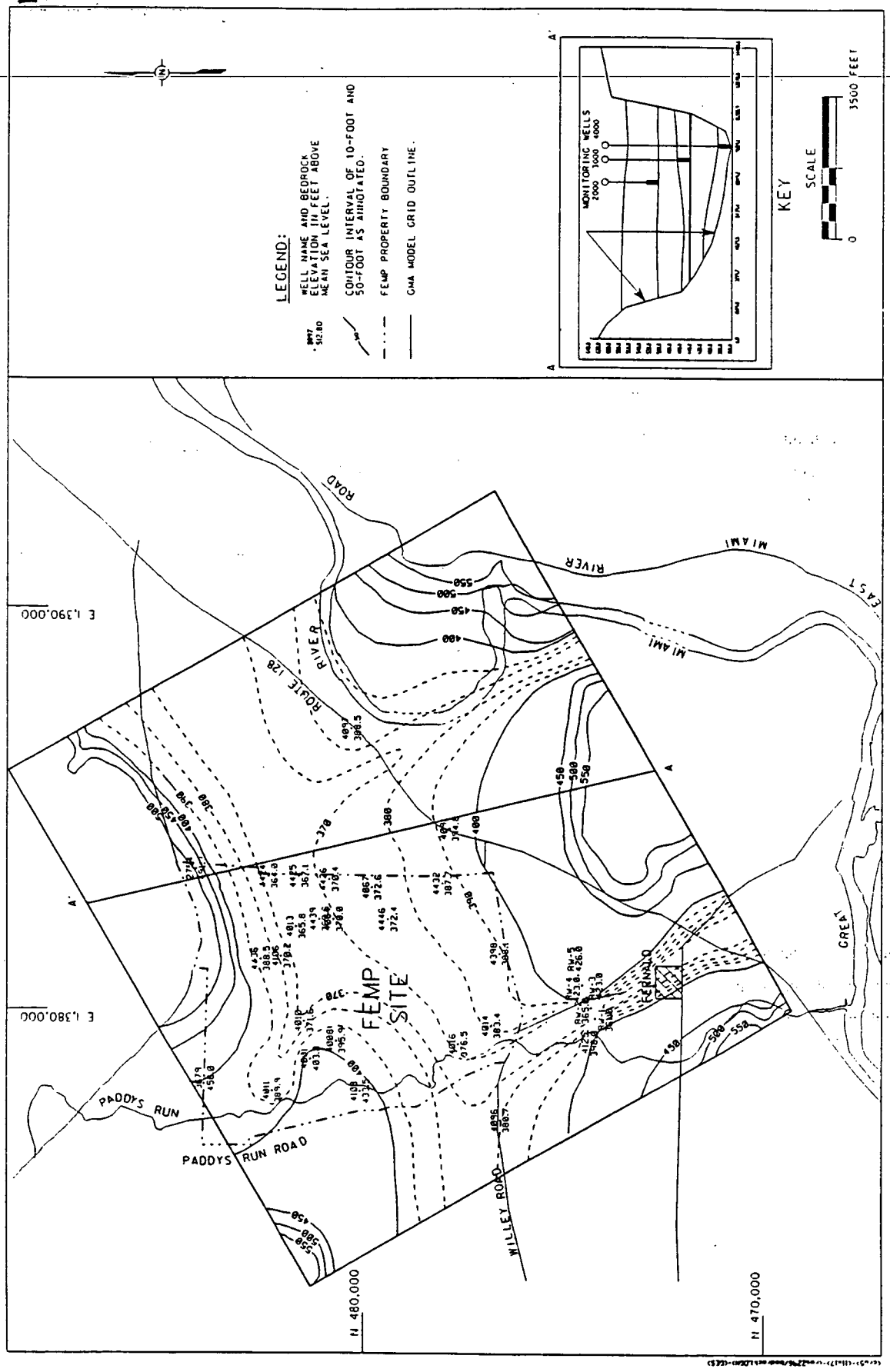
3.2-4 - Top of Clay Interbed Structure



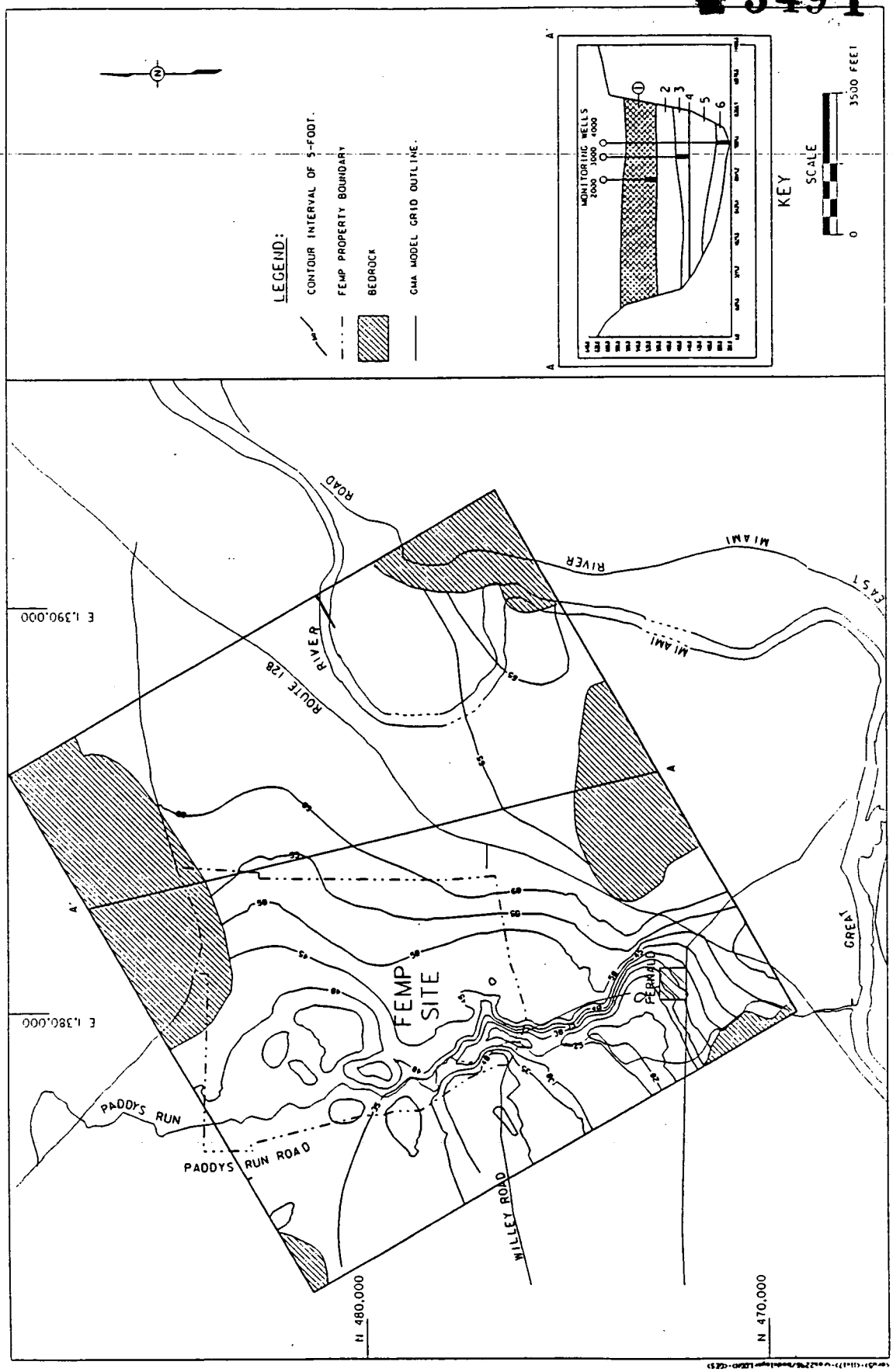
3.2-5 - Base of Clay Interbed Structure



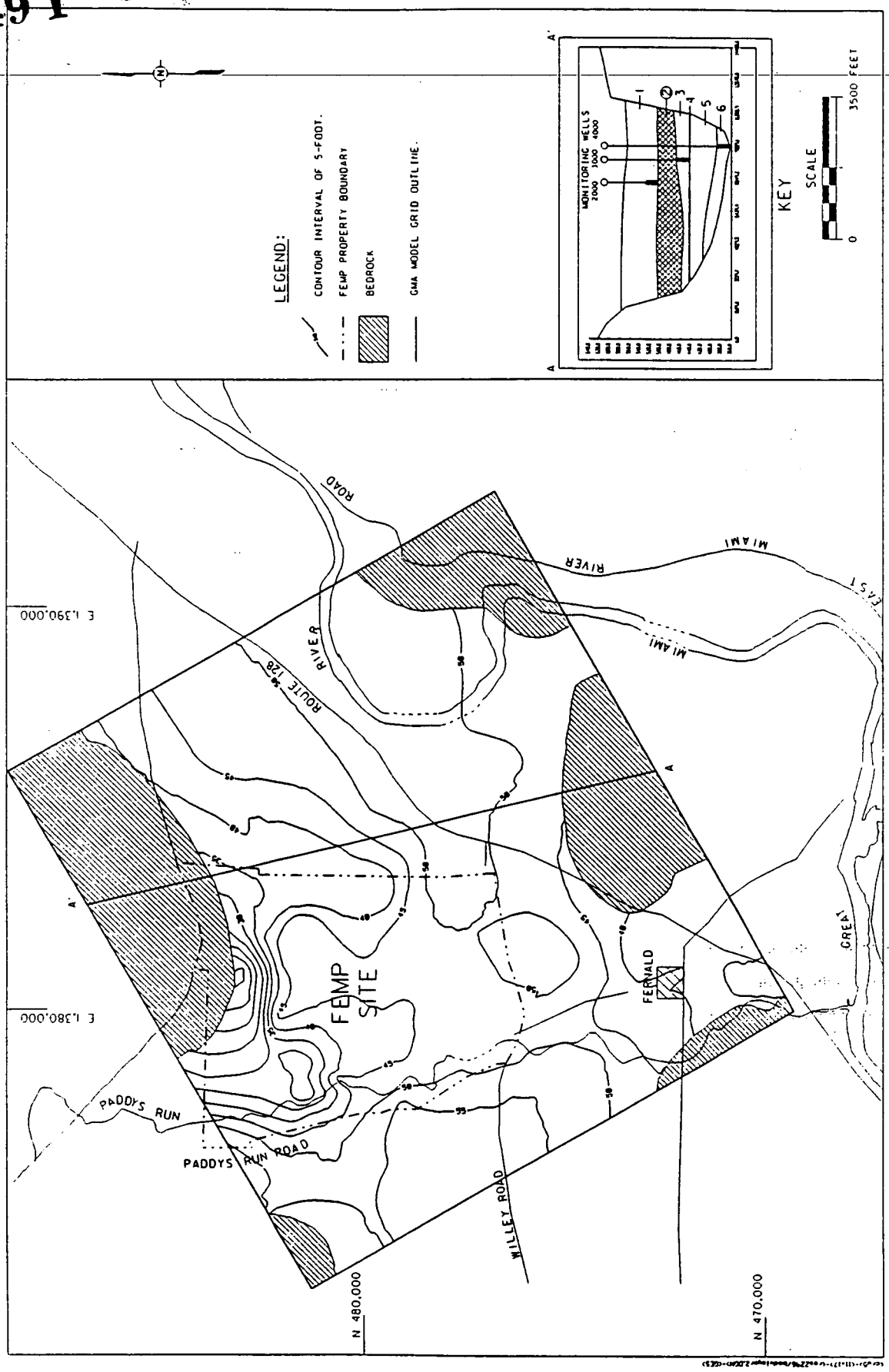
3.2-6 - Well Screen Top Elevations 4000 Series Monitoring Wells



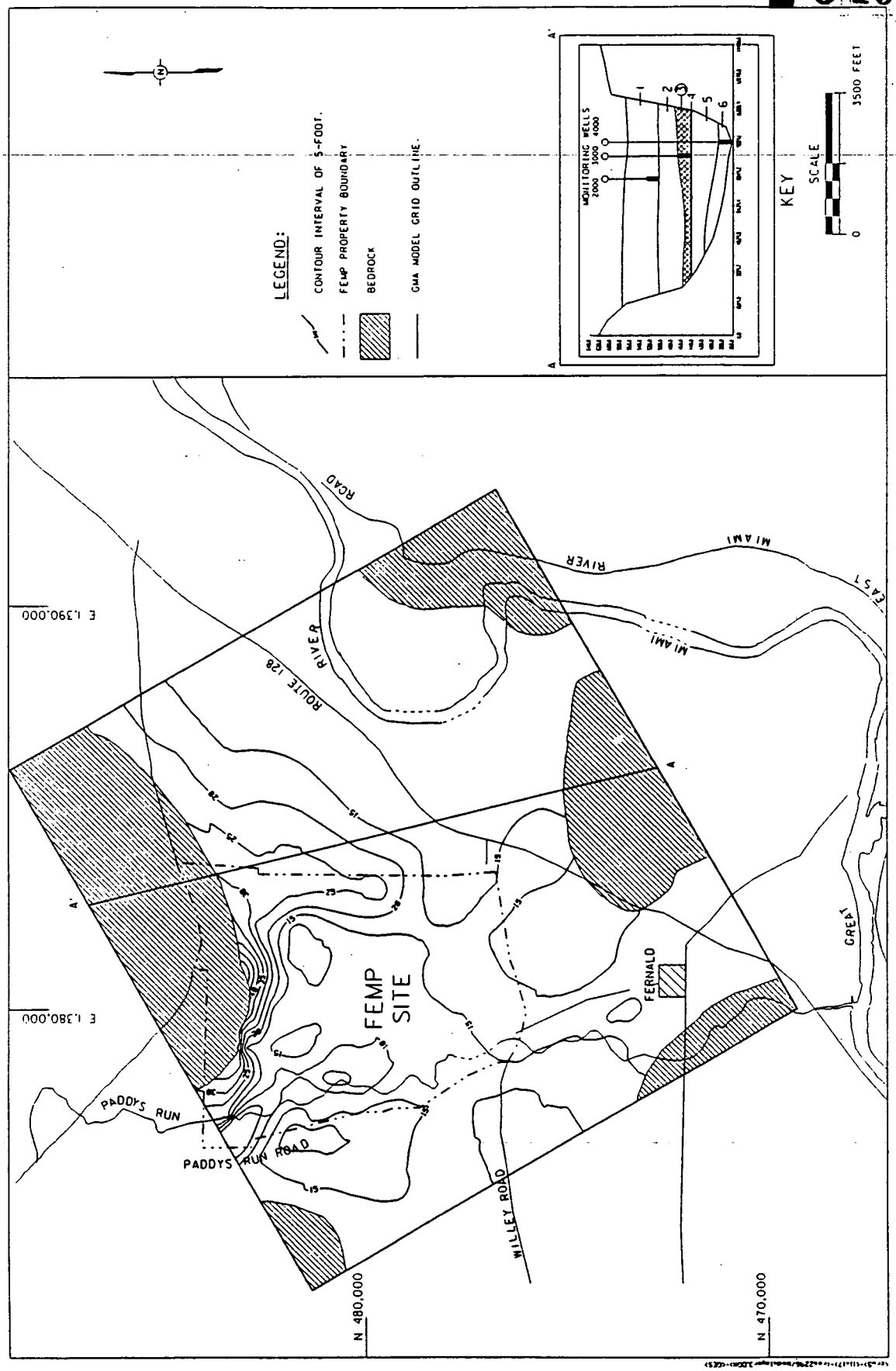
3.2-7 - Bedrock Structure



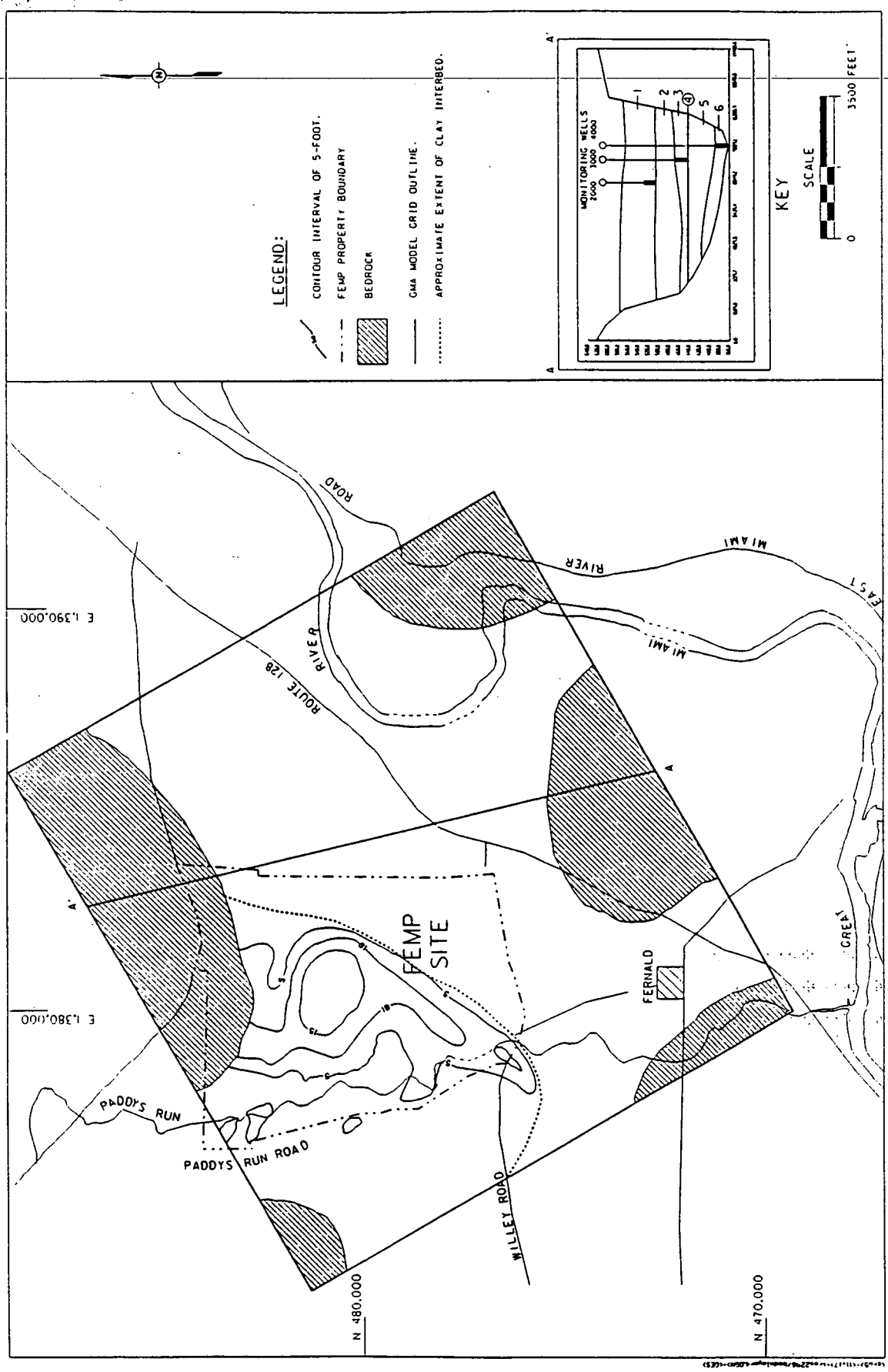
3.2-8 - Isopach of Model Layer 1



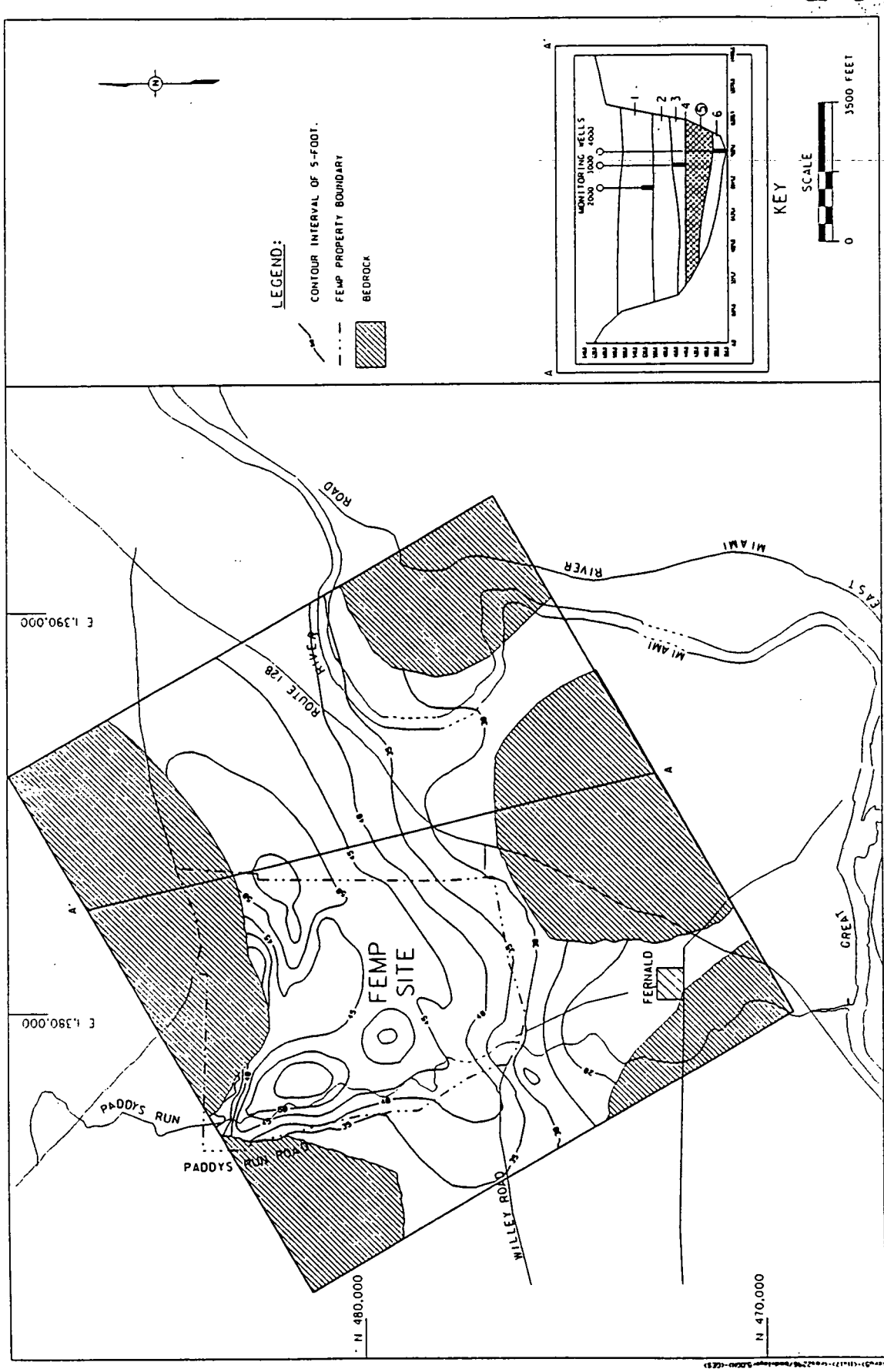
3.2-9 - Isopach of Model Layer 2



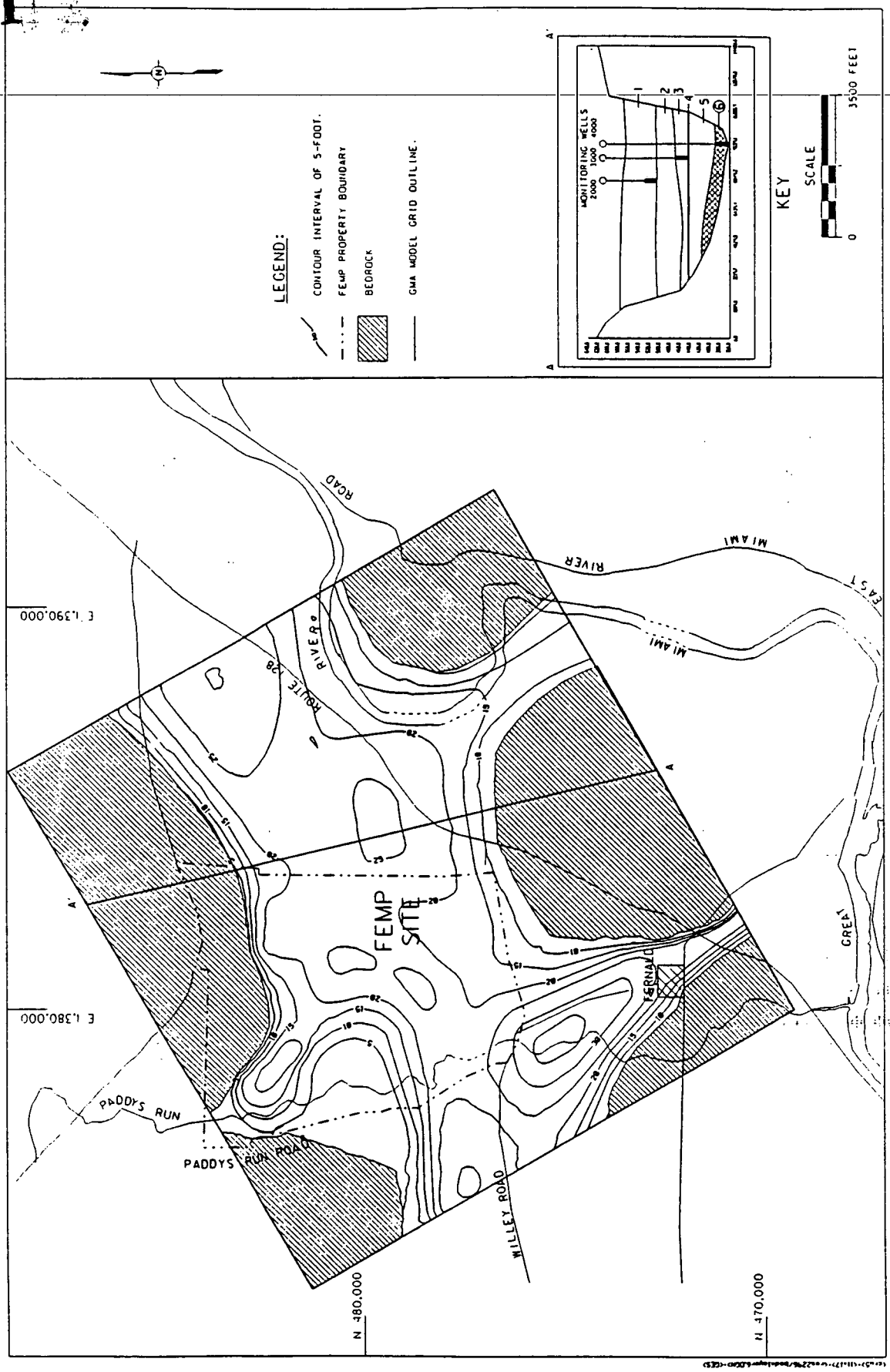
3.2-10 - Isopach of Model Layer 3



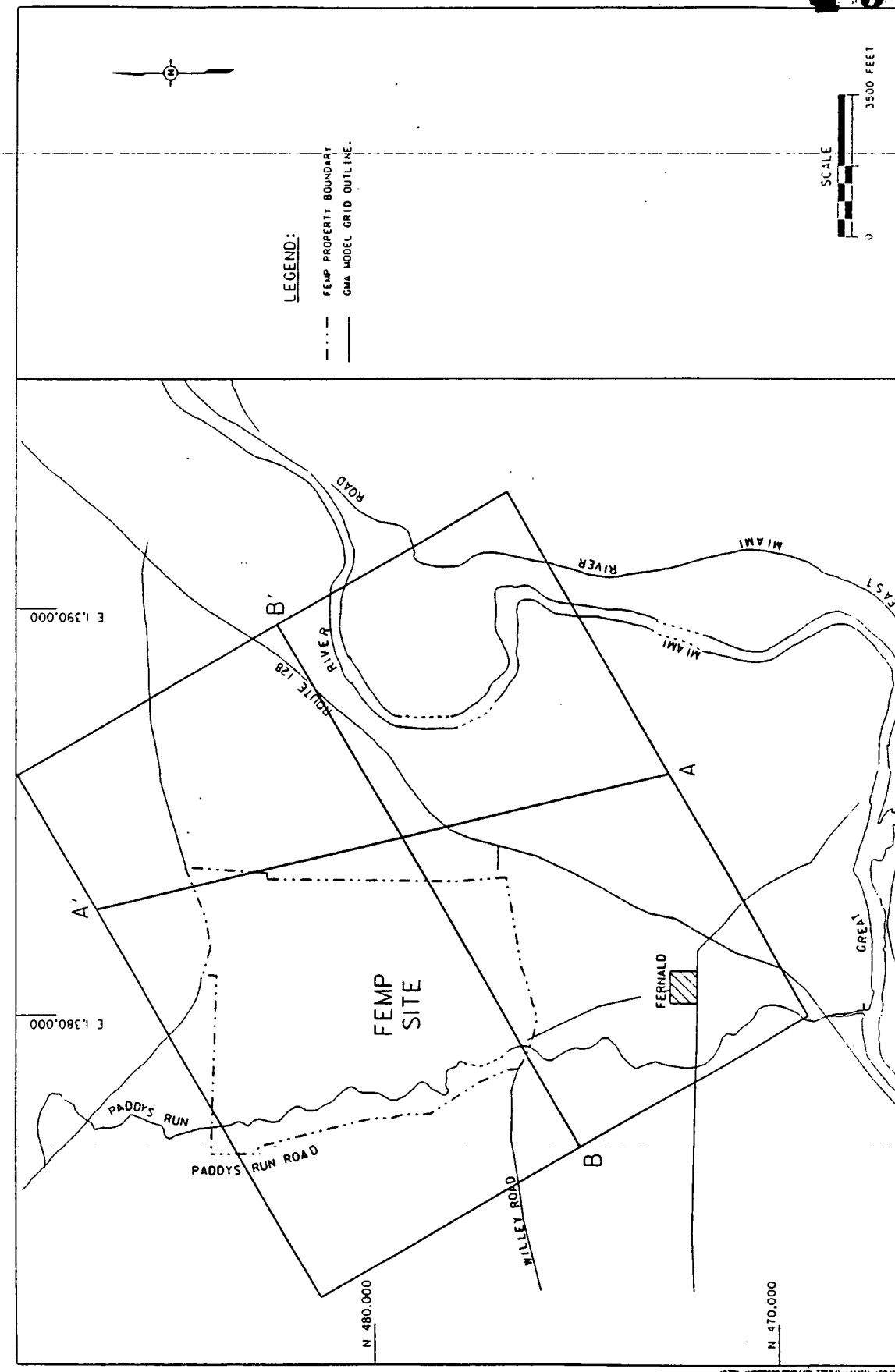
3.2-11 - Isopach of Model Layer 4



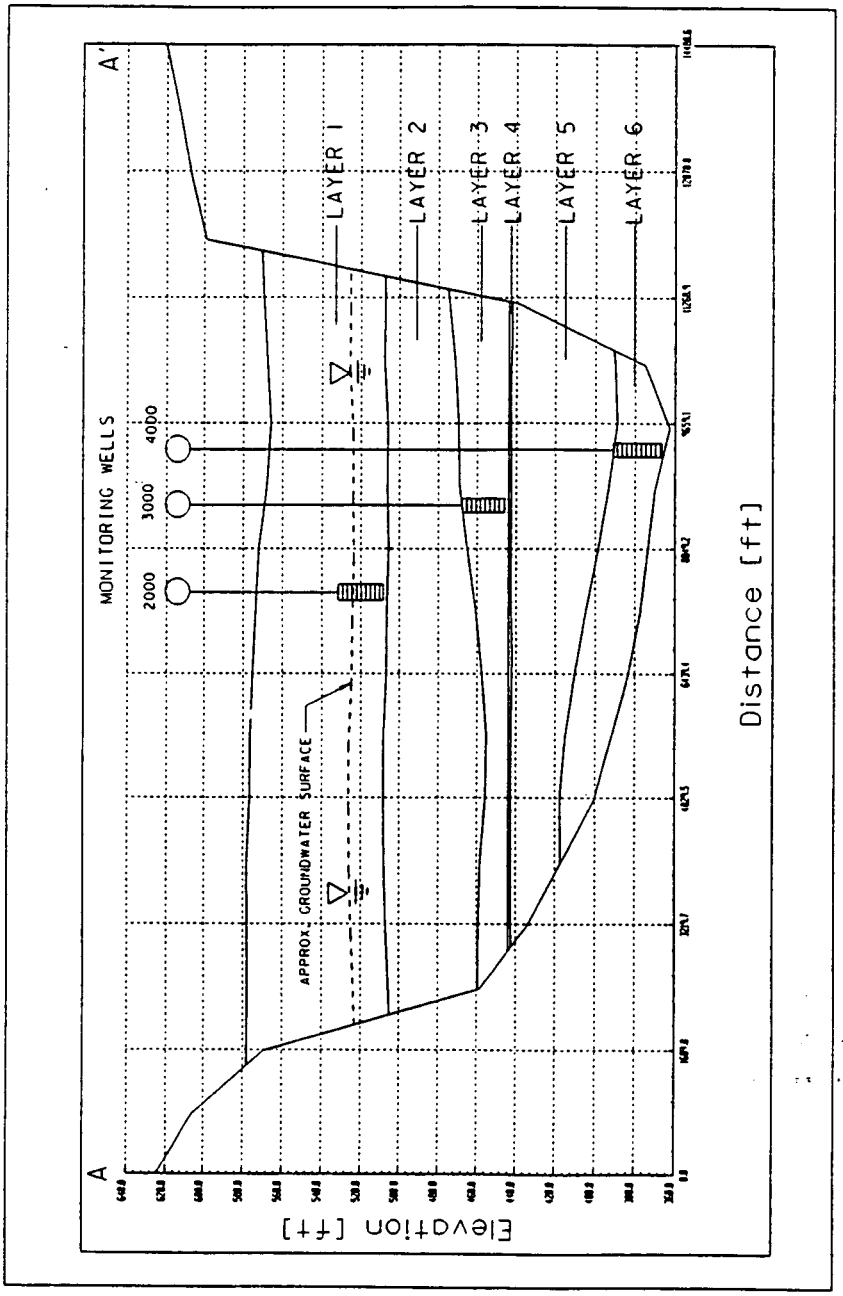
3.2-12 - Isopach of Model Layer 5



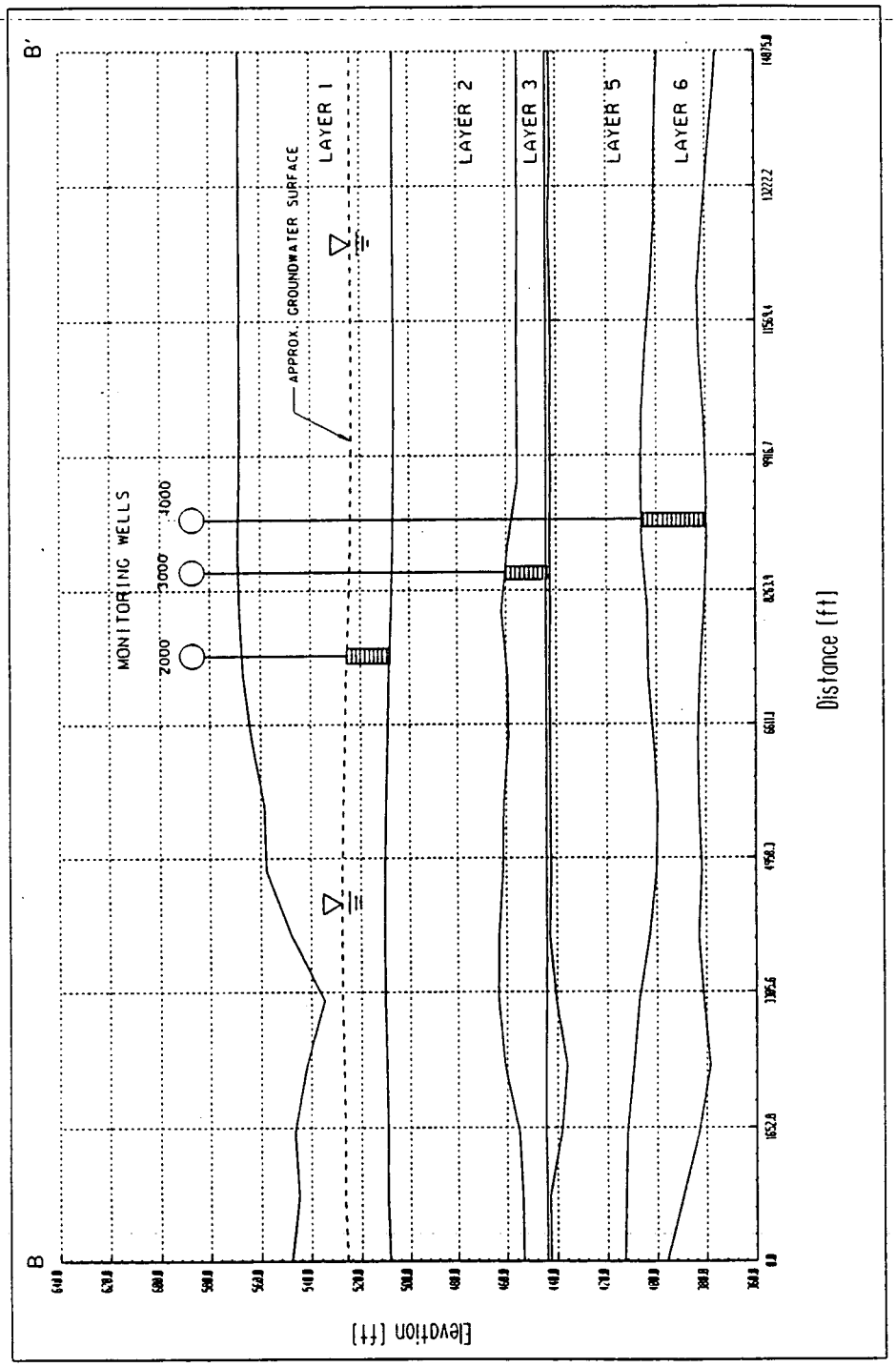
3.2-13 - Isopach of Model Layer 6



3.2-14 - Location of Model Cross Sections



3.2-15 - Model Cross Section A-A'



3.2-16 - Model Cross Section B-B'

Table 3.2-1 - 2000 Series Monitoring Wells Used to Define the Top of Model Layer 2

2002	2054	2171	2421
2006	2055	2383	2423
2007	2064	2384	2550
2008	2065	2385	2551
2010	2066	2386	2552
2024	2084	2387	2553
2027	2091	2388	2554
2028	2092	2389	2555
2032	2093	2390	2556
2033	2094	2391	2557
2034	2096	2392	2558
2037	2098	2393	2559
2042	2106	2394	2560
2043	2107	2395	2561
2044	2108	2396	2643
2045	2109	2397	2648
2046	2118	2398	2649
2047	2120	2399	2679
2048	2125	2400	2728
2049	2126	2401	2733
2051	2127	2402	2754
2052	2128	2417	2821
2053	2129	2420	2822

Table 3.2-2 - 3000 Series Monitoring Wells Used to Define the Top of Model Layer 3

3004	3064	3098	3396
3011	3065	3106	3397
3015	3066	3107	3402
3024	3067	3108	3421
3032	3068	3120	3423
3034	3069	3125	3550
3037	3070	3126	3551
3043	3084	3127	3552
3044	3091	3128	3678
3045	3092	3385	3679
3046	3093	3387	3821
3049	3094	3390	
3051	3096	3391	

Table 3.2-3 - 4000 Series Monitoring Wells Used to Define the Top of Model Layer 6

4010	4064	4398	4436
4011	4067	4424	4439
4013	4091	4425	4446
4014	4096	4426	
4016	4125	4432	

Table 3.2-4 - 4000 Series Monitoring Wells Used to Define Base of Model Layer 6 (Bedrock)

2754+	4016	4398	4967
3679+	4064	4424	41066
4001	4067	4425	RW-1*
4008	4091	4426	RW-2*
4010	4096	4432	RW-3*
4011	4097	4436	RW-4*
4013	4108	4439	RW-5*
4014	4125	4446	

* South Plume Recovery Wells

\+ Although not numbered as such, these wells also encountered bedrock.

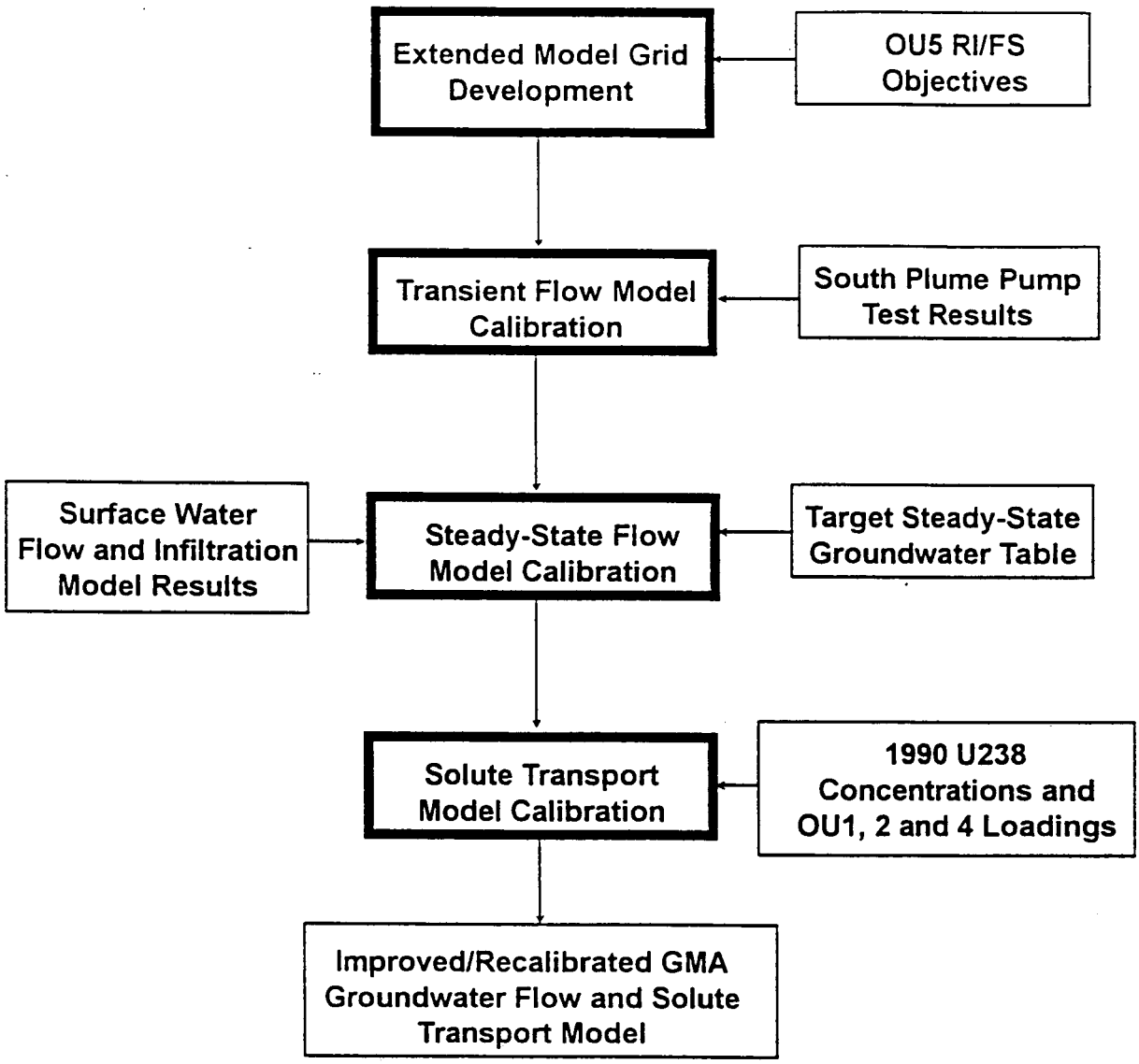


Figure 4.1-1 - GMA Model Improvement - Overview of Model Calibration

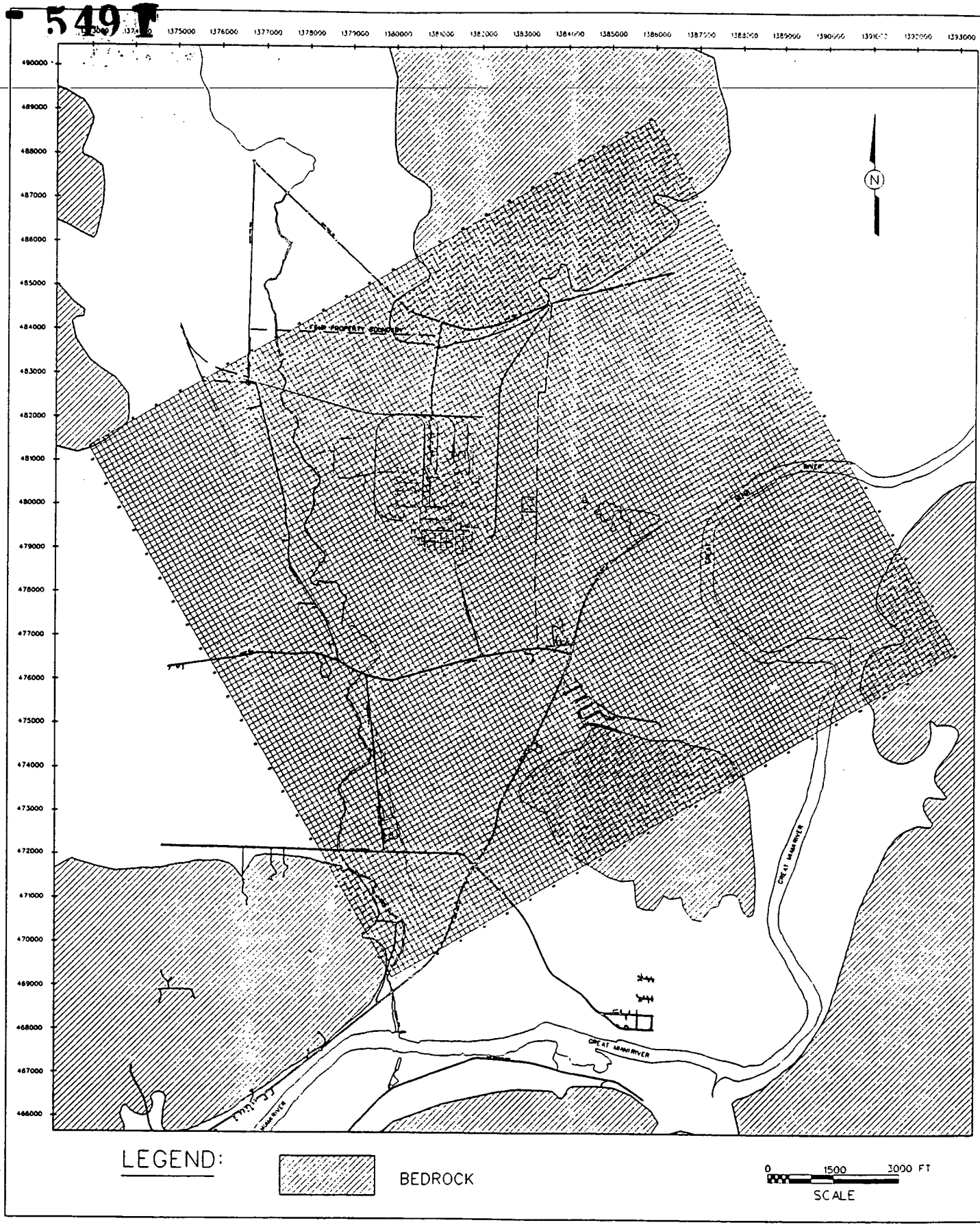
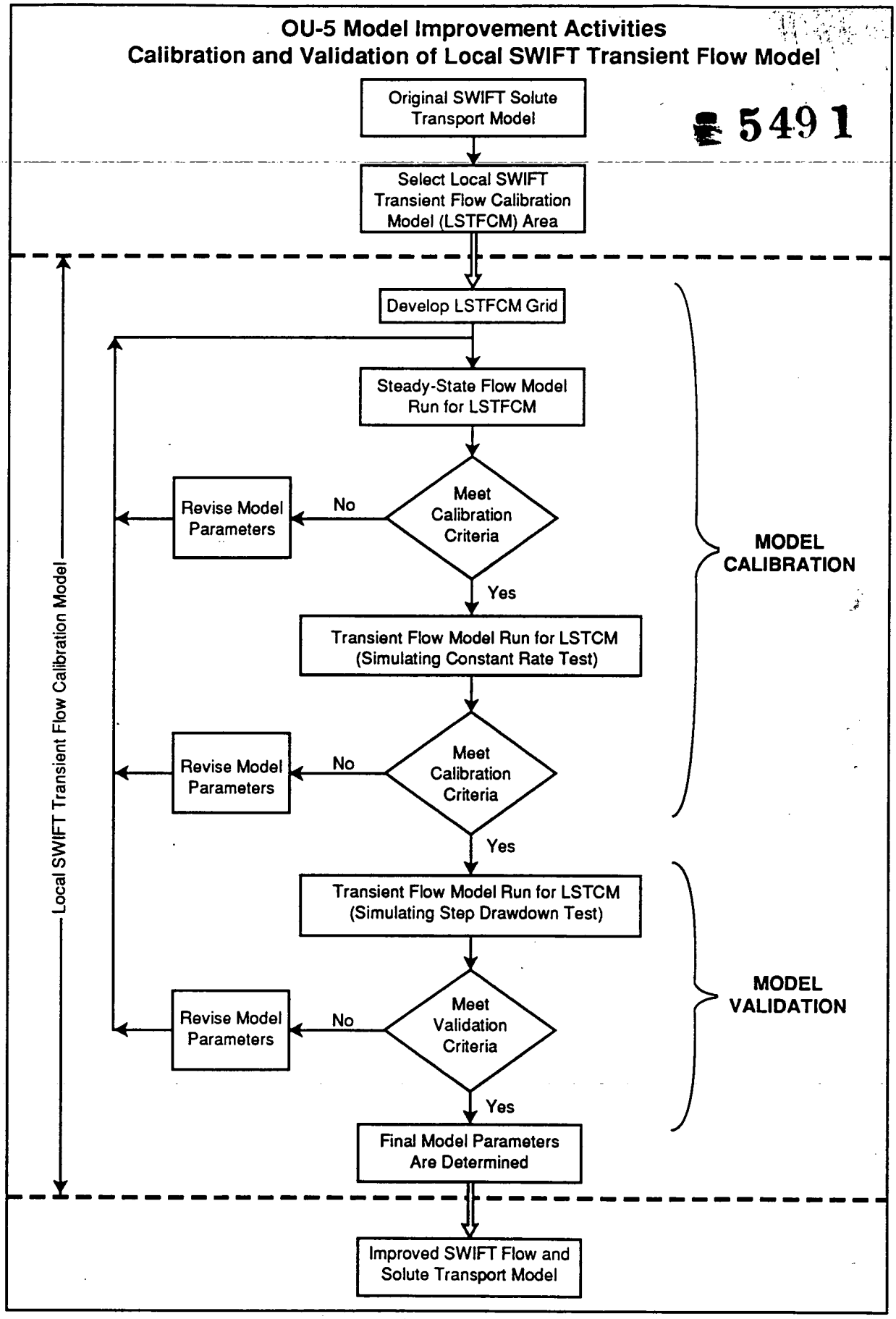


Figure 4.1-2 - Expanded Flow and Solute Transport Grid



5491

Figure 4.2-1 - Flow Chart of Transient Calibration Modeling

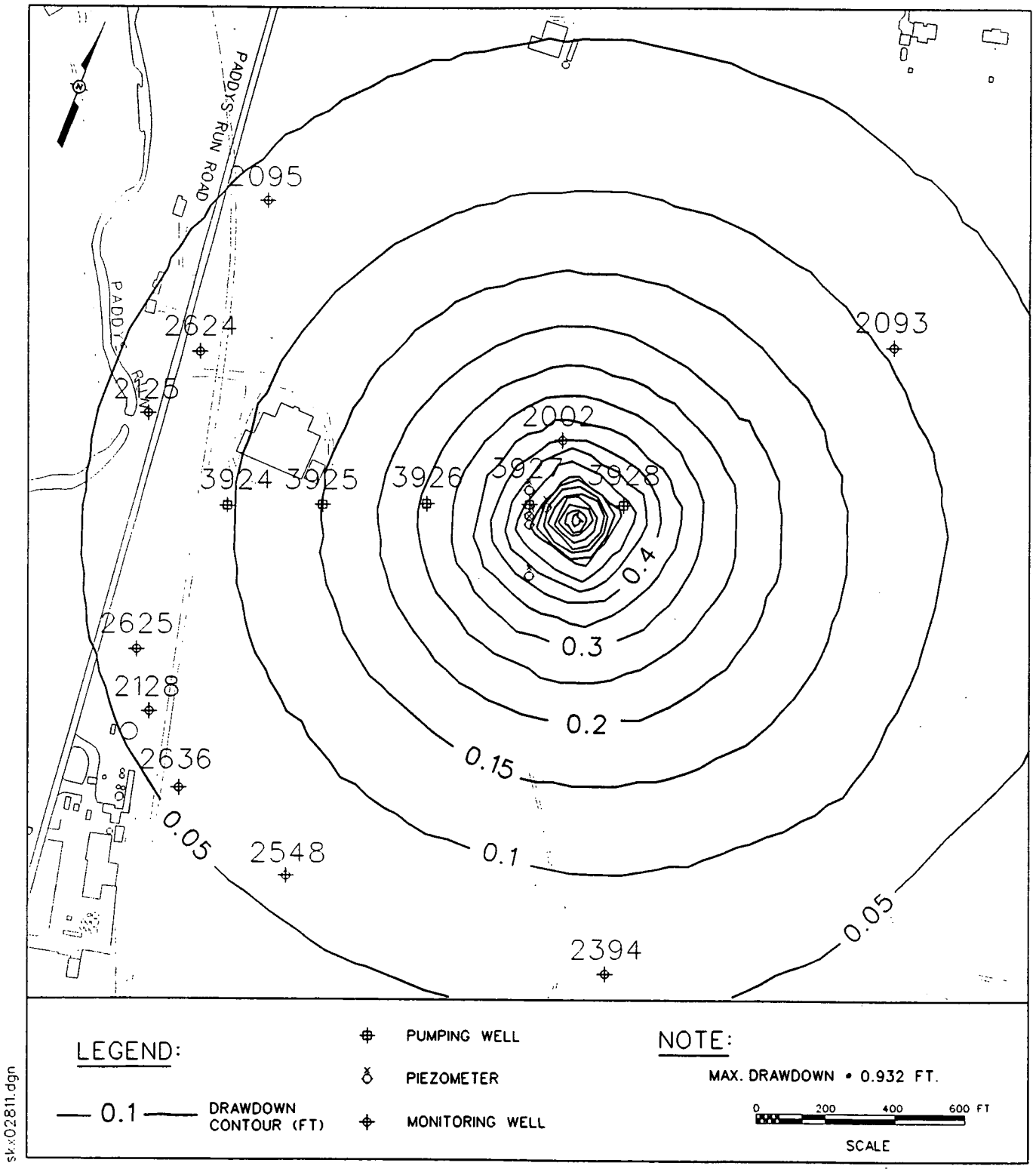


FIGURE 4.2-2 CONE OF DEPRESSION USED TO SELECT MODEL AREA

Figure 4.2-2 - Cone of Depression Used to Select Model Area

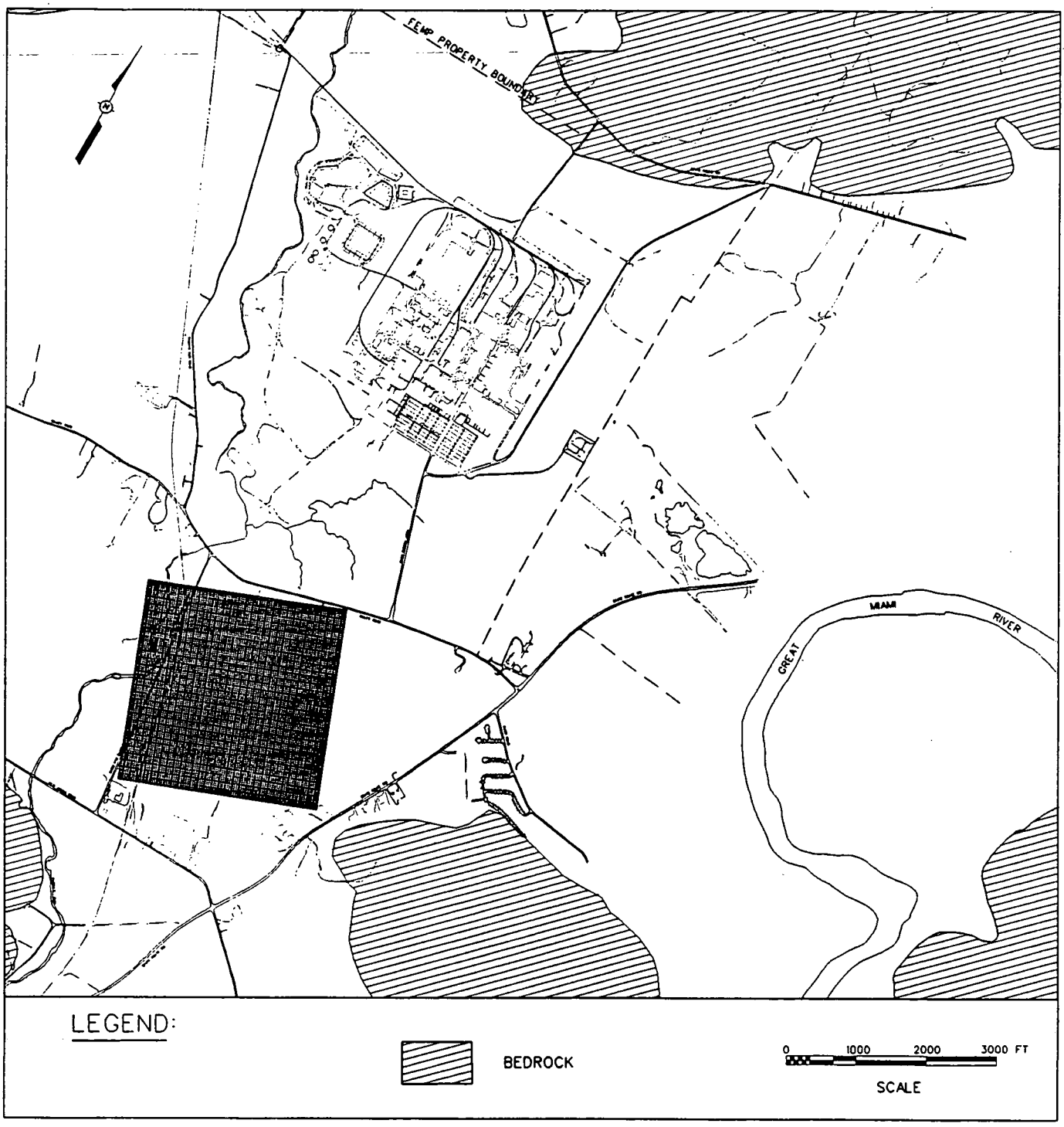
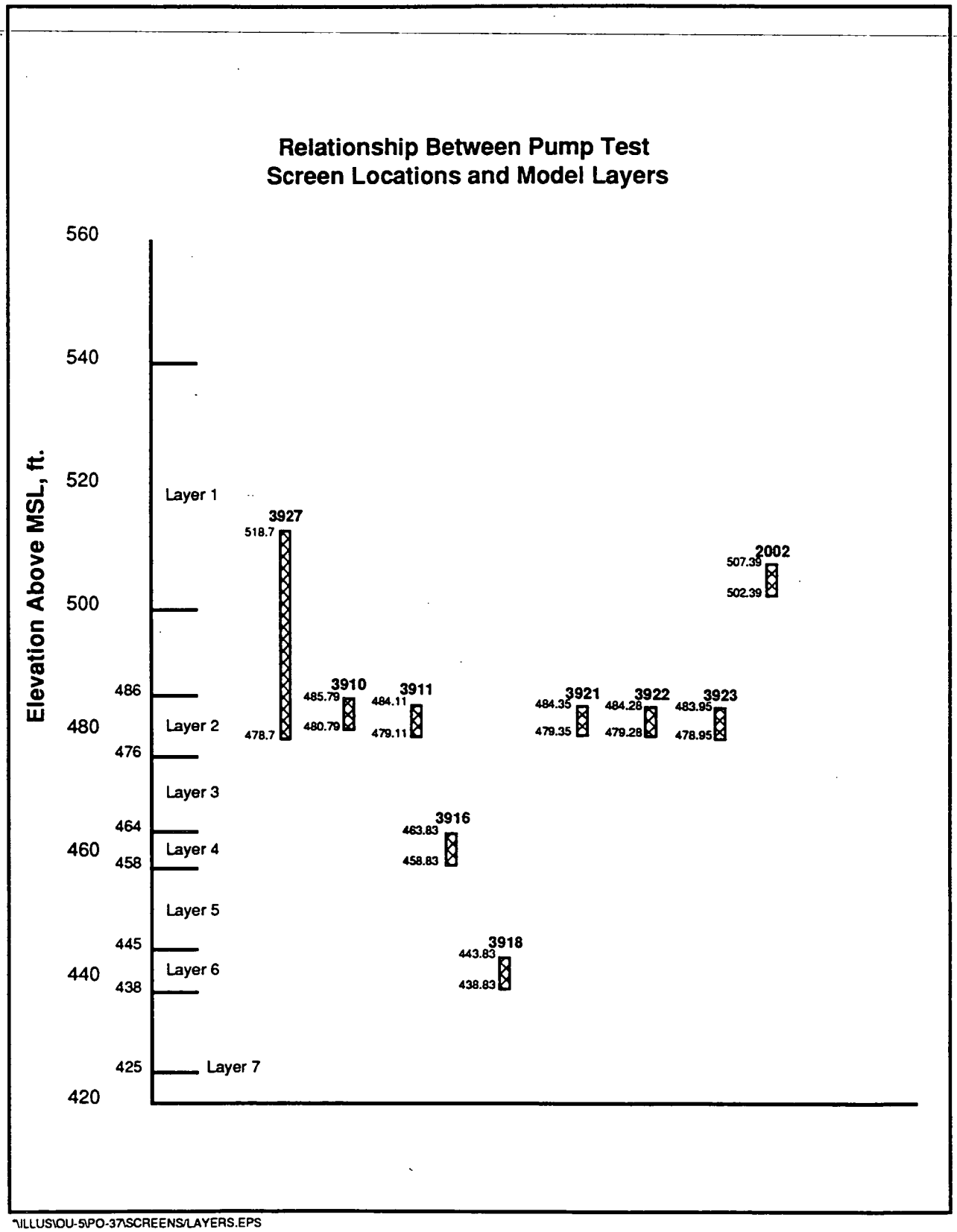


Figure 4.2-3 - Telescoped Model Grid



^\ILLUS\OU-5\PO-37\SCREENS\LAYERS.EPS

Figure 4.2-4 - Model Layer Structure and Well Screen Intervals

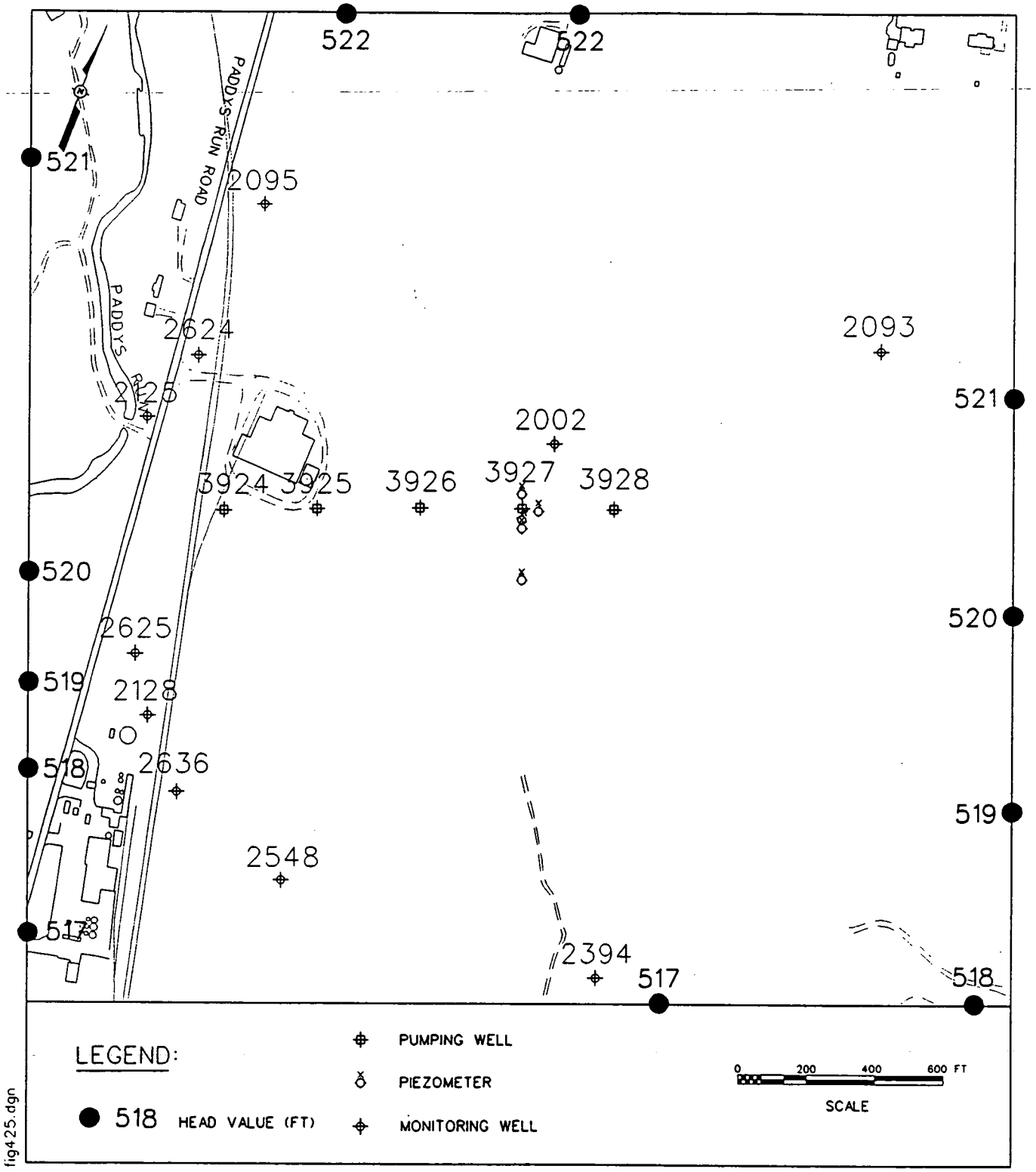


Figure 4.2-5 - Constant Head Boundary Conditions

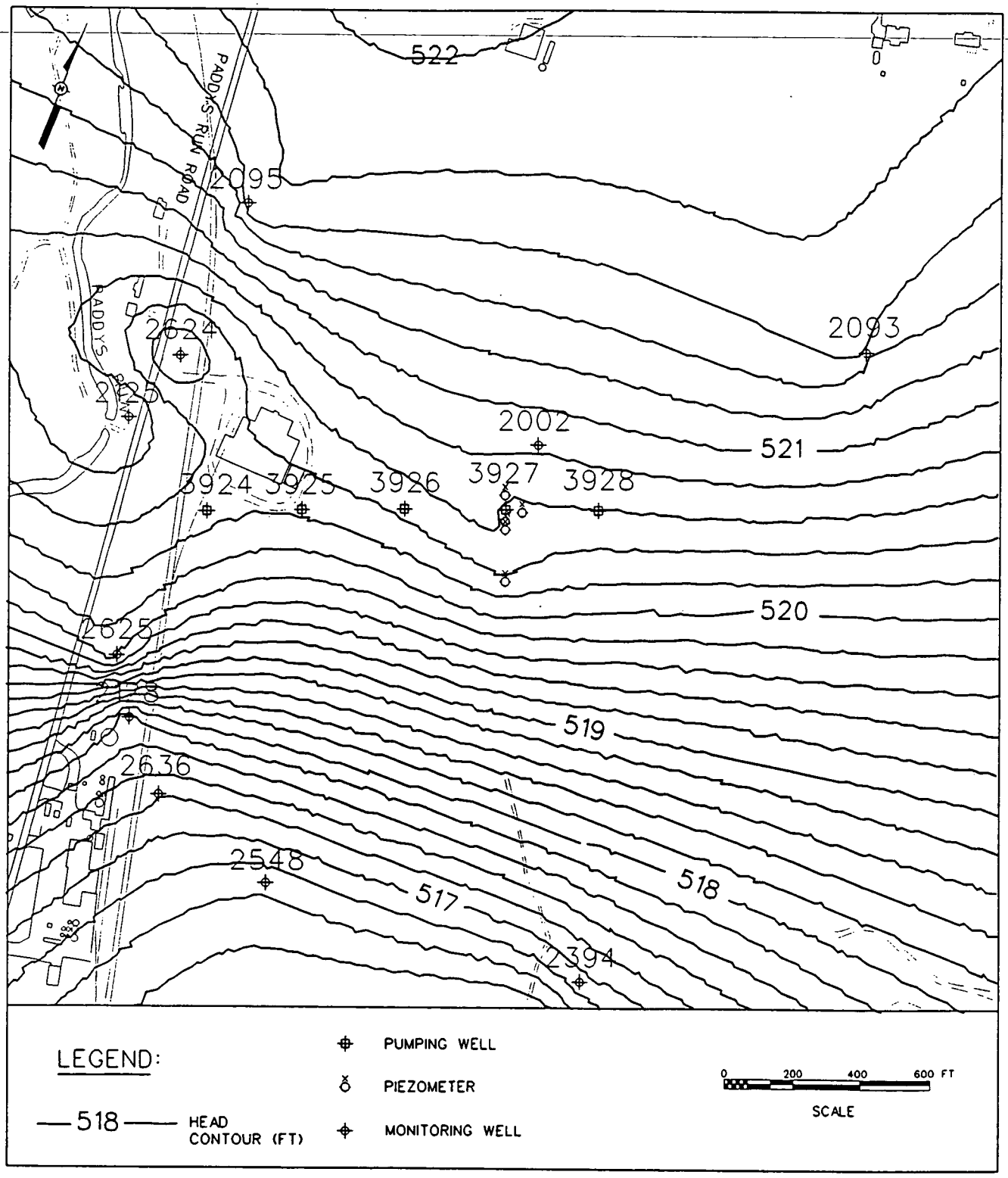


Figure 4.2-6 - Contoured Grid-Wide Head Distribution

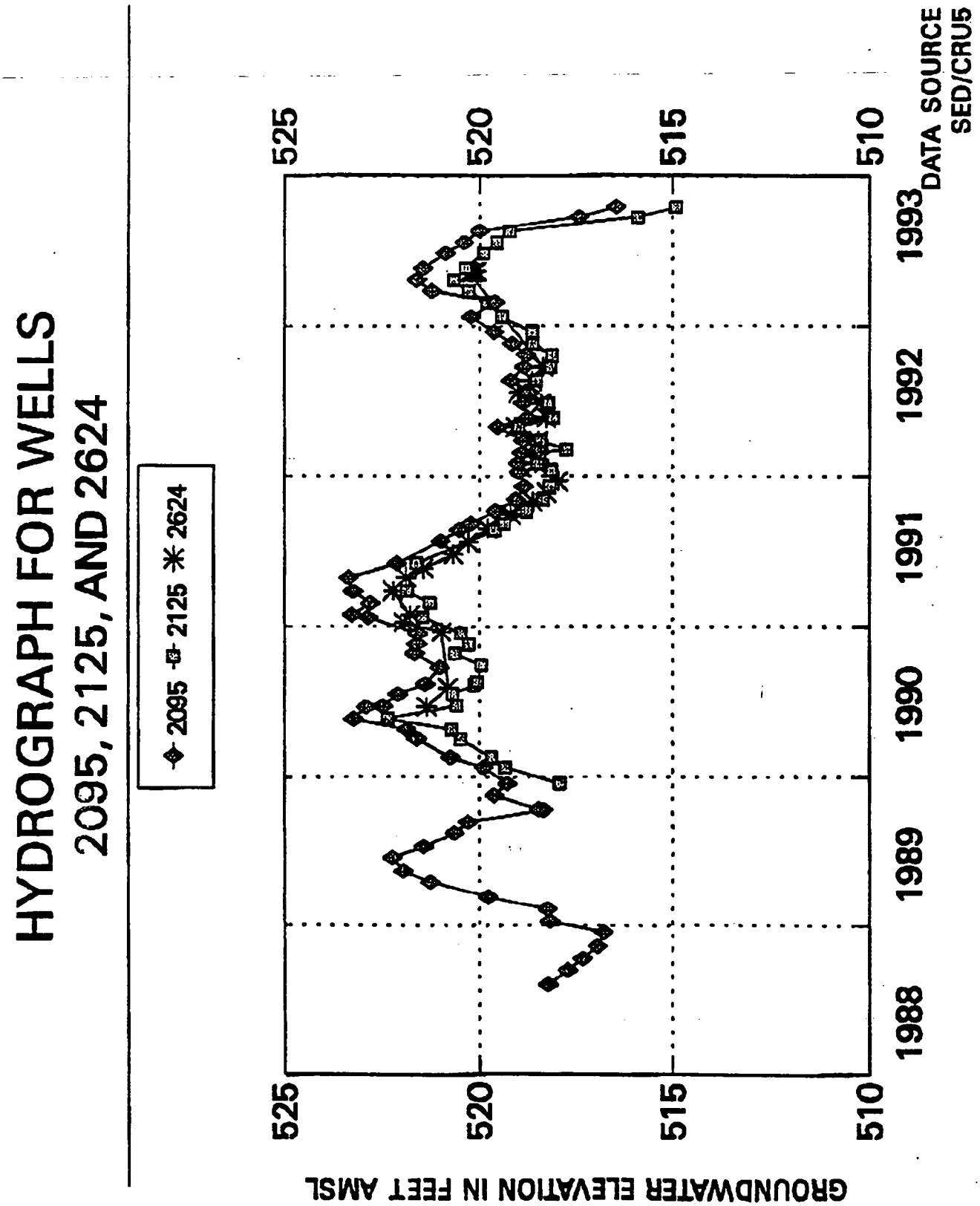


Figure 4.2-7 - Time Series of Groundwater Elevations at Wells 2095, 2125, and 2624

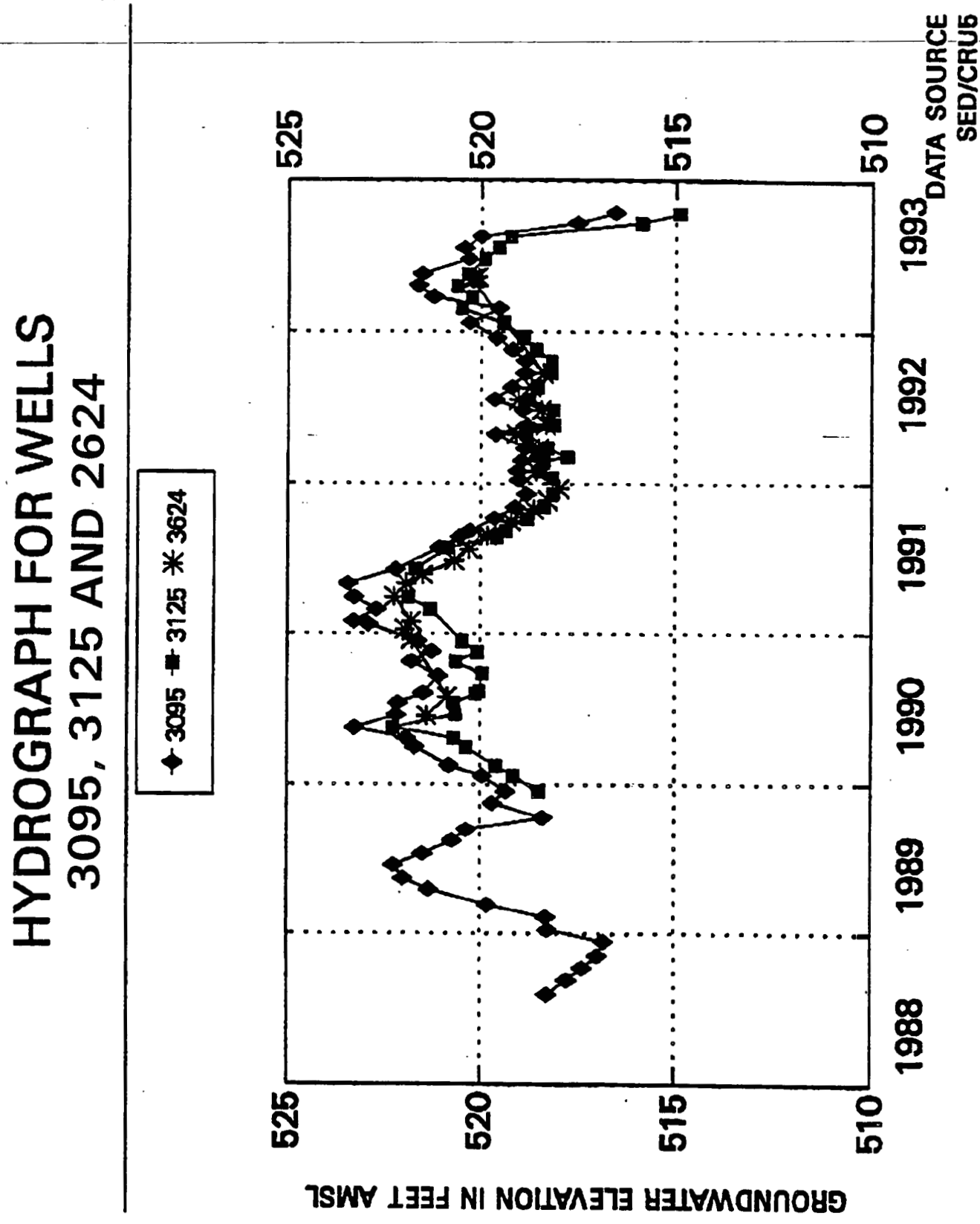


Figure 4.2-8 - Time Series of Groundwater Elevations at Wells 3095, 3125, and 3624

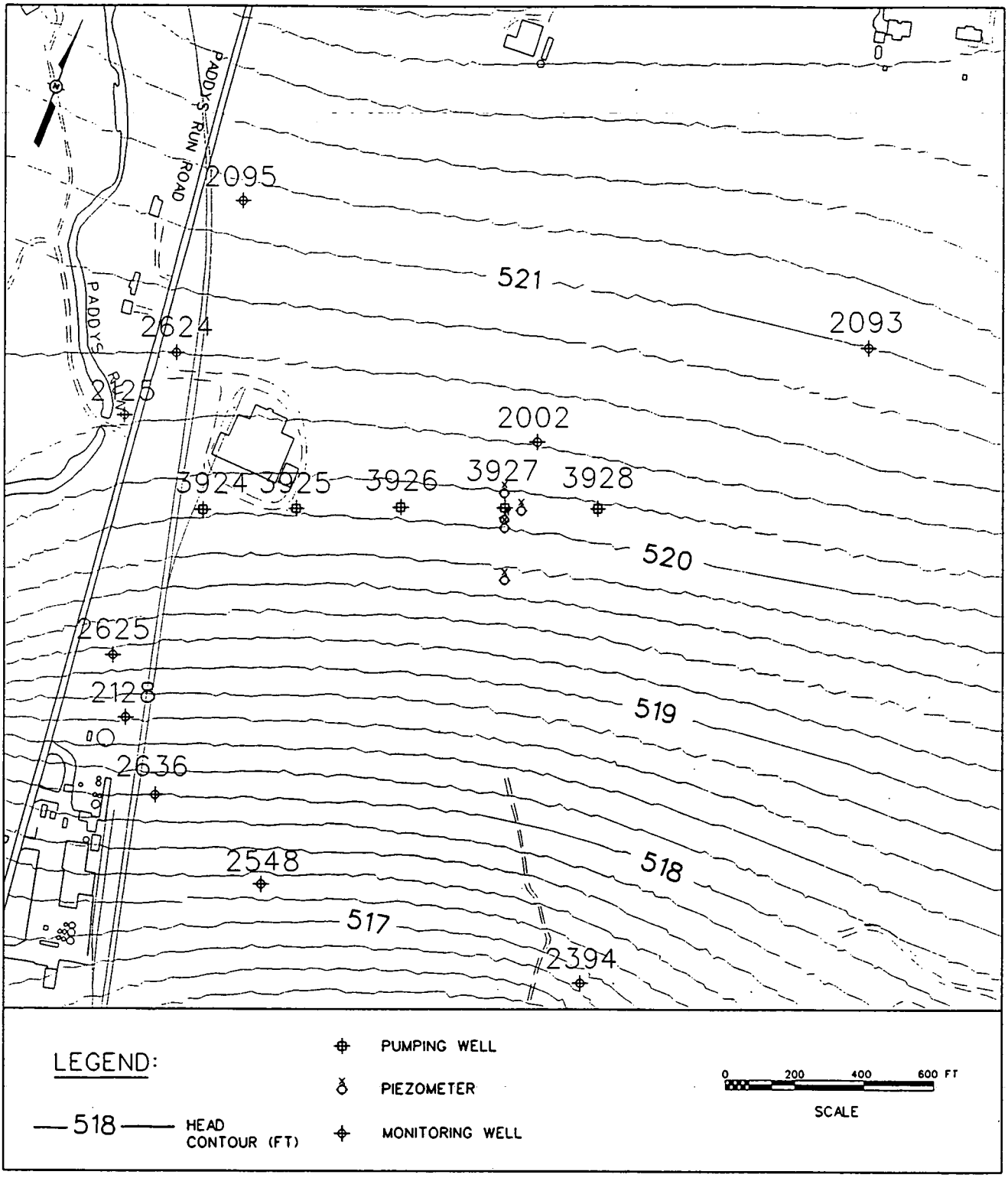


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Figure 4.2-9 - Contoured Steady-State Modeled Solution

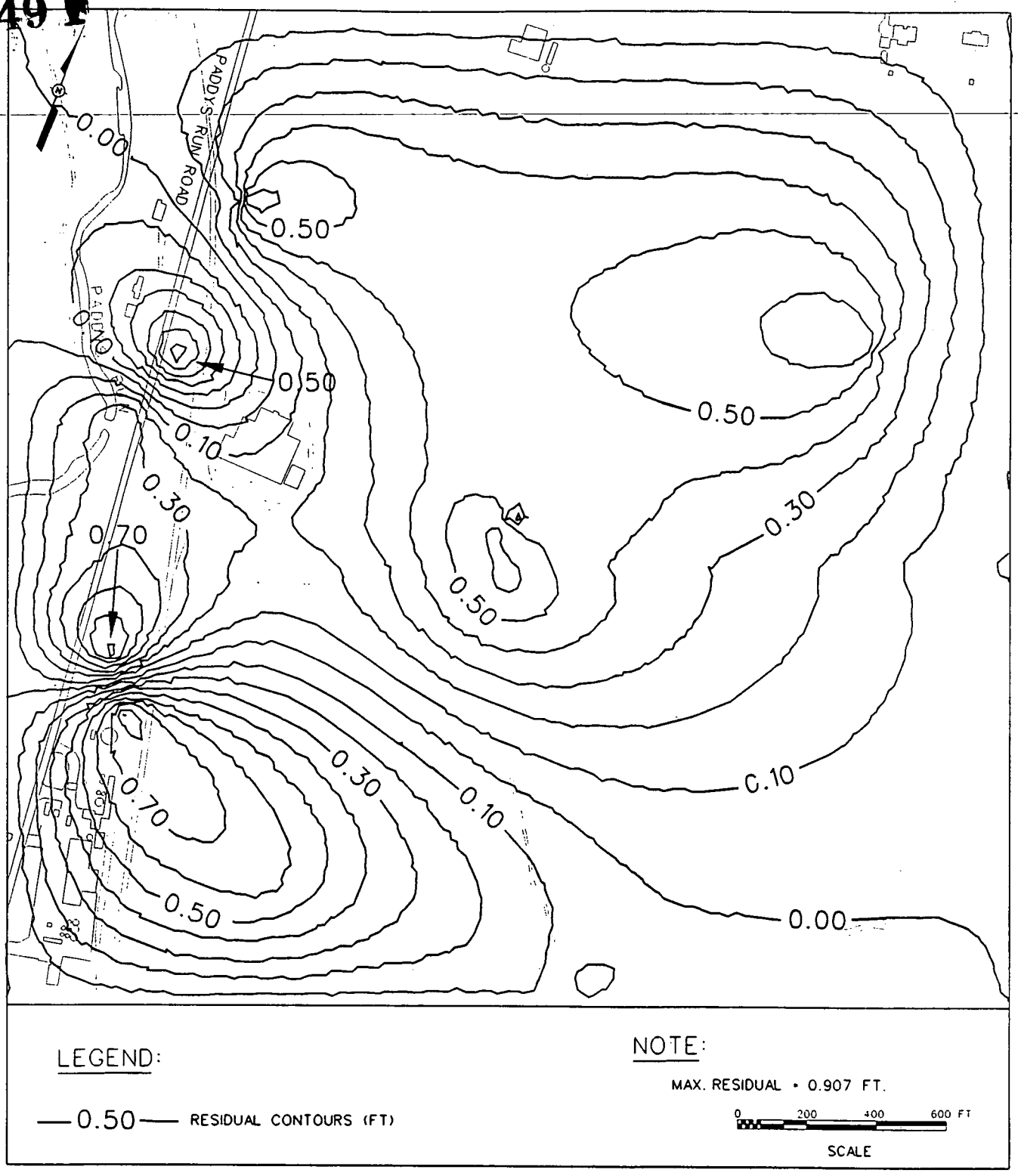


FIGURE 4.2-10 RESIDUAL OF CONTOURED WATER TABLE MEASUREMENTS (KRIGED) AND STEADY-STATE SOLUTION

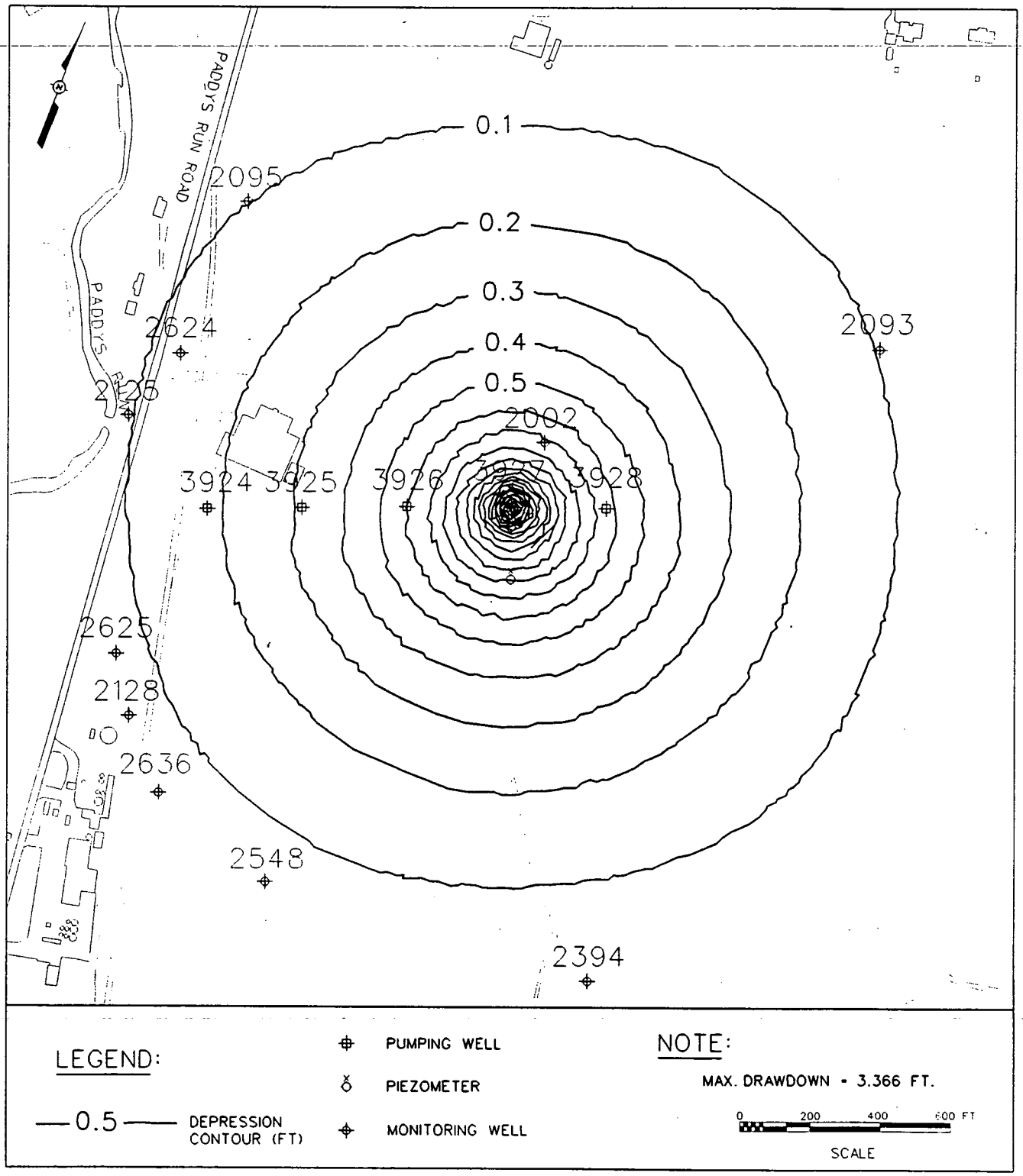


FIGURE 4.2-11 CRT CONE OF DEPRESSION

Figure 4.2-11 - CRT Cone of Depression

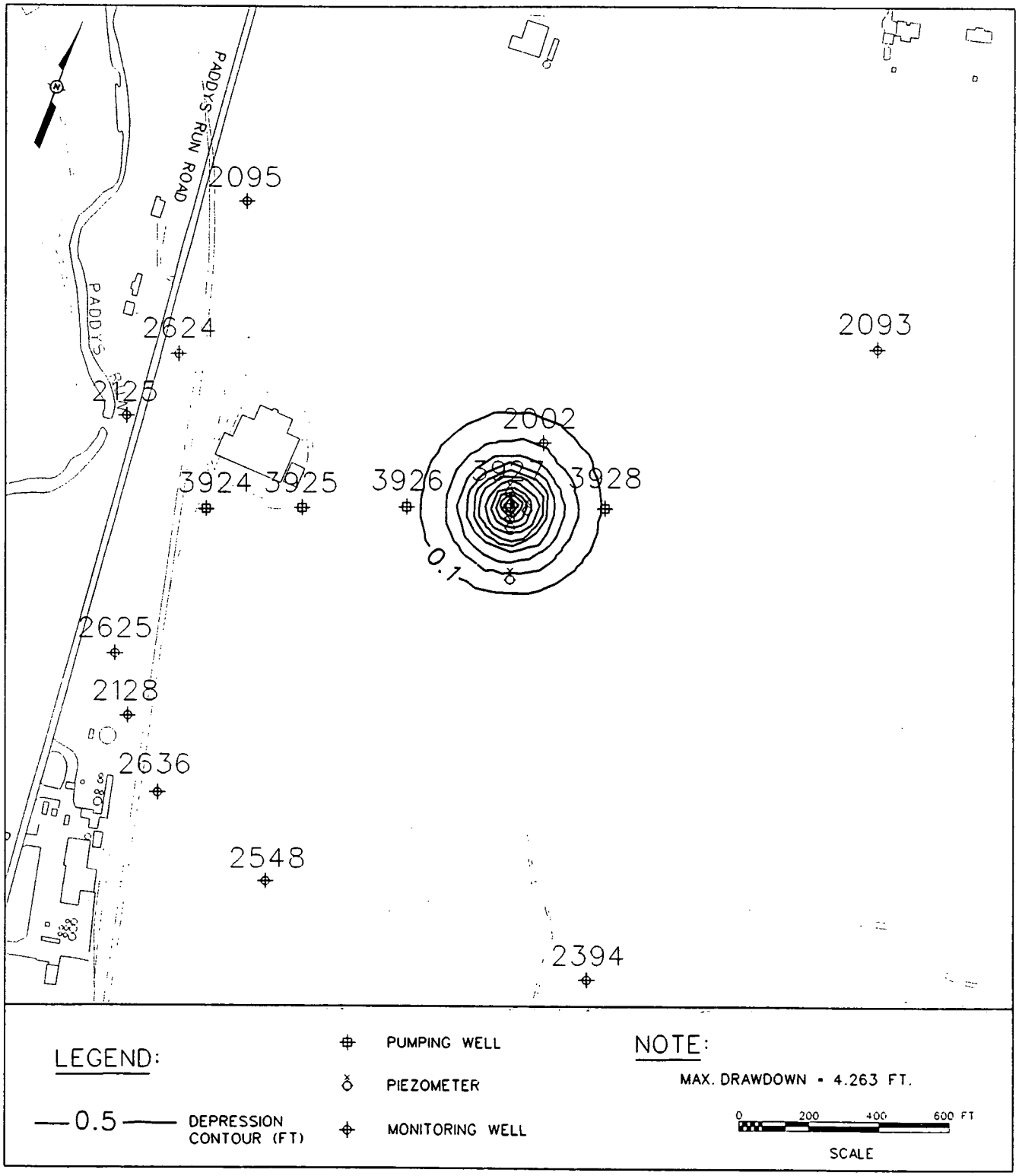


FIGURE 4.2-12 SDT CONE OF DEPRESSION

Figure 4.2-12 - SDT Cone of Depression

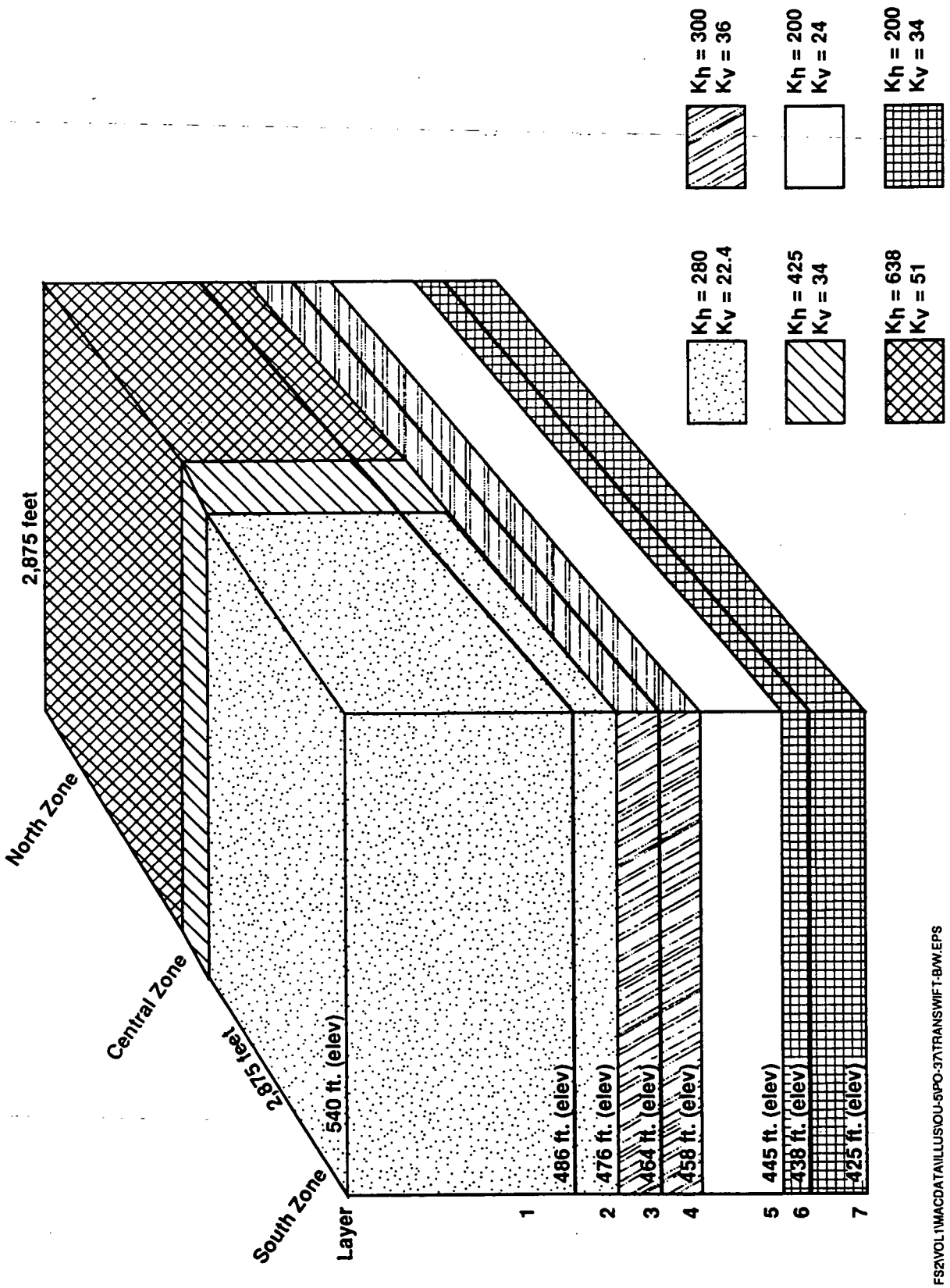


Figure 4.2-13 - Horizontal and Vertical Hydraulic Conductivity Zonation

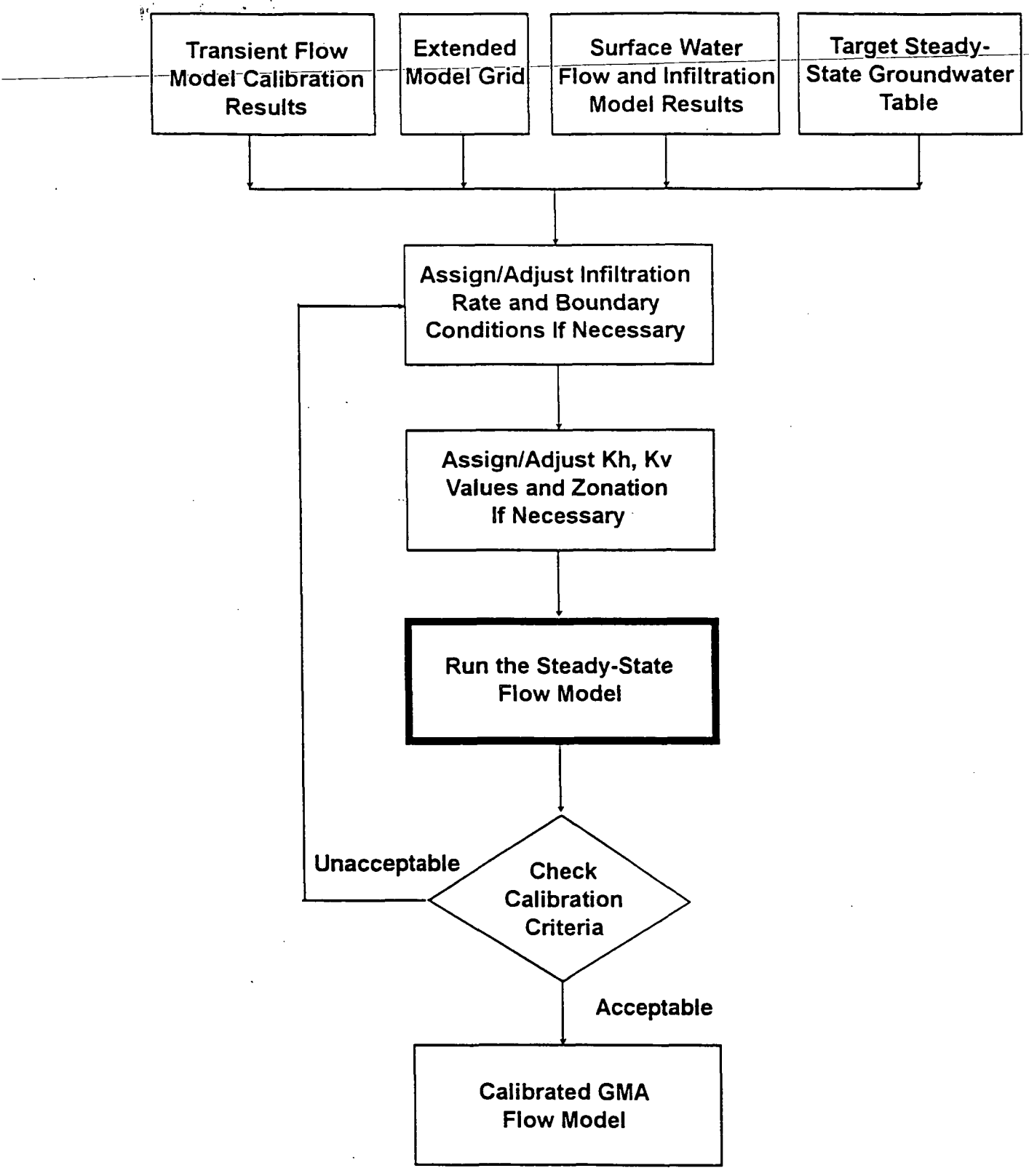
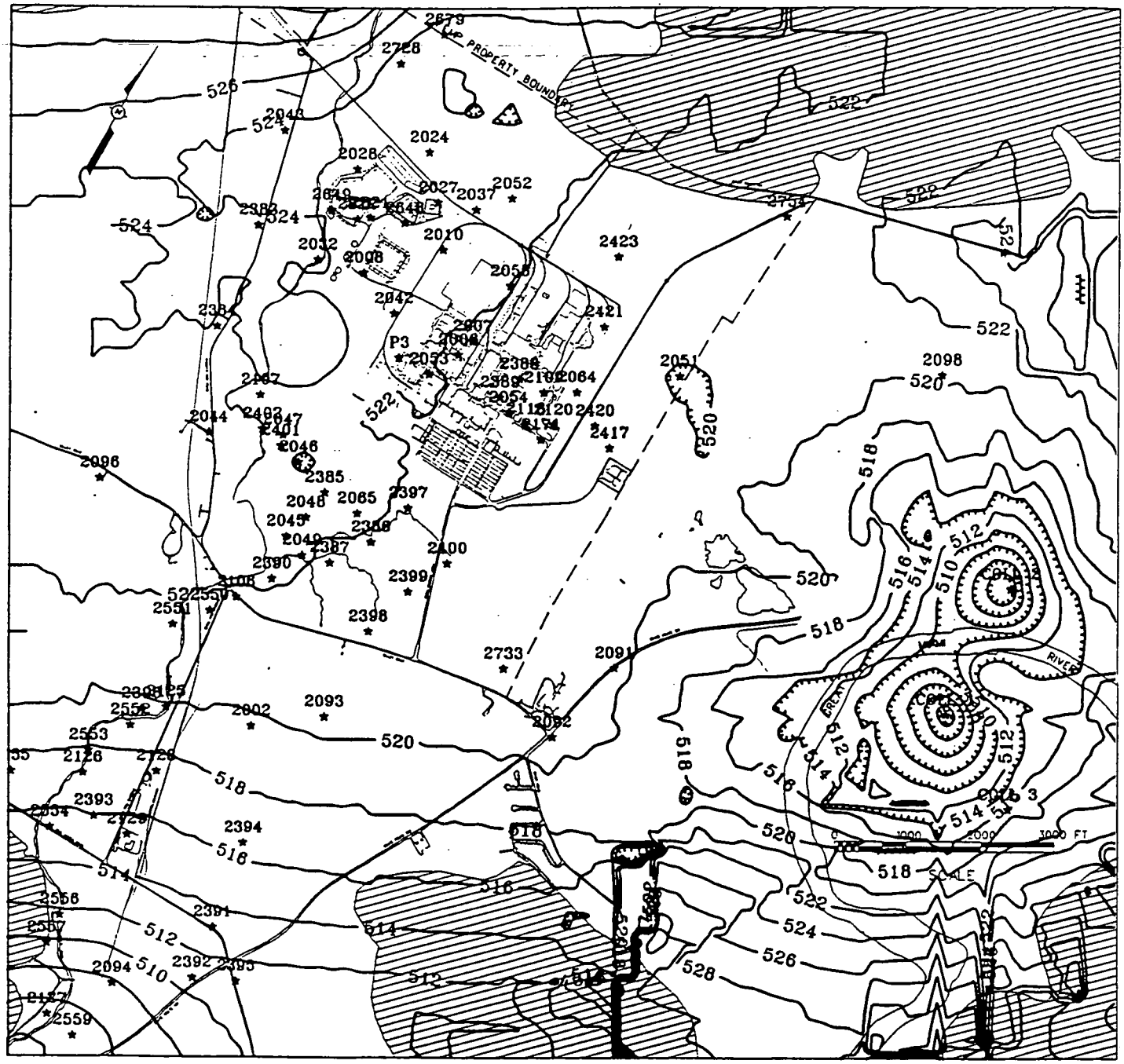
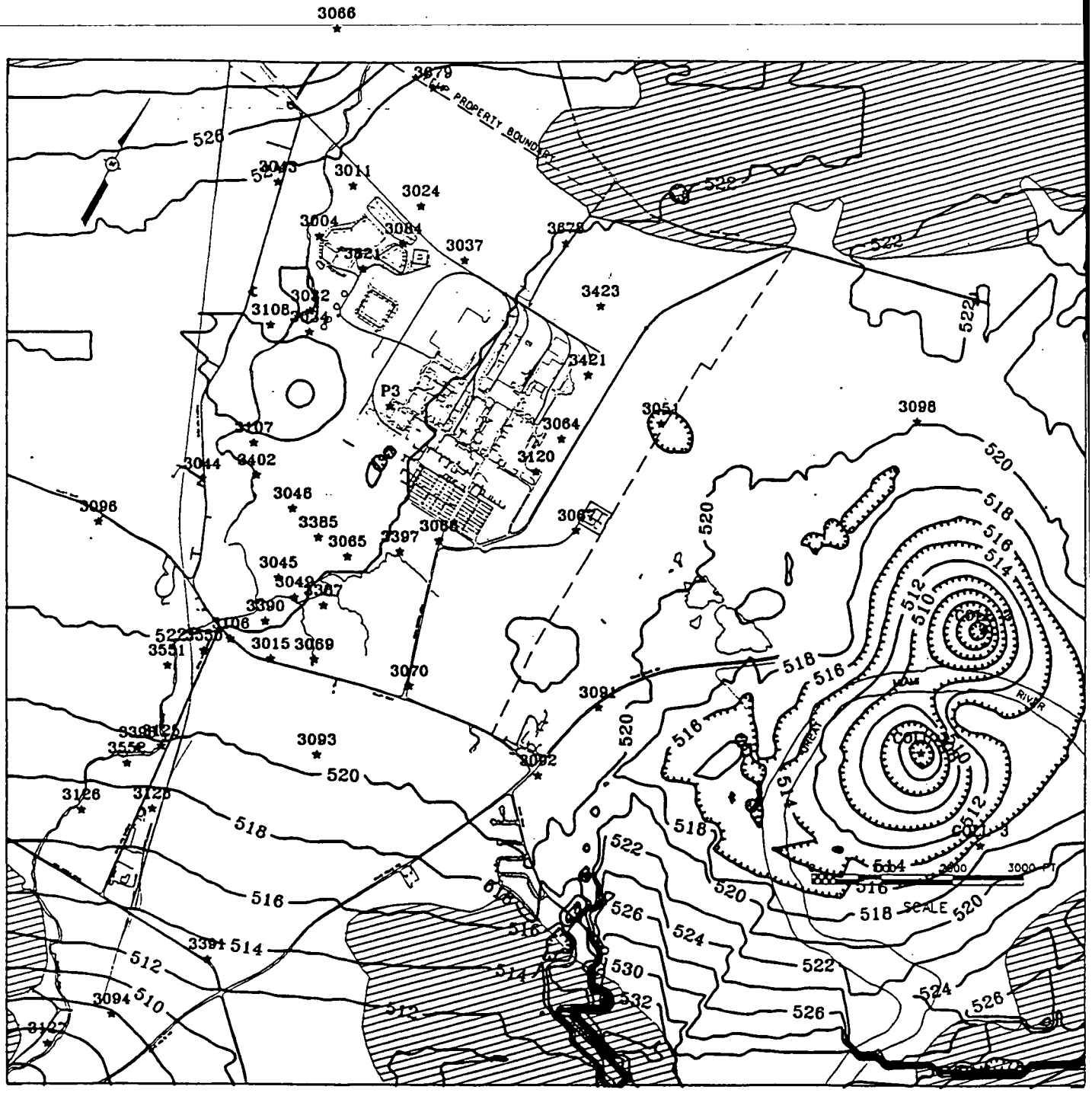


Figure 4.3-1 - Calibration of the Flow Model - Overview



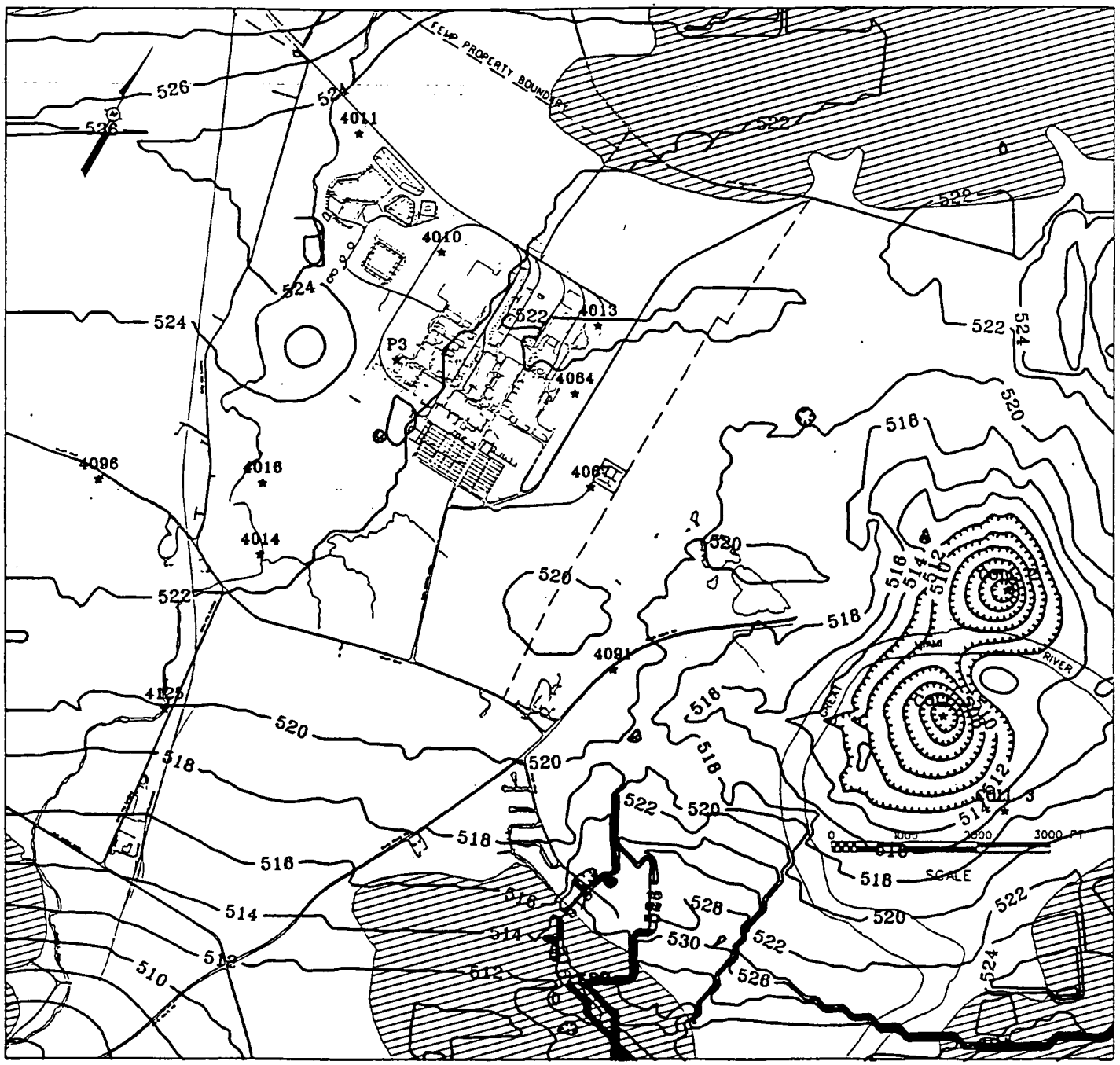
Note: Contours in ft-MSL

Figure 4.3-2 - Geostatistical Distribution of Steady State Heads in Layer 1 Kriged from Water Levels in 2000 Series and Collector Wells



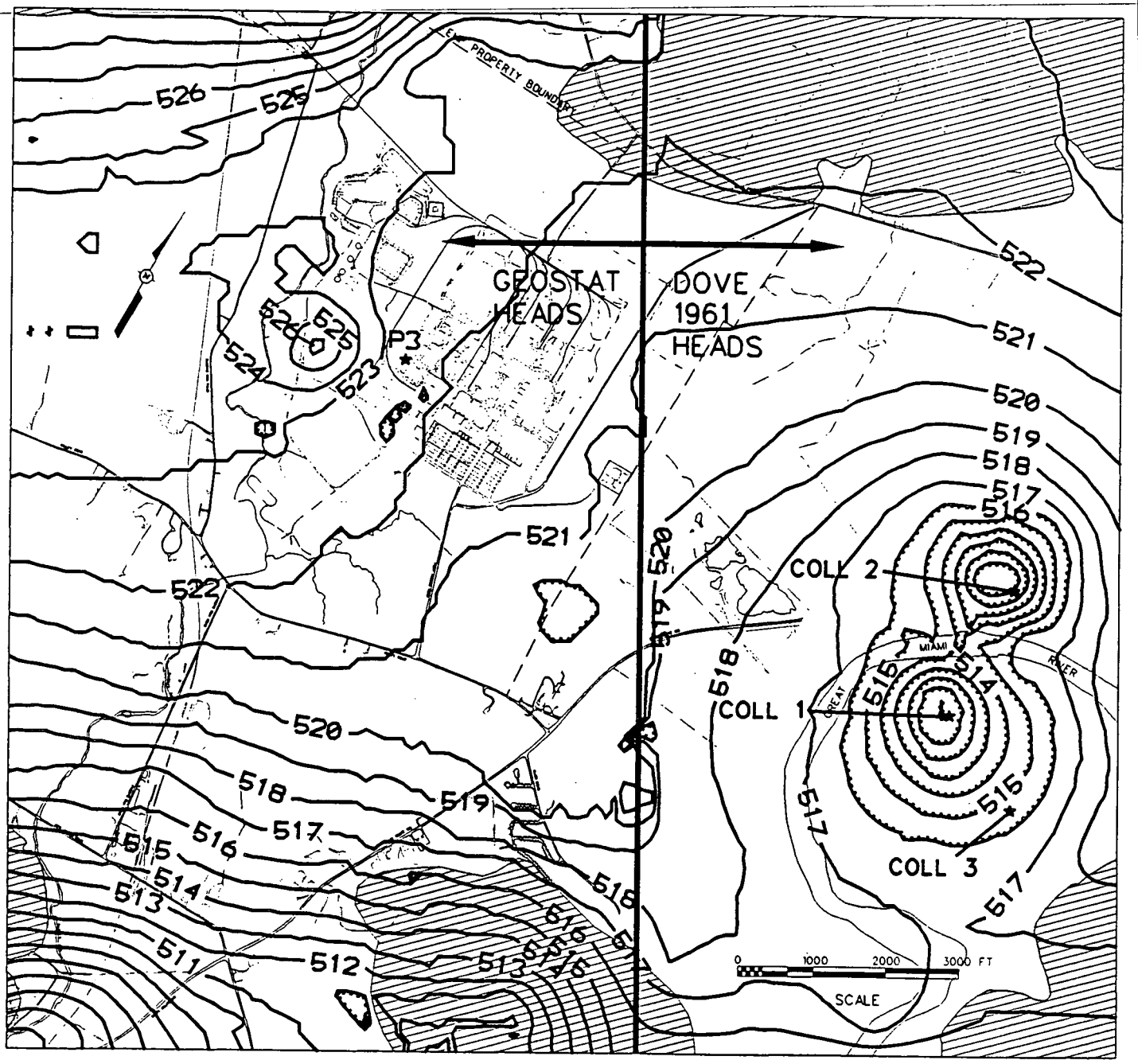
Note: Contours in ft-MSL

Figure 4.3-3 - Geostatistical Distribution of Steady State Heads in Layer 3 Kriged from Water Levels in 3000 Series and Collector Wells



Note: Contours in ft-MSL

Figure 4.3-4 - Geostatistical Distribution of Steady State Heads in Layer 6 Kriged from Water Levels in 4000 Series and Collector Wells



Note: Contours in ft-MSL

Figure 4.3-5 - Combined Heads from Geostatistical Distribution of Heads in Layer 1 and Dove (1961 Figure 47)

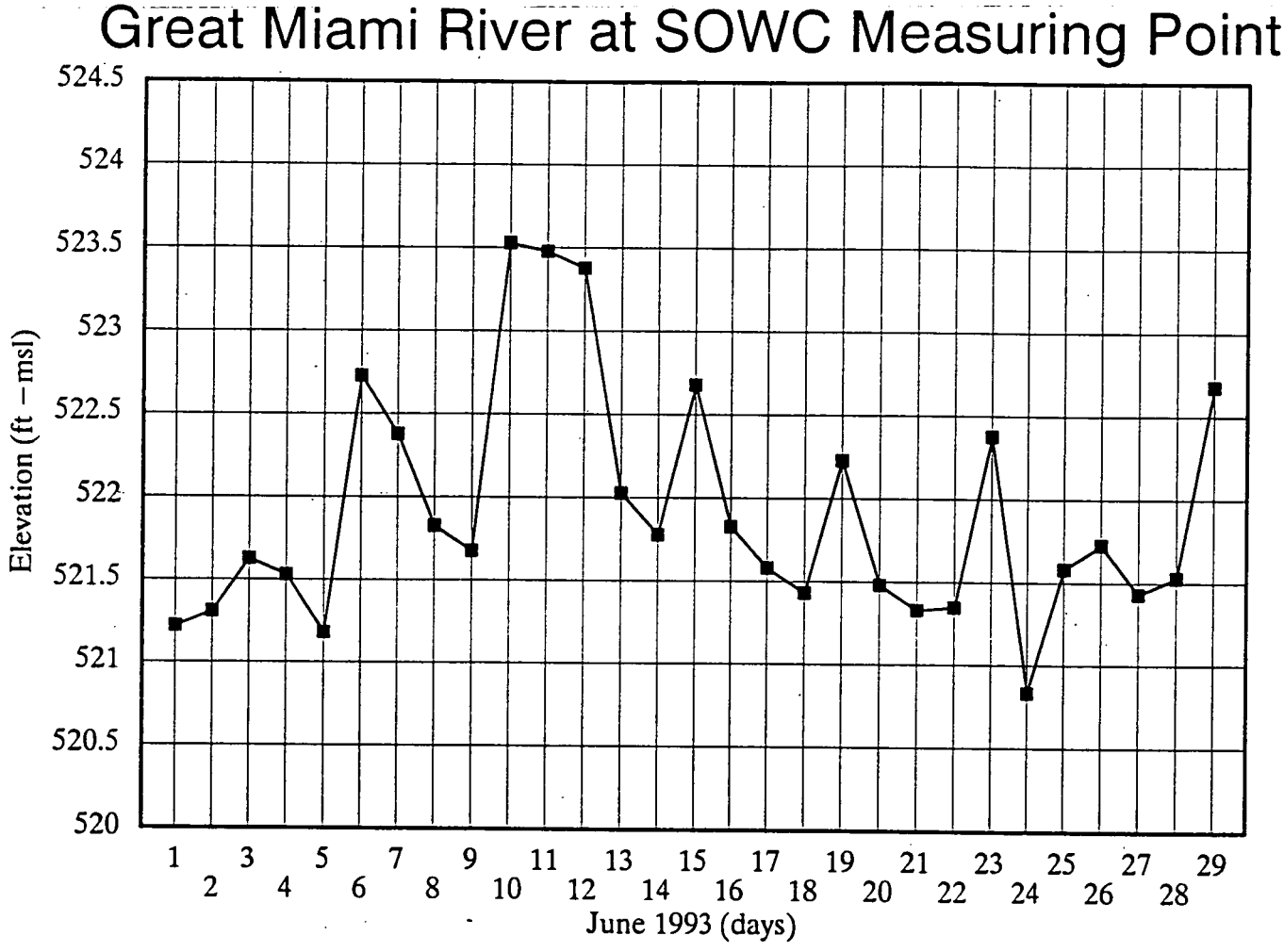


Figure 4.3-6 - Great Miami River Elevation at SOWC Measuring Point

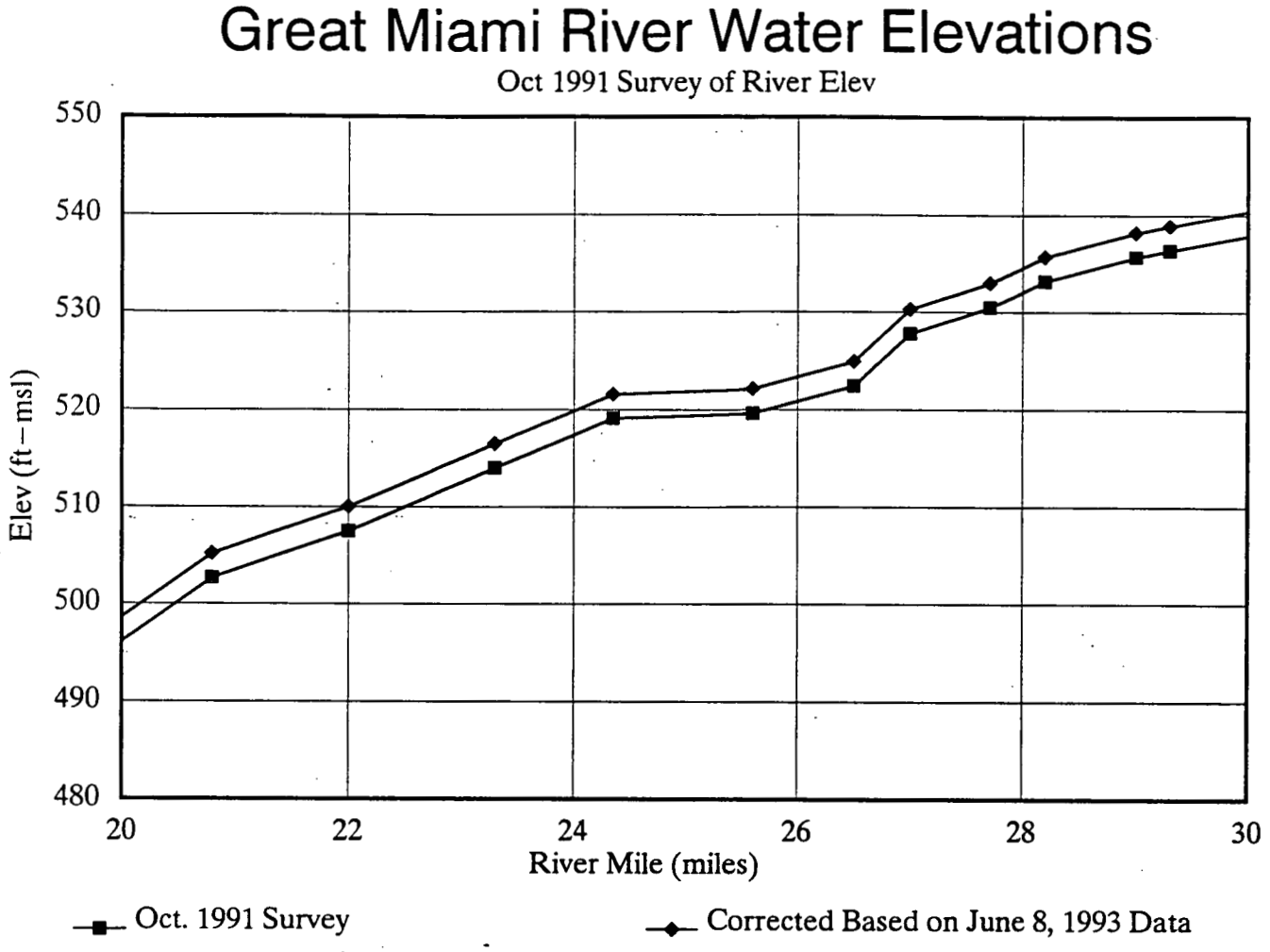


Figure 4.3-7 - Great Miami River Elevations - Surveyed and Corrected to 1993

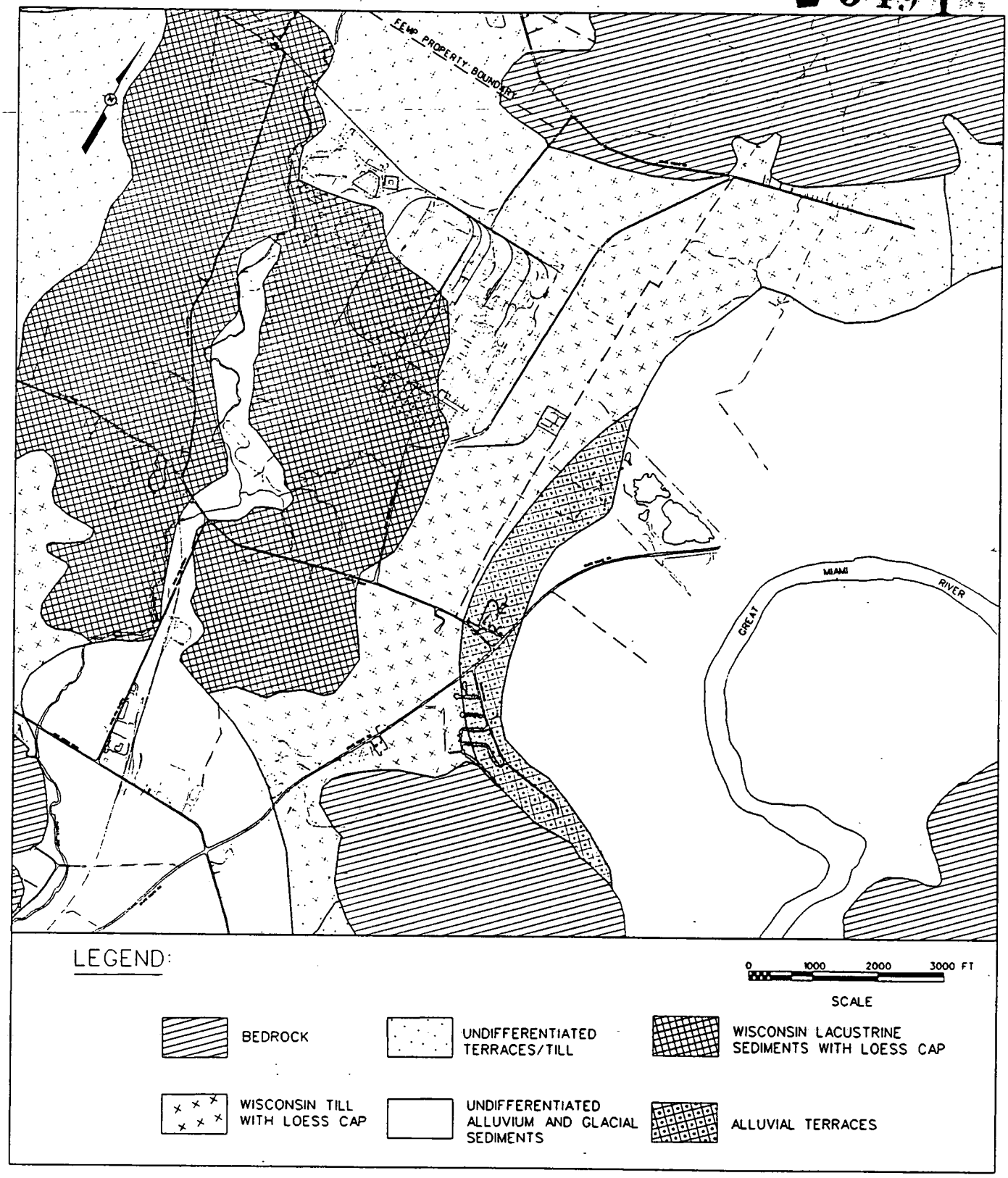


Figure 4.3-8 - Basis for Steady State Model Recharge Zones

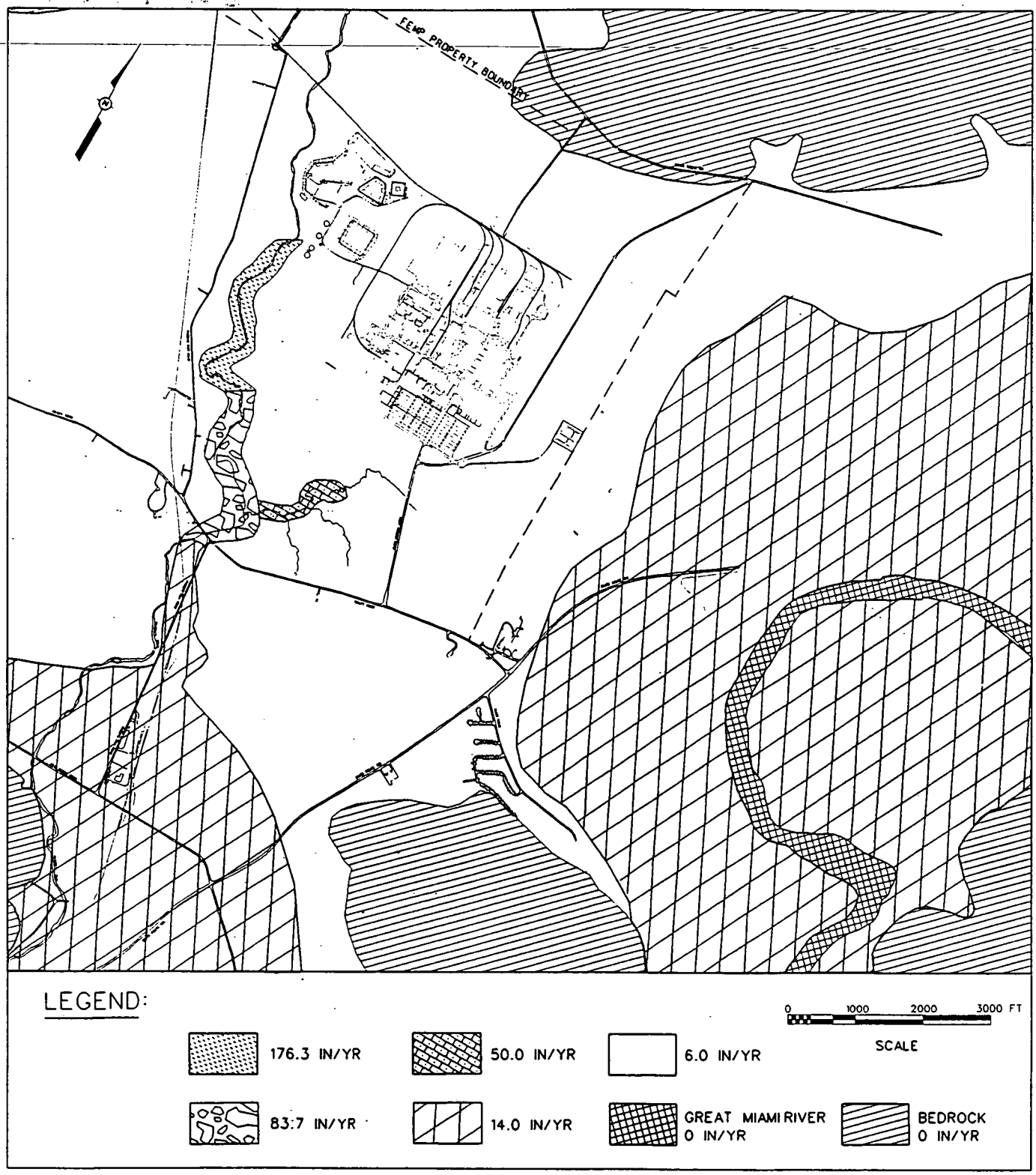


Figure 4.3-9 - Steady State Model Calibrated Recharge Zones

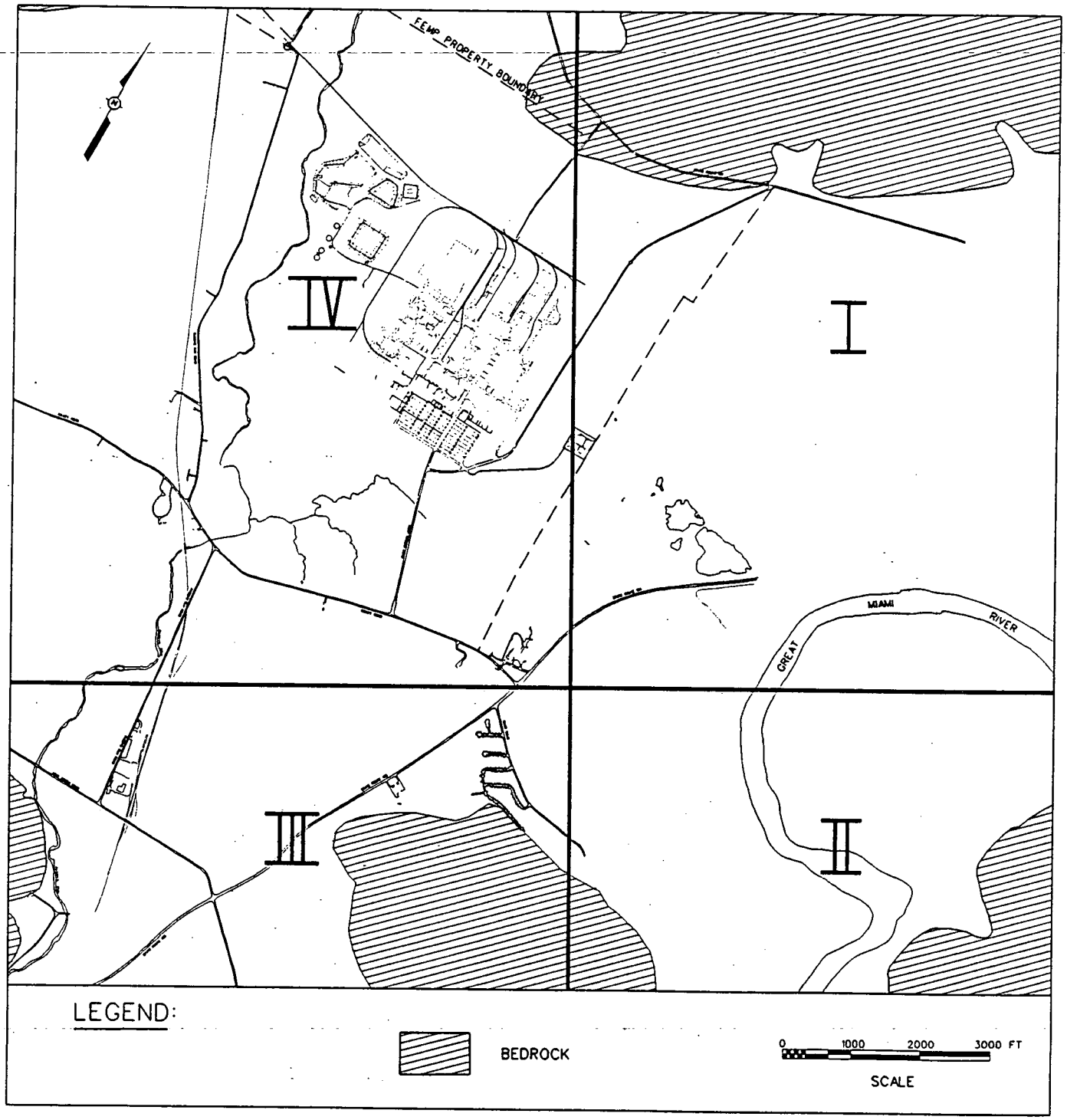


Figure 4.3-10 - Steady-State Model Hydraulic Conductivity Zones - Configuration A

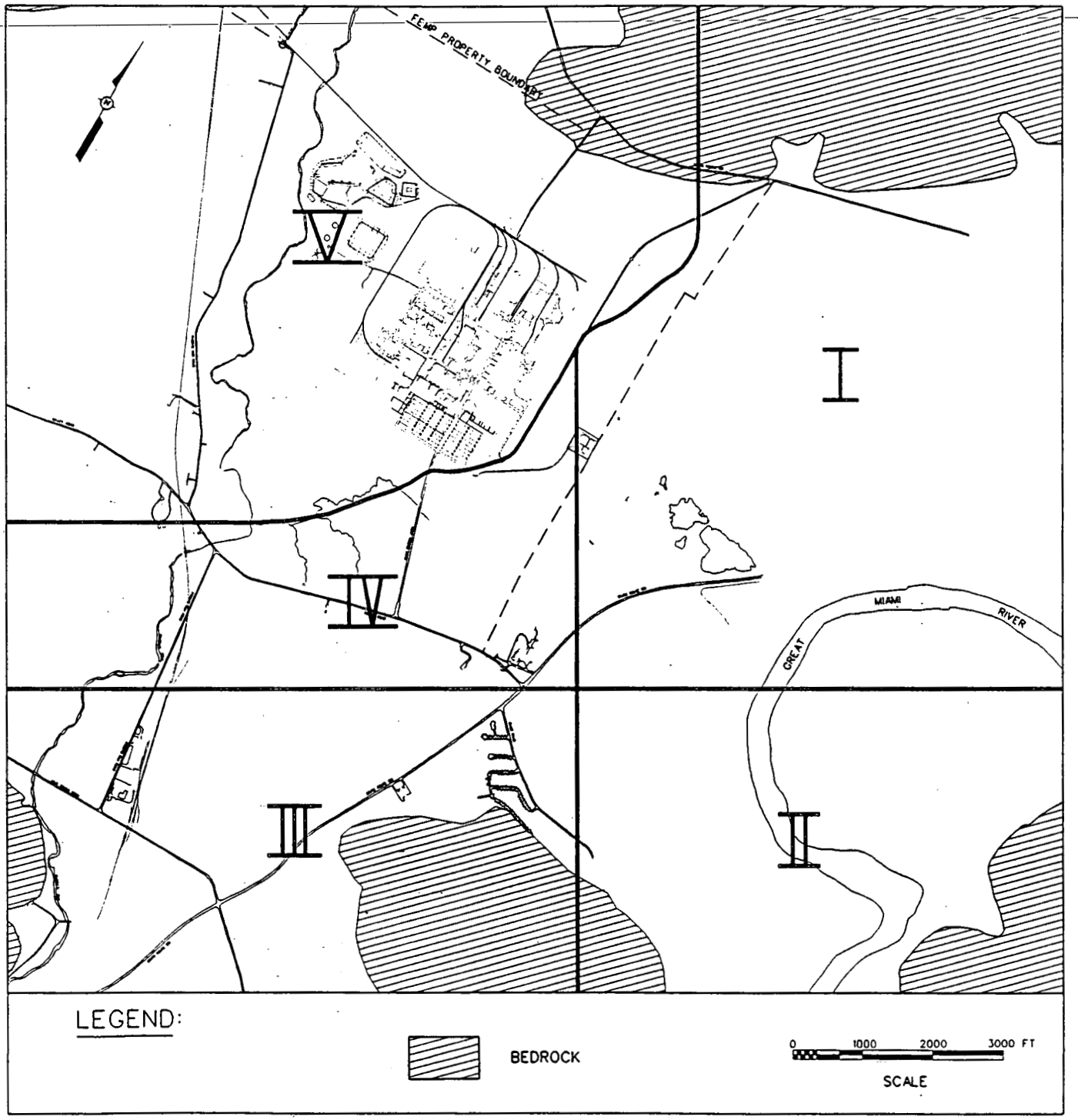


Figure 4.3-11 - Steady-State Model Hydraulic Conductivity Zones - Configuration B

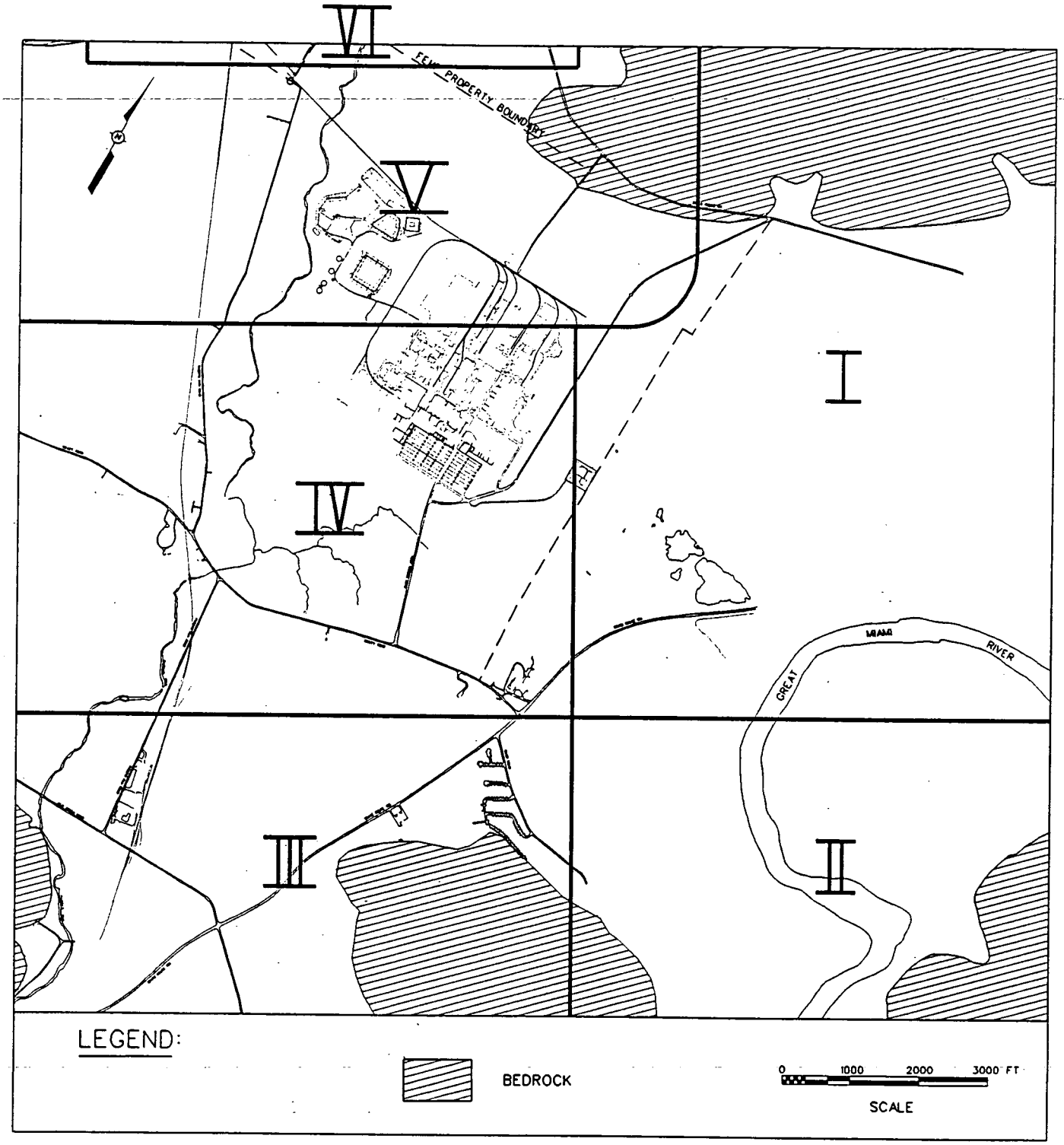


Figure 4.3-12 - Steady-State Model Hydraulic Conductivity Zones - Configuration C

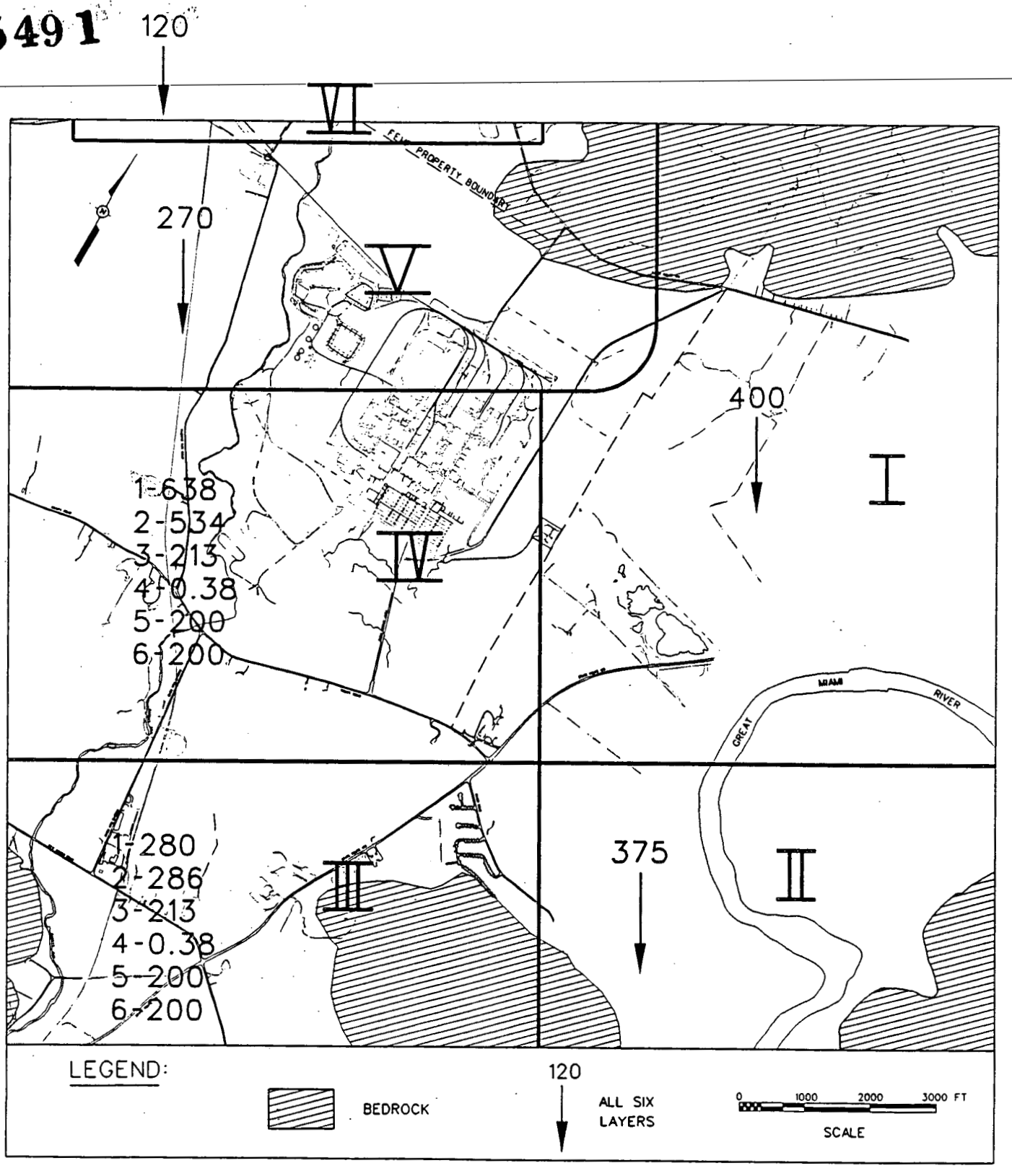
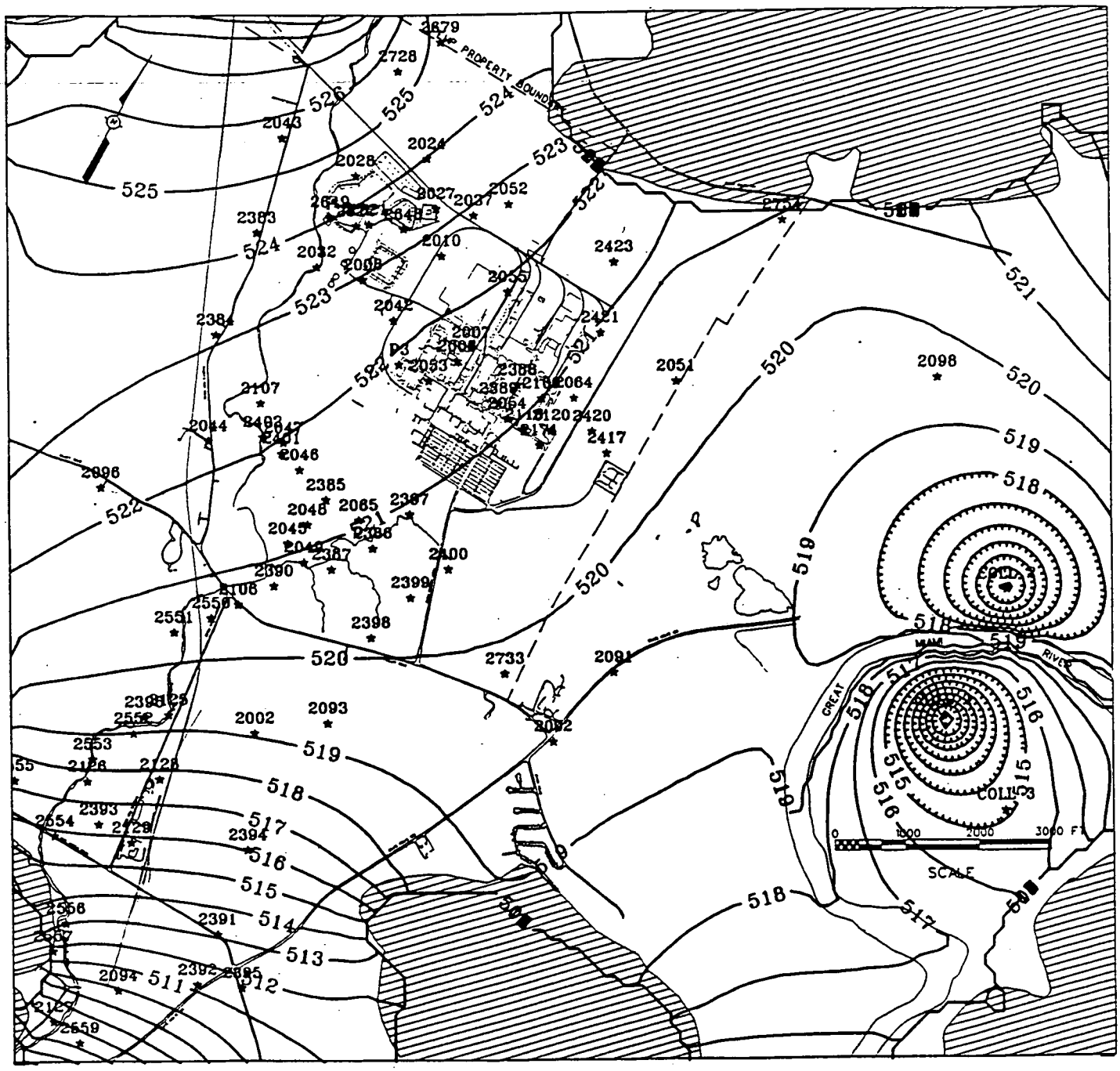
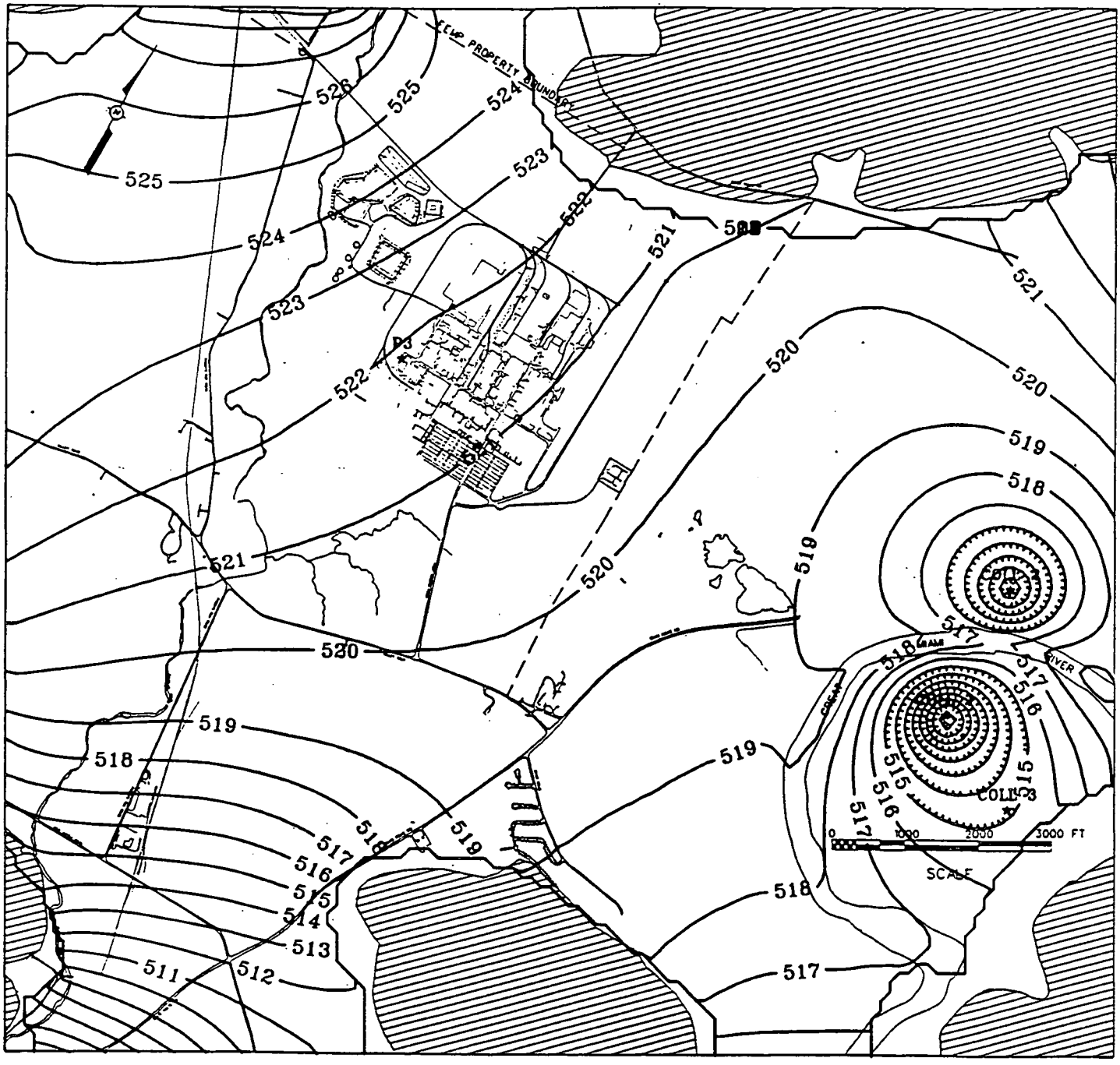


Figure 4.3-13 - Steady State Model Calibrated Hydraulic Conductivity Zones



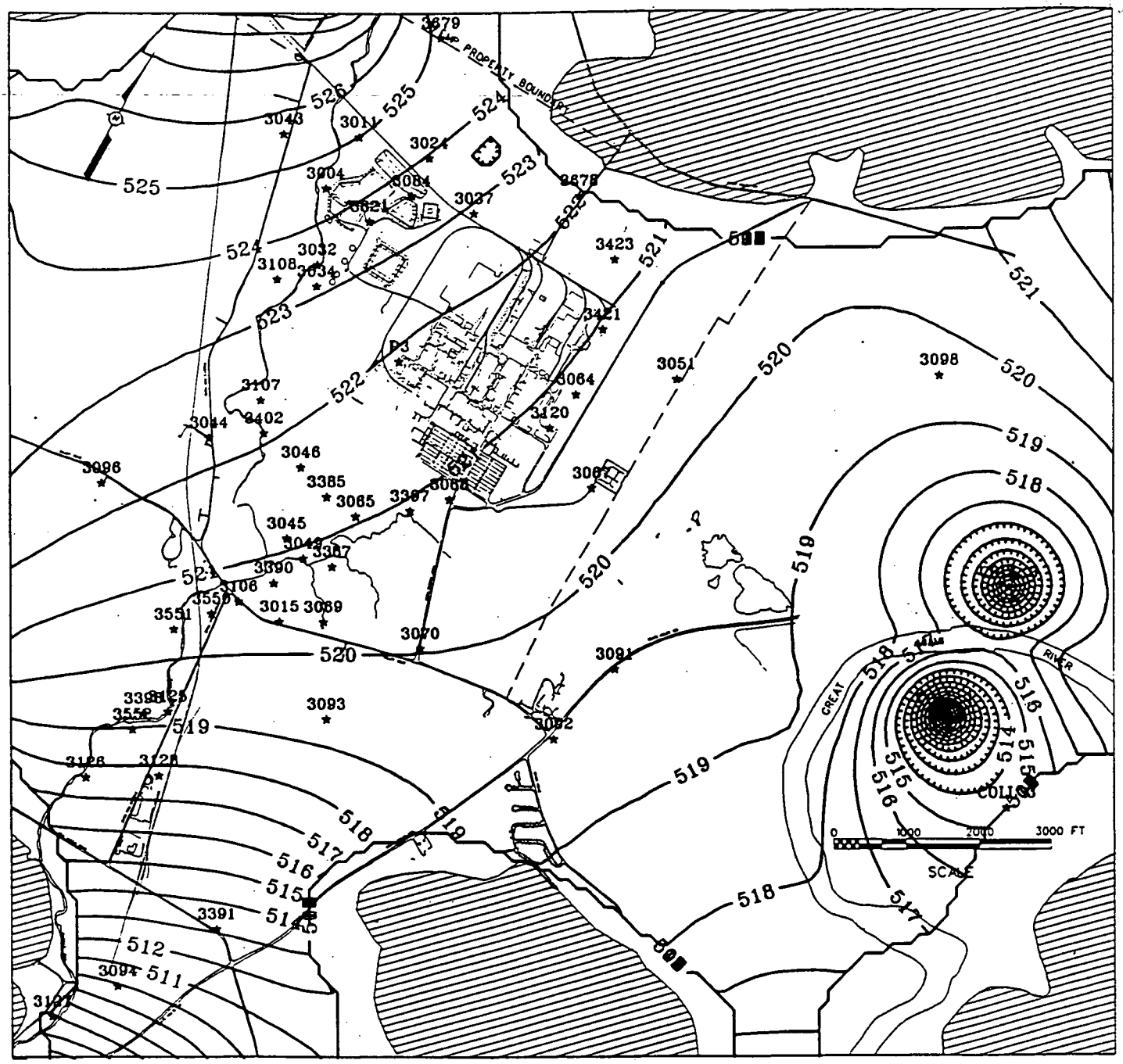
Note: Contours in ft-MSL

Figure 4.3-14 - Steady State Flow Model Head Contours - Layer 1



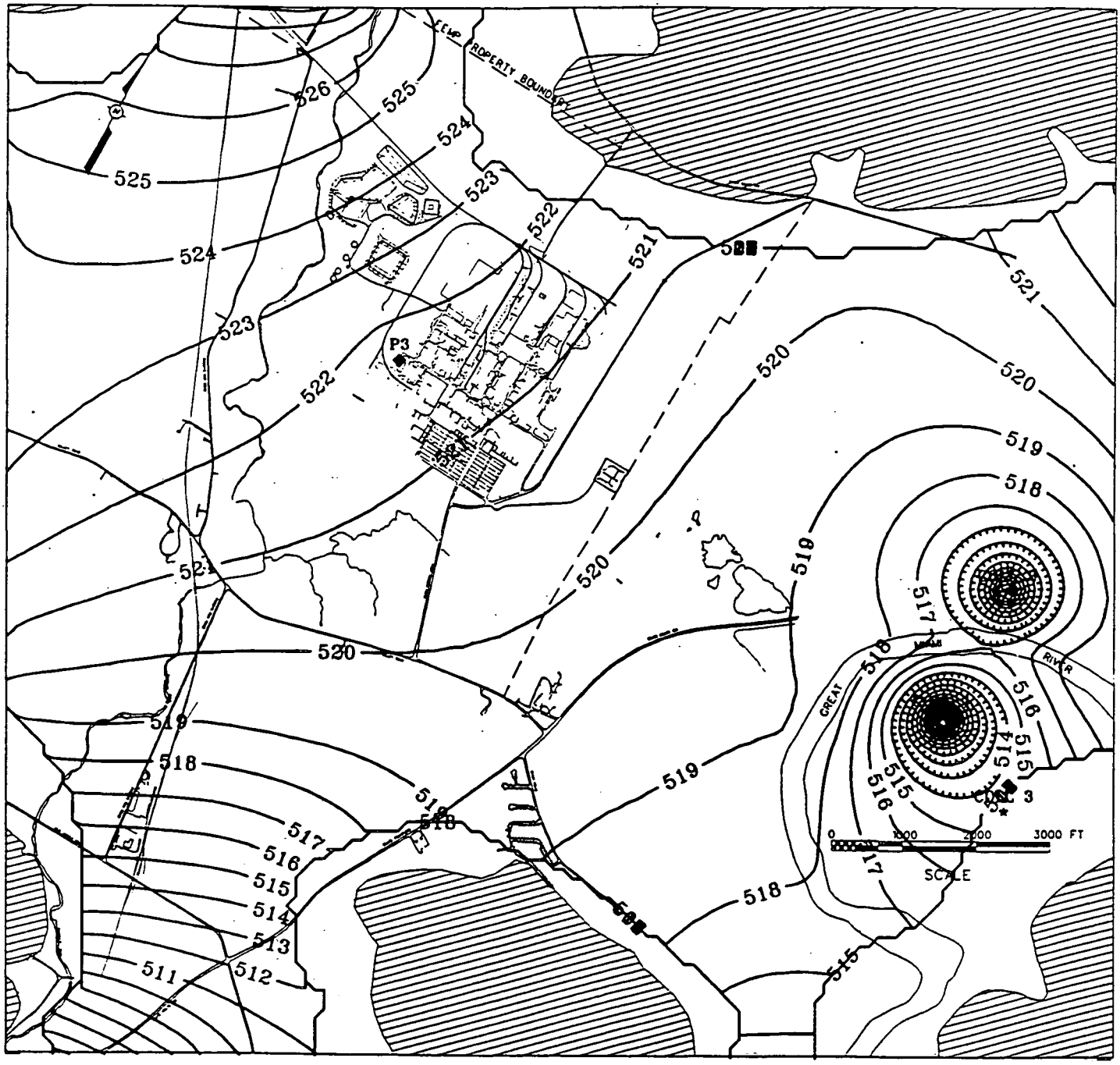
Note: Contours in ft-MSL

Figure 4.3-15 - Steady State Flow Model Head Contours - Layer 2



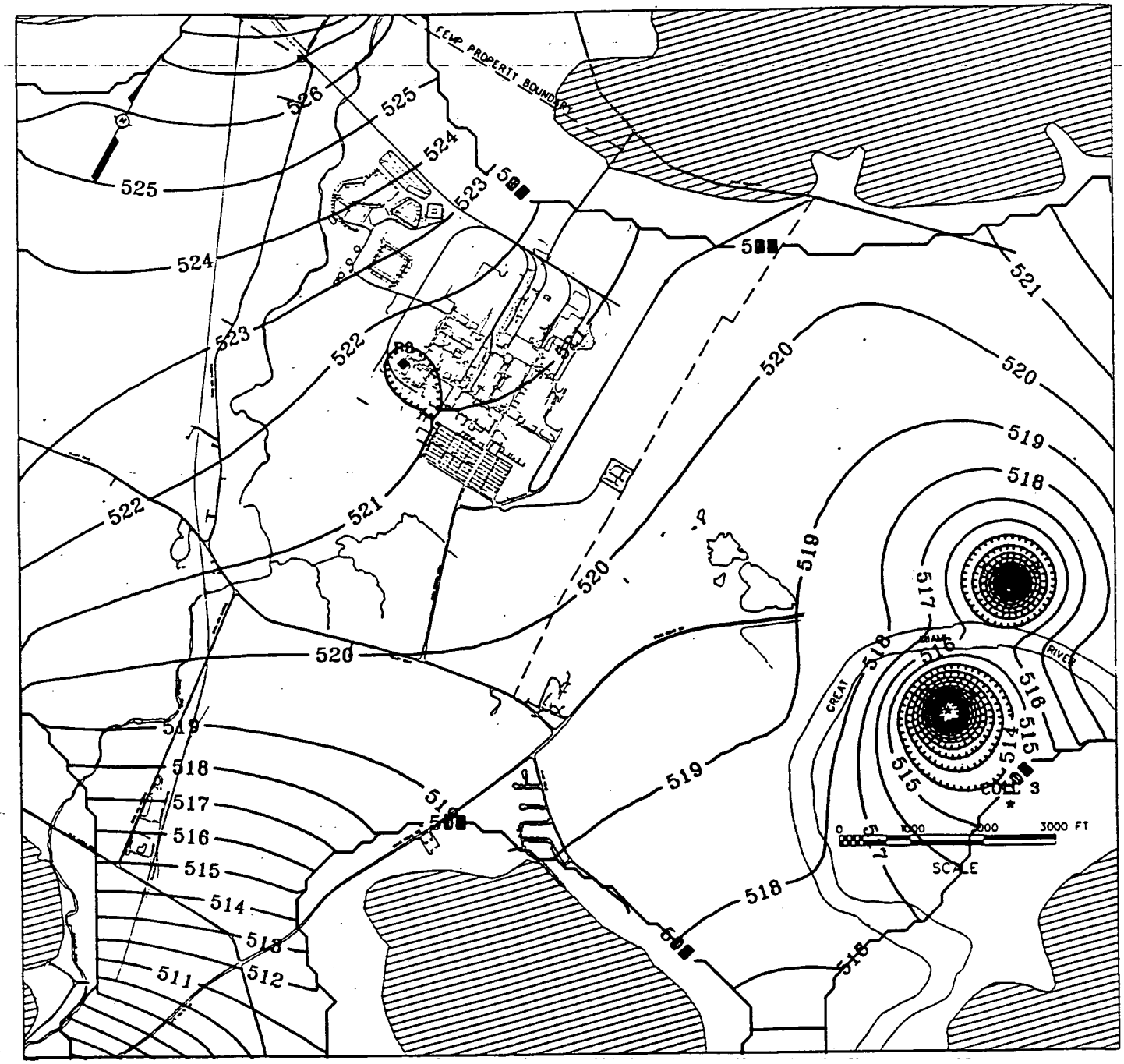
Note: Contours in ft-MSL

Figure 4.3-16 - Steady State Flow Model Head Contours - Layer 3



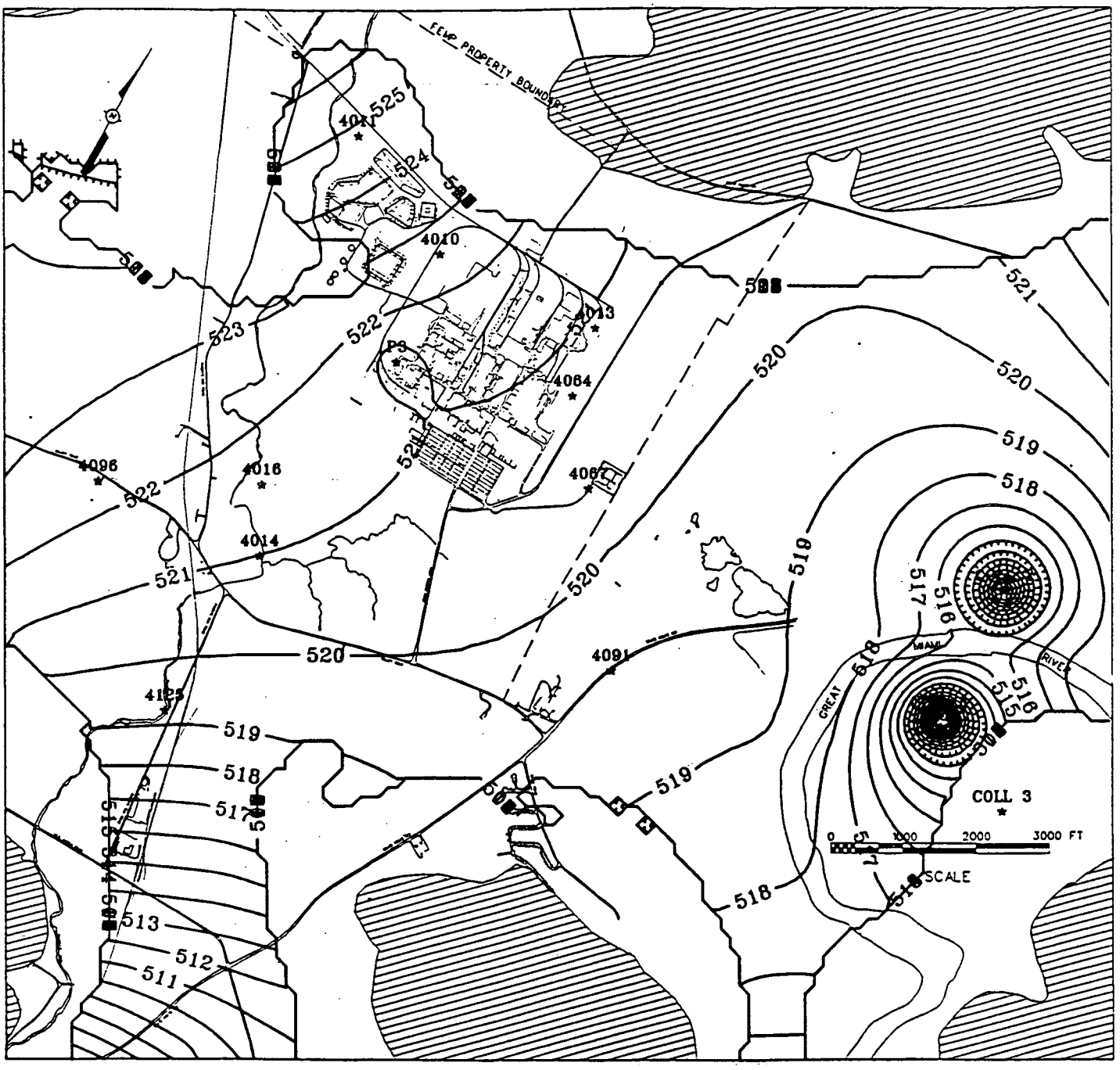
Note: Contours in ft-MSL

Figure 4.3-17 - Steady State Flow Model Head Contours - Layer 4



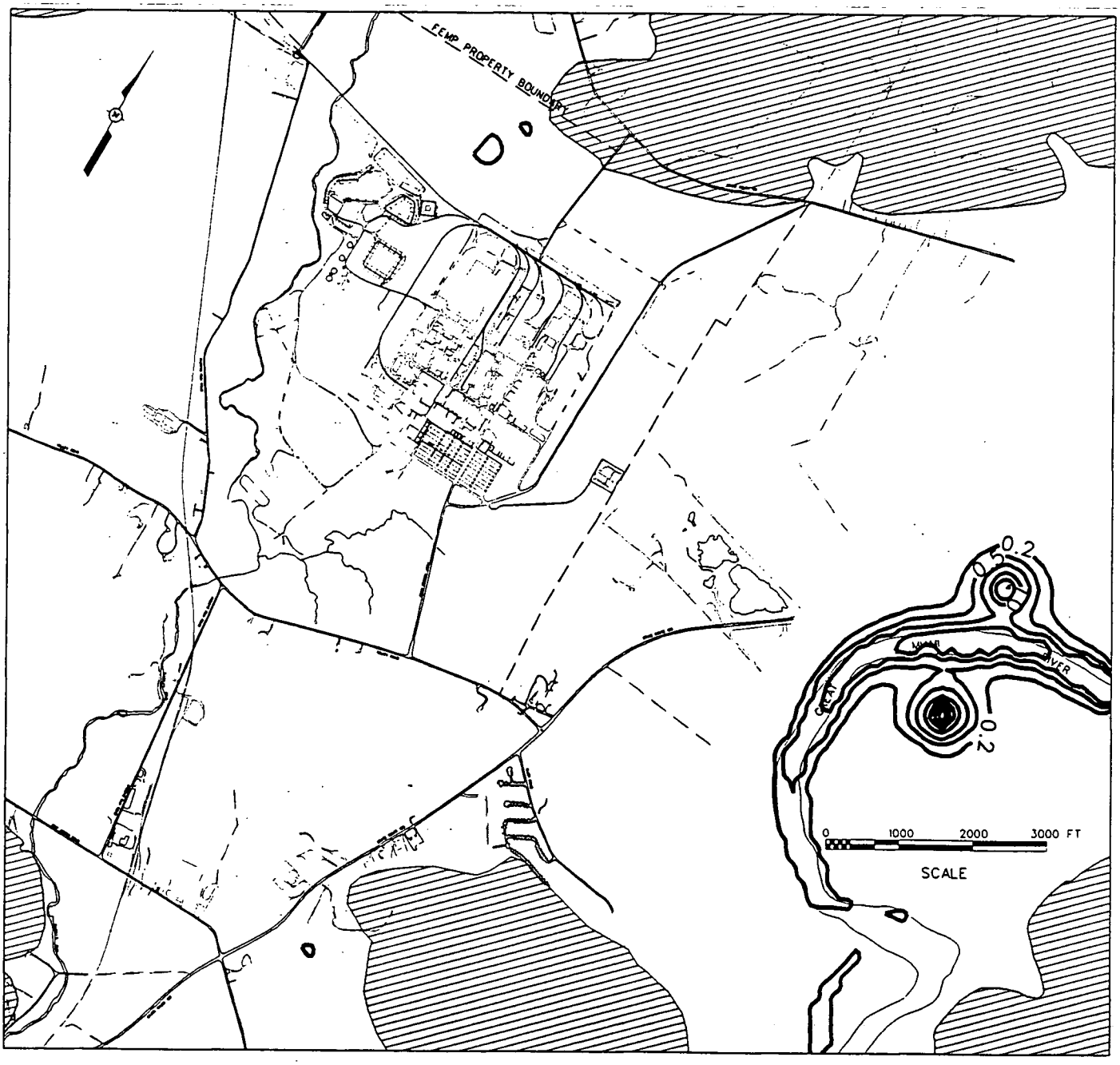
Note: Contours in ft-MSL

Figure 4.3-18 - Steady State Flow Model Head Contours - Layer 5



Note: Contours in ft-MSL

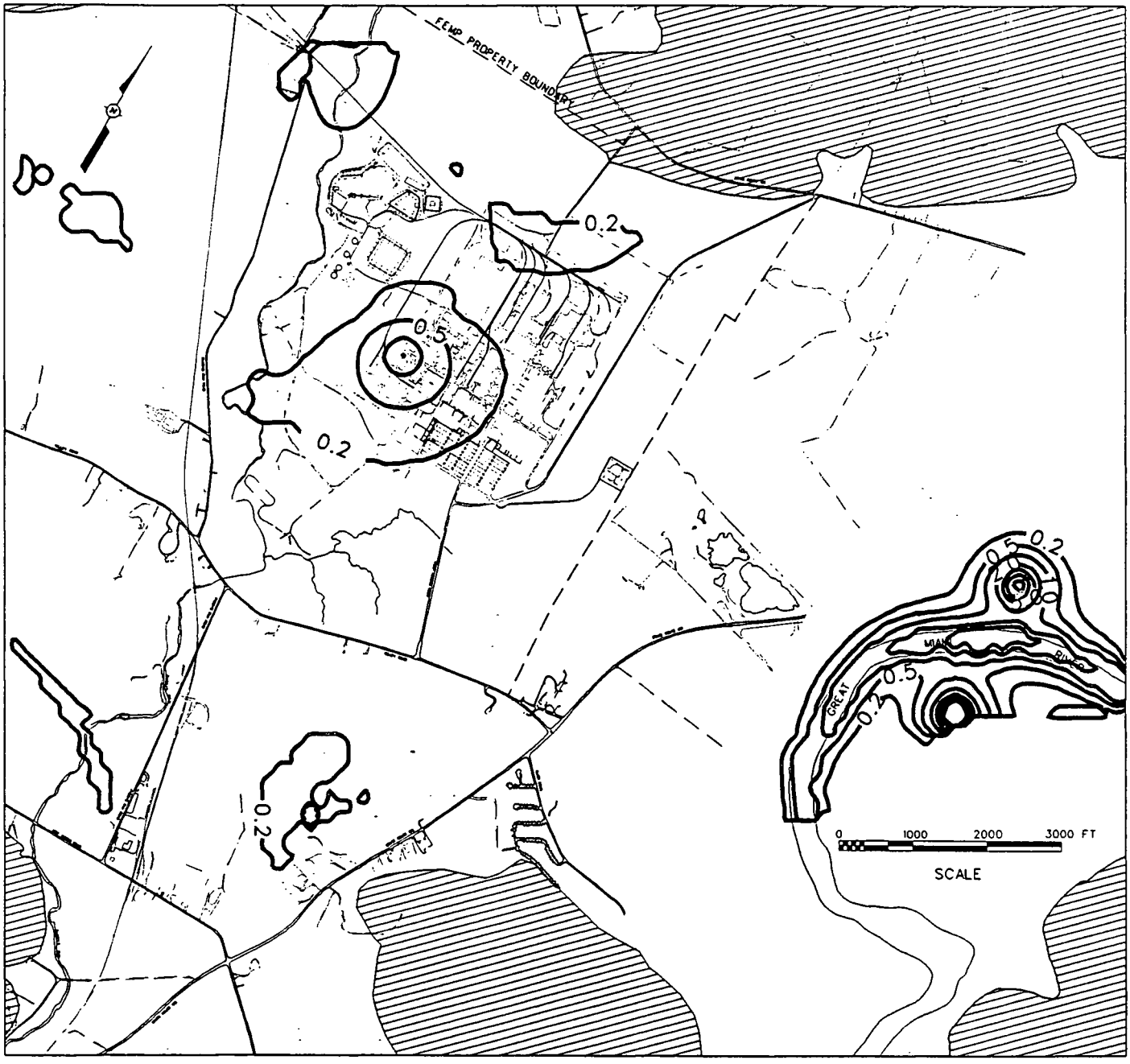
Figure 4.3-19 - Steady State Flow Model Head Contours - Layer 6



NOTE: MAXIMUM DIFFERENCE = 4.03 FT.

Note: Contours in ft

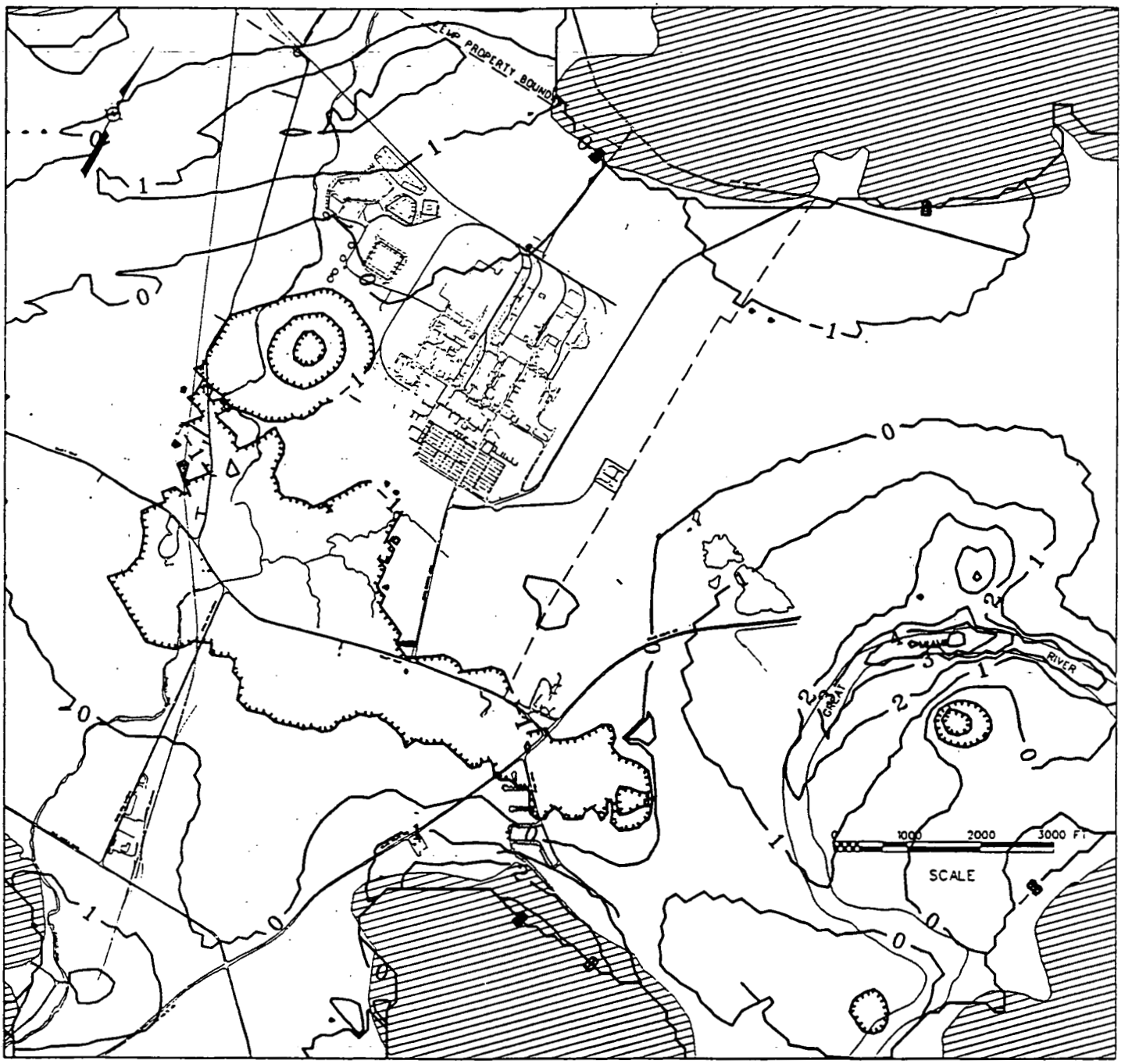
Figure 4.3-20 - Head Difference Between Layers 1 and 3 of Steady State Flow Model



NOTE: MAXIMUM DIFFERENCE = 5.43 FT.

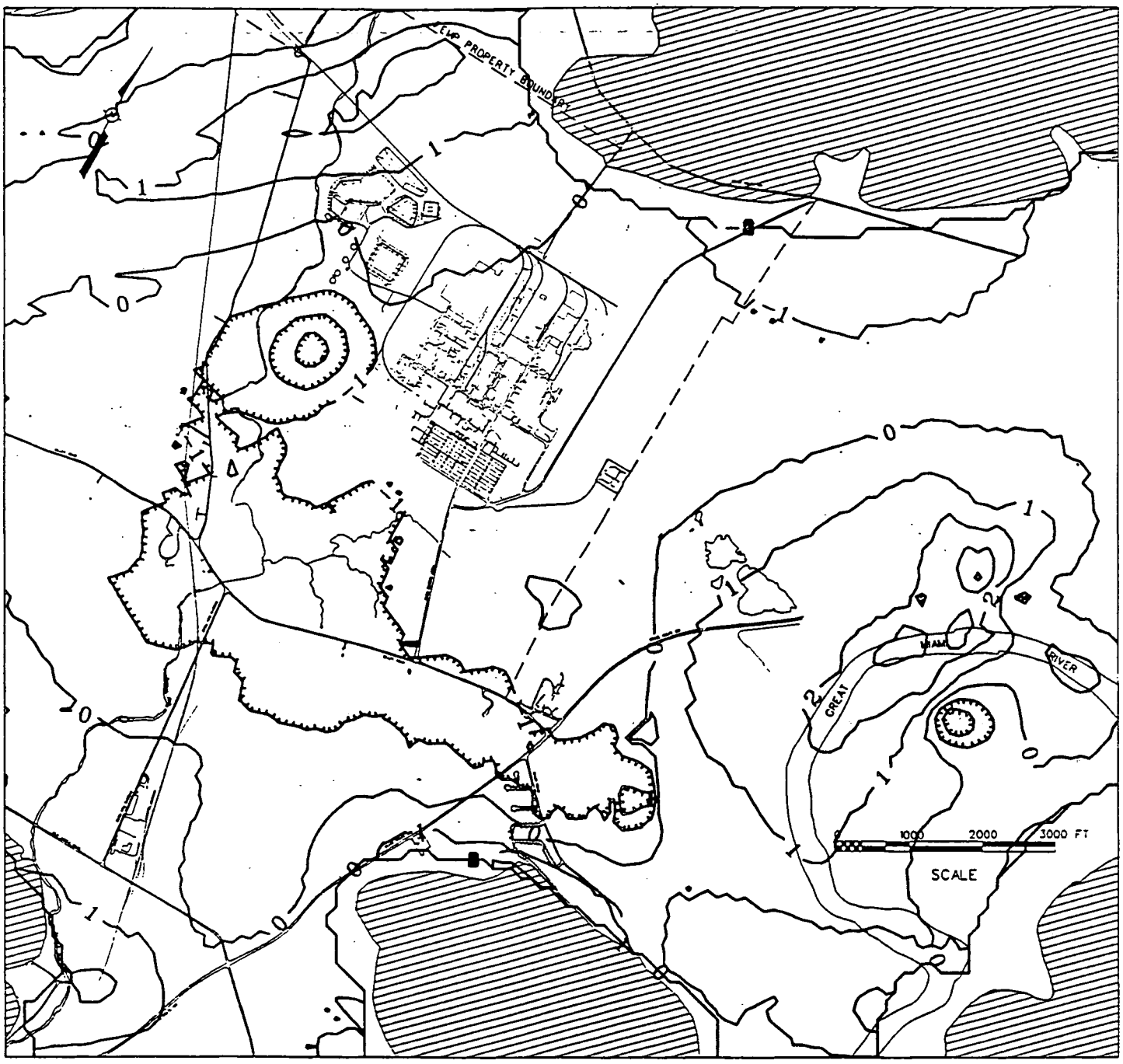
Note: Contours in ft

Figure 4.3-21 - Head Difference Between Layers 1 and 6 of Steady State Flow Model



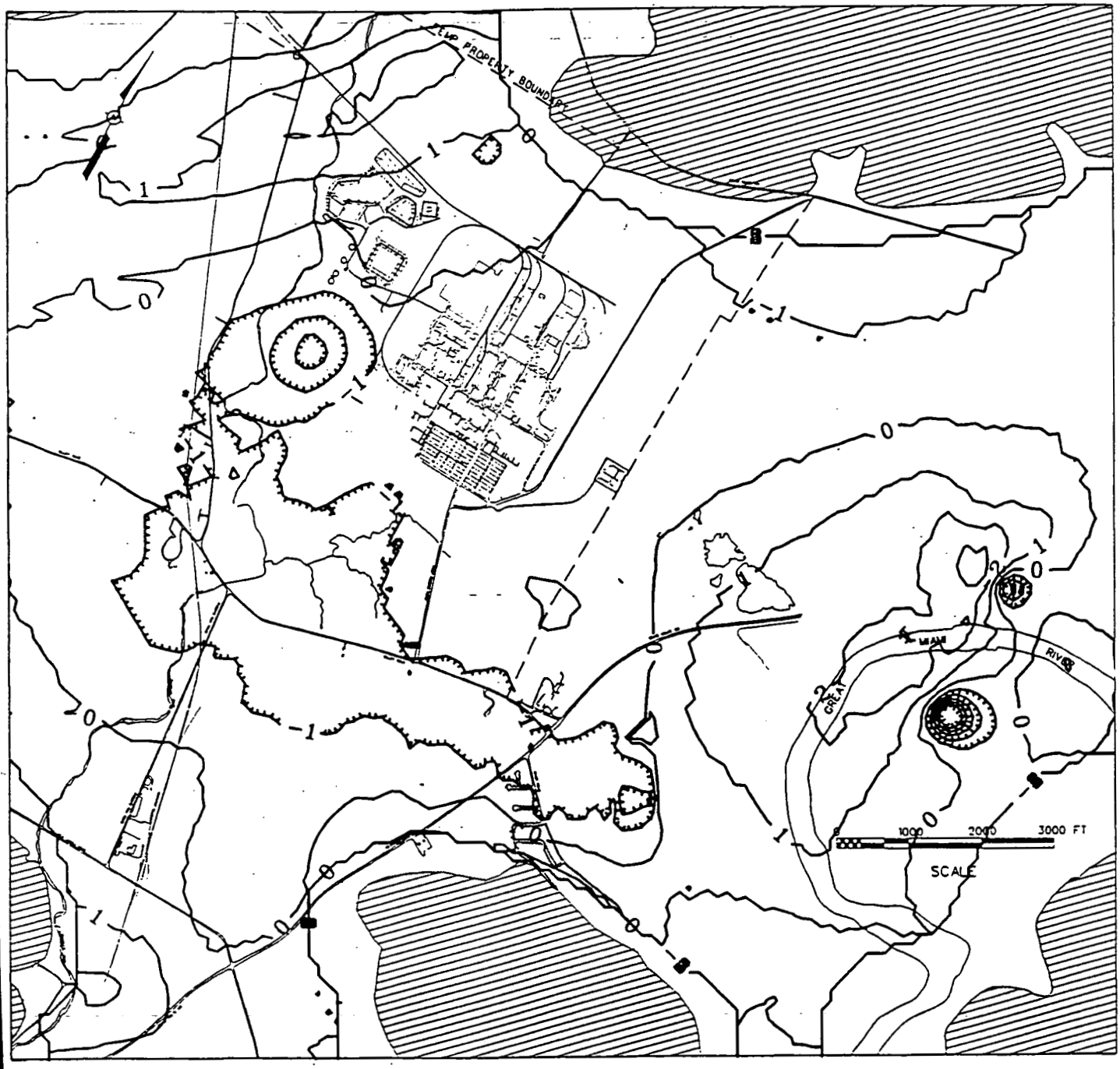
Note: Contours in ft

Figure 4.3-22 - Layer 1 Residuals - Predicted Minus Target Heads



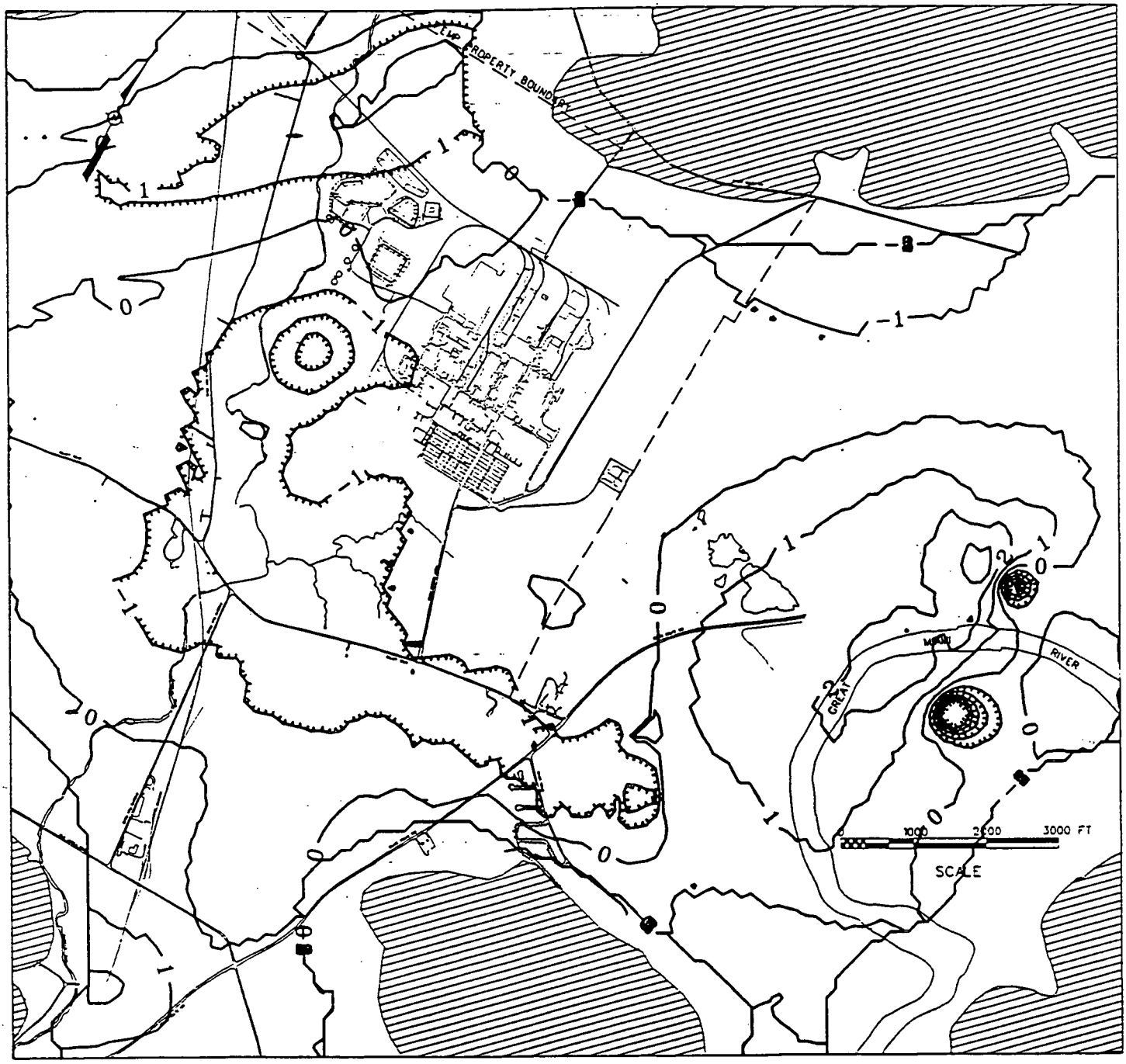
Note: Contours in ft

Figure 4.3-23 - Layer 2 Residuals - Predicted Minus Target Heads



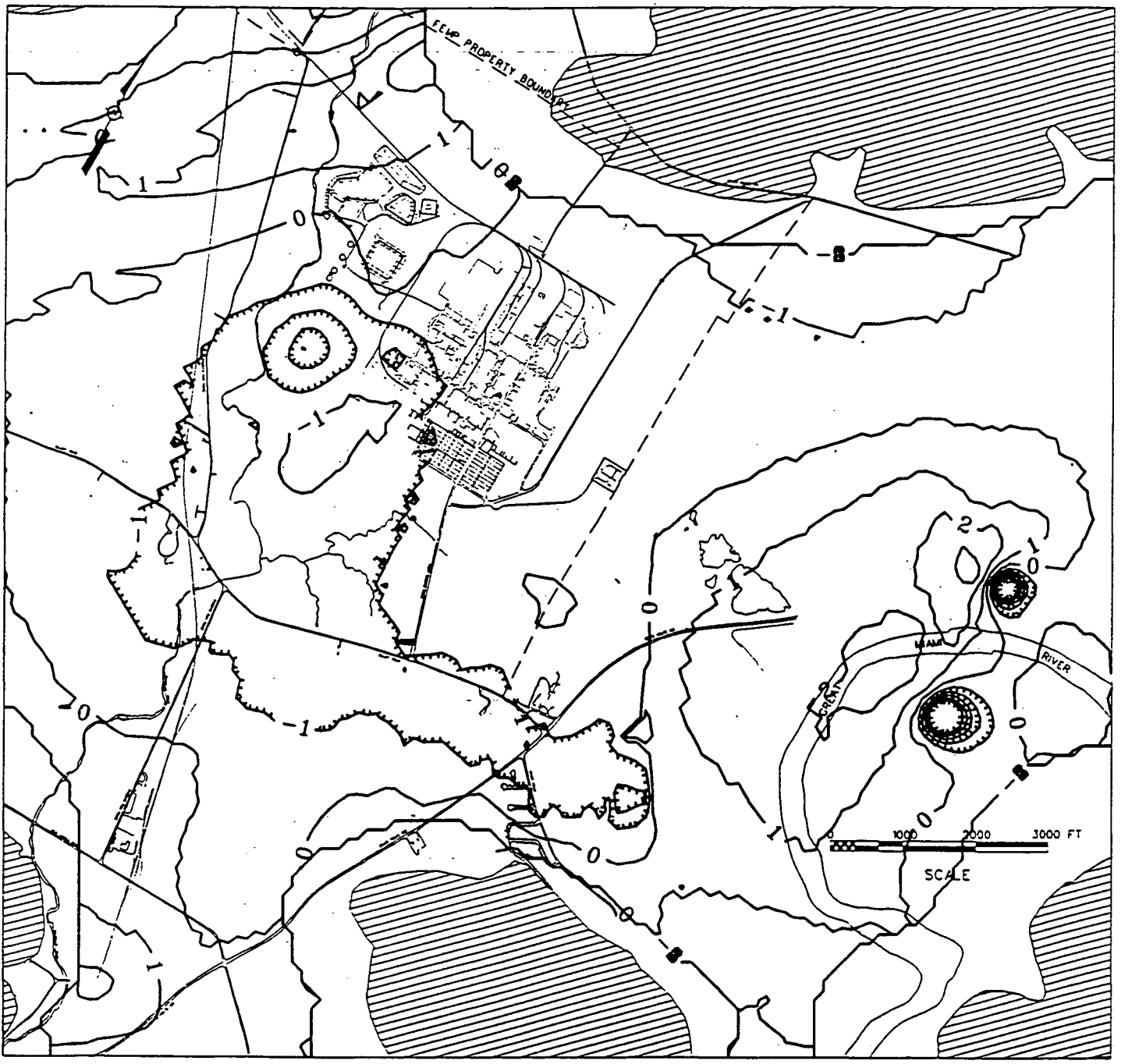
Note: Contours in ft

Figure 4.3-24 - Layer 3 Residuals - Predicted Minus Target Heads



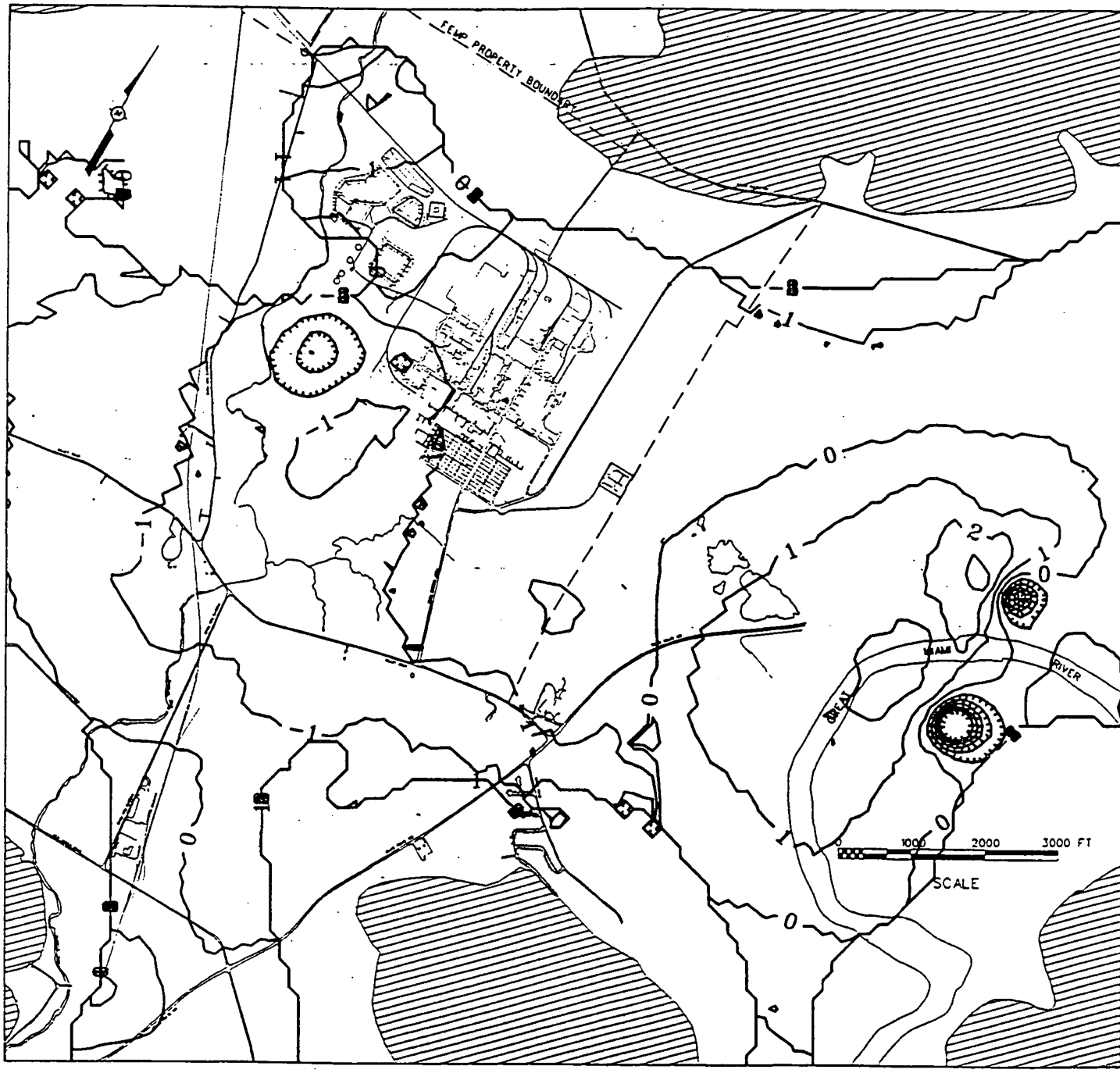
Note: Contours in ft

Figure 4.3-25 - Layer 4 Residuals - Predicted Minus Target Heads



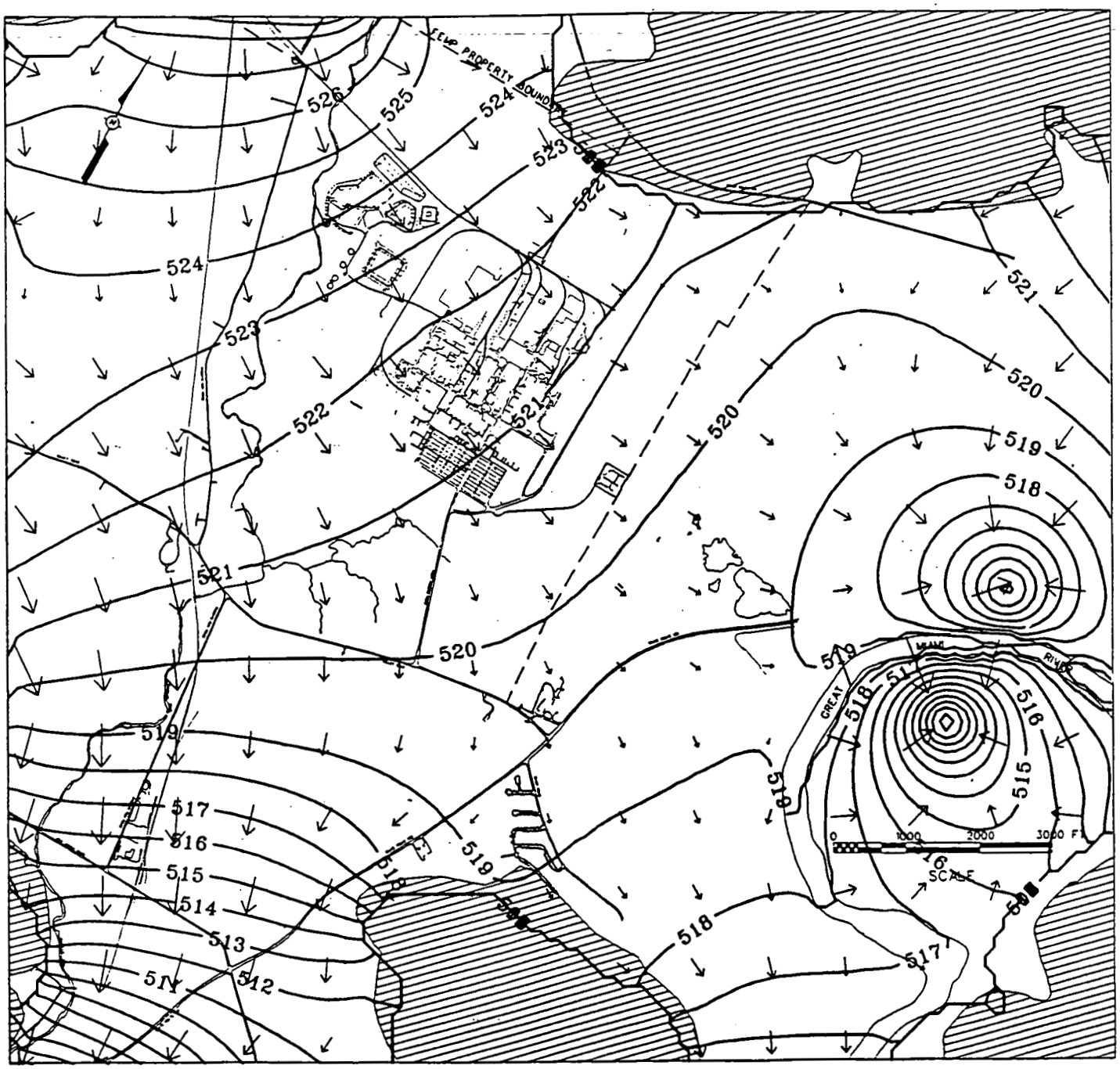
Note: Contours in ft

Figure 4.3-26 - Layer 5 Residuals - Predicted Minus Target Heads



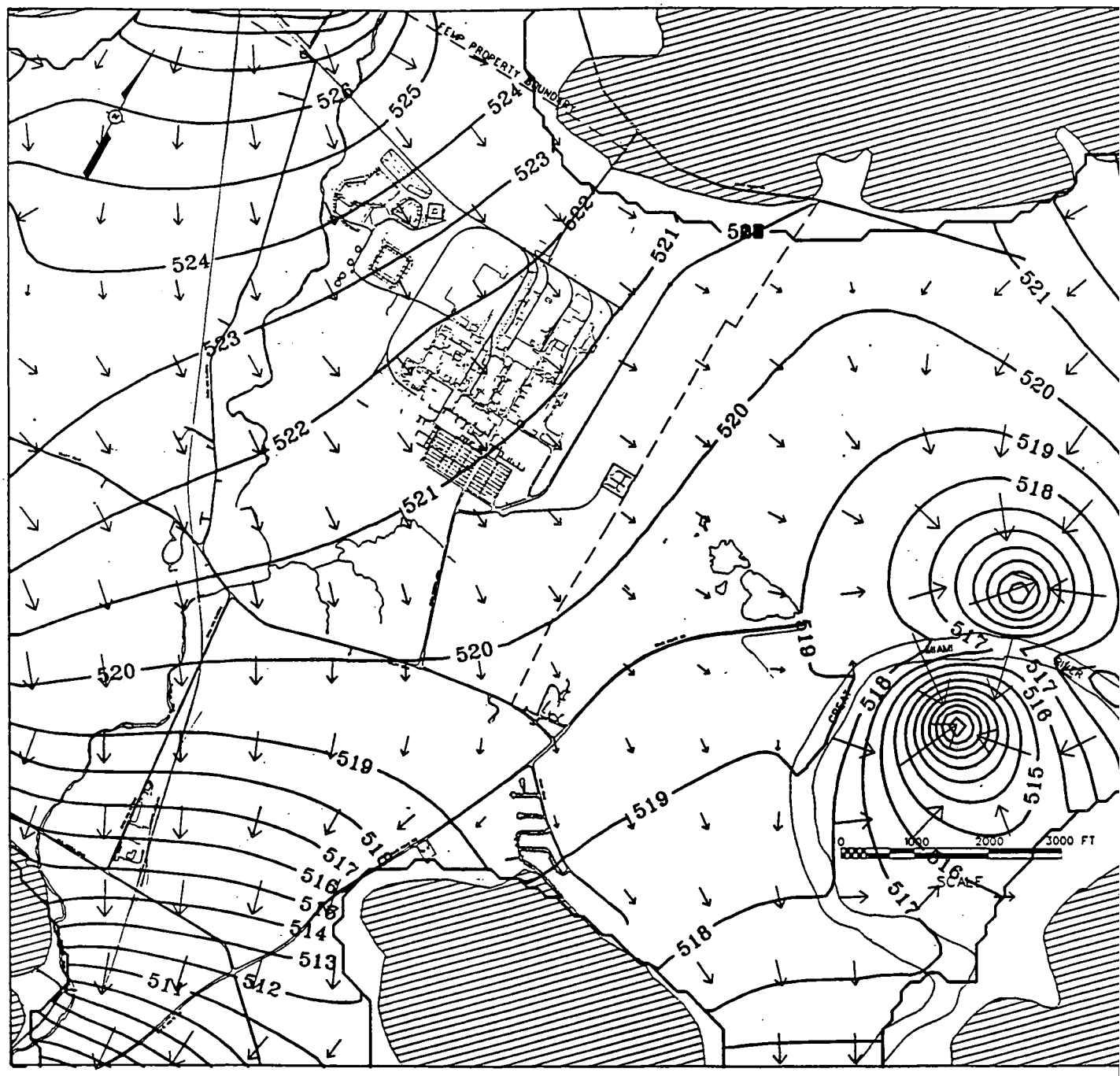
Note: Contours in ft

Figure 4.3-27 - Layer 6 Residuals - Predicted Minus Target Heads



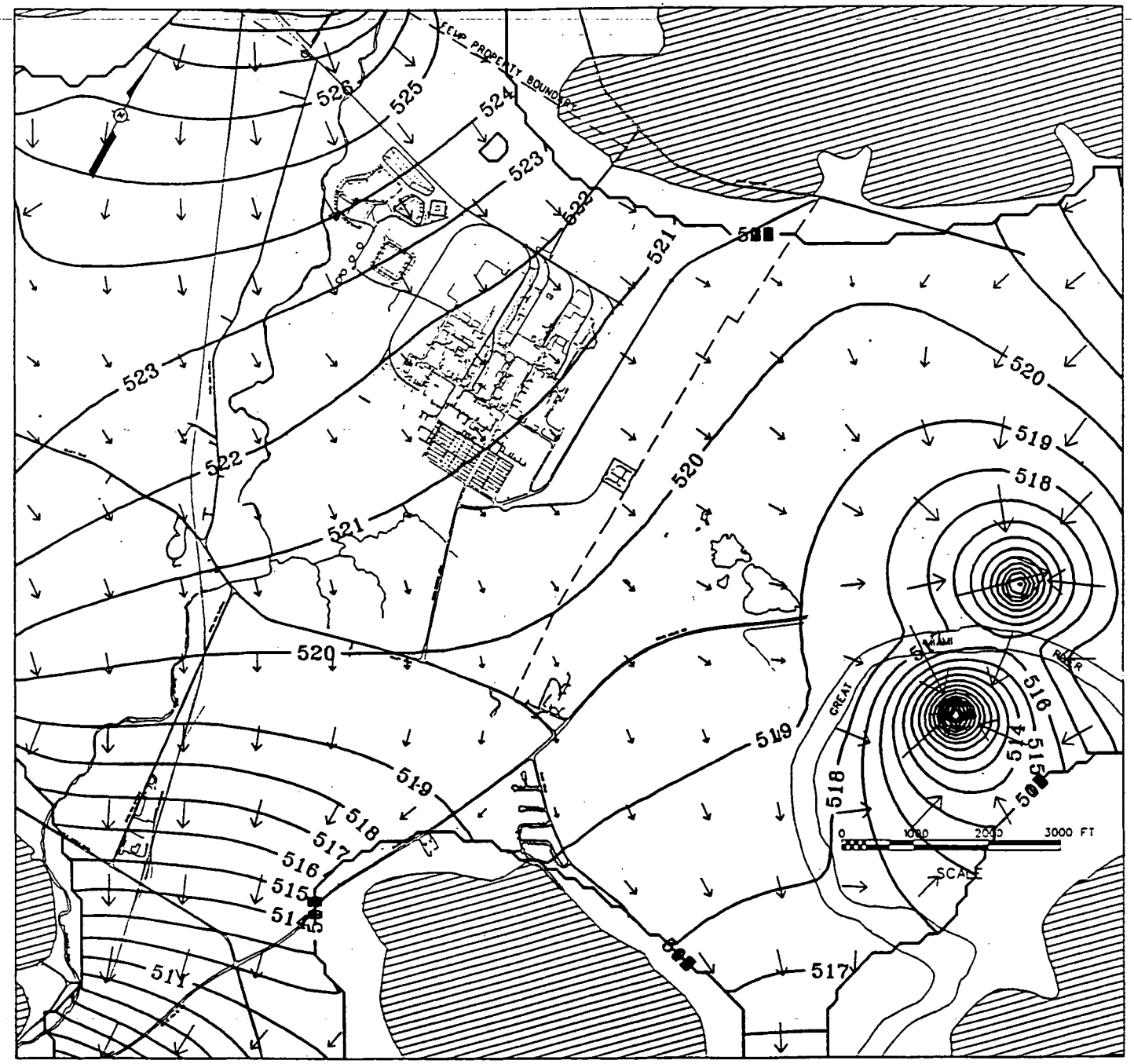
Note: Contours in ft-MSL

Figure 4.3-28 - Steady State Flow Model Velocity Vectors - Layer 1



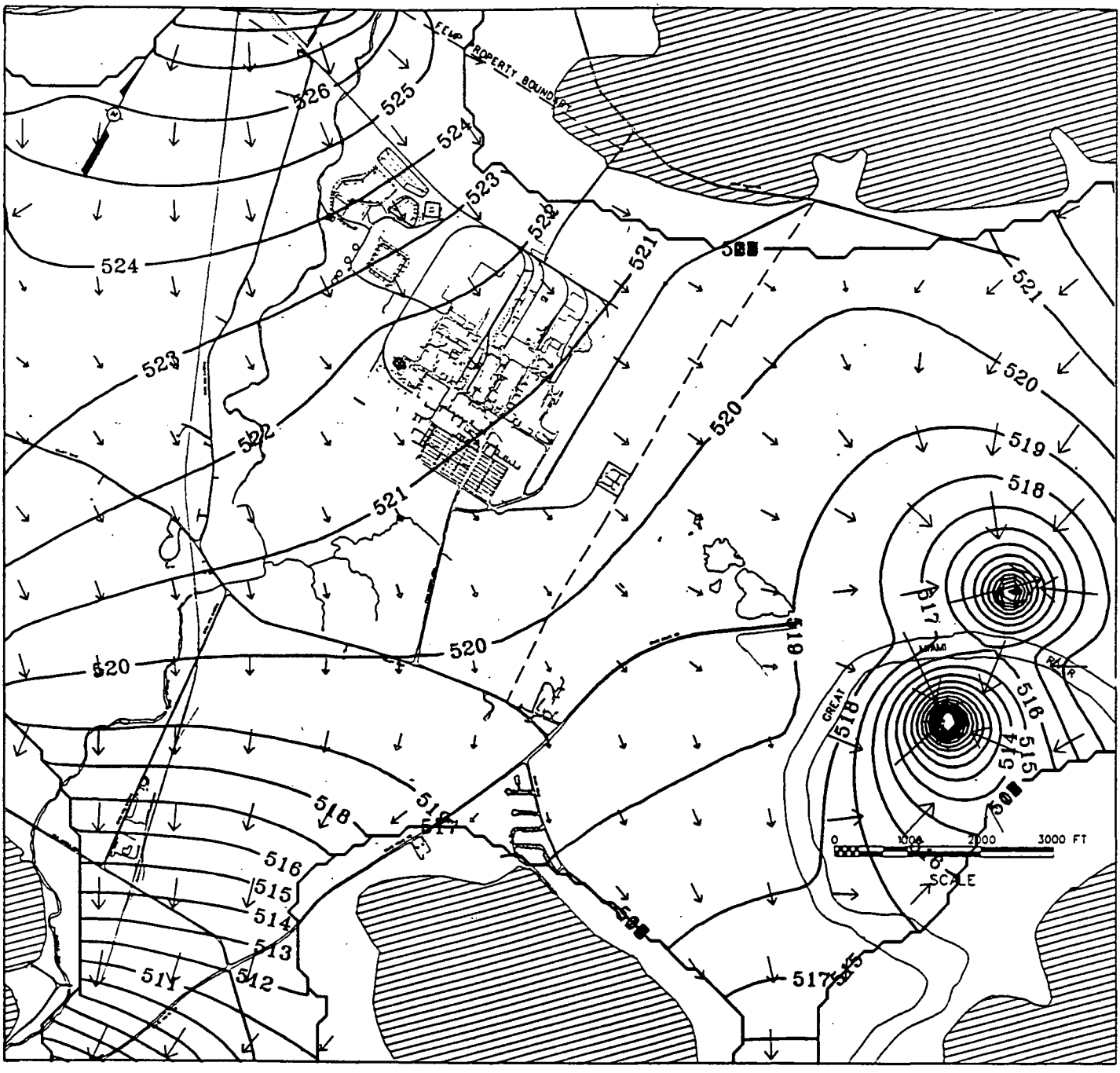
Note: Contours in ft-MSL

Figure 4.3-29 - Steady State Flow Model Velocity Vectors - Layer 2



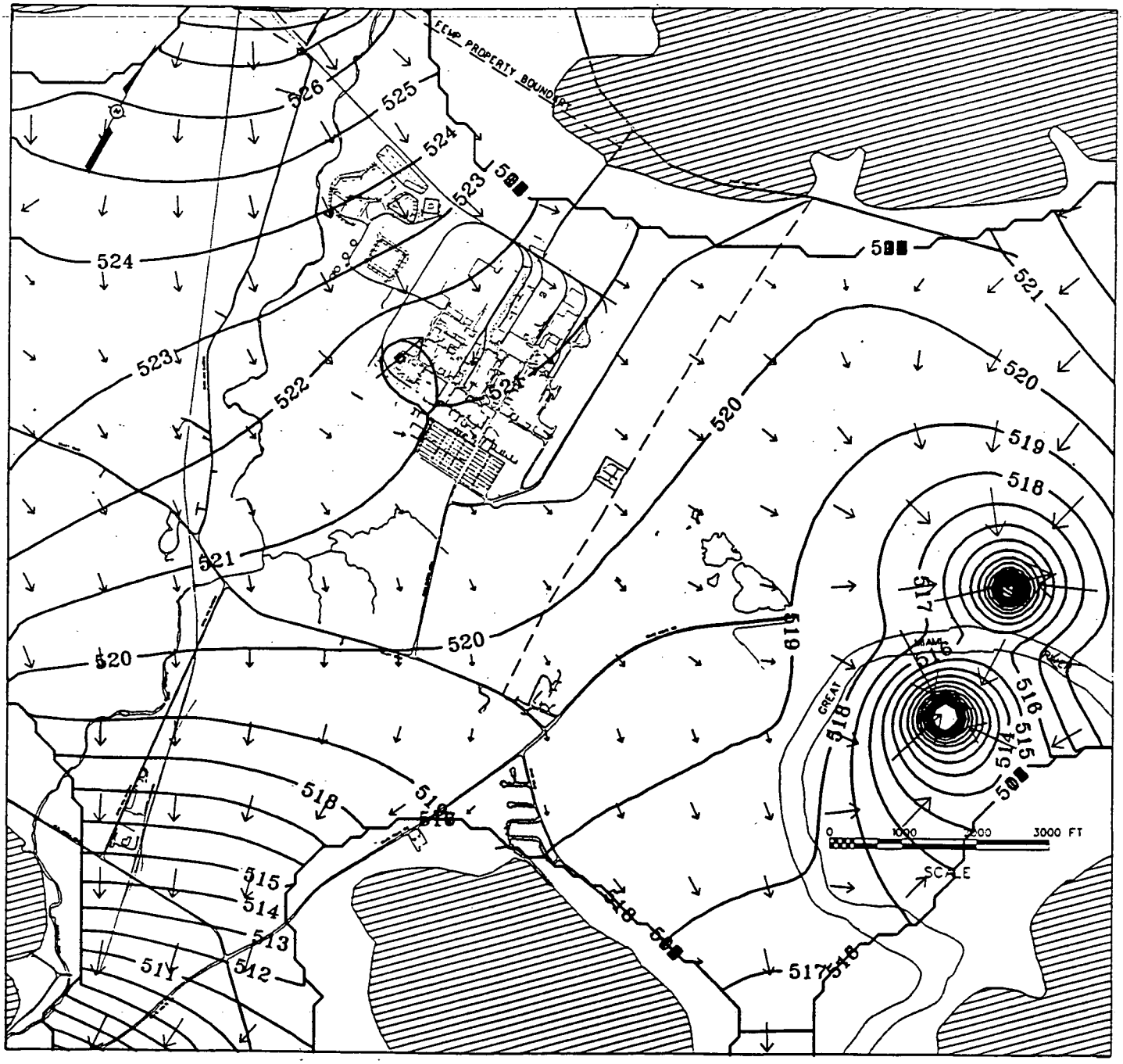
Note: Contours in ft-MSL

Figure 4.3-30 - Steady State Flow Model Velocity Vectors - Layer 3



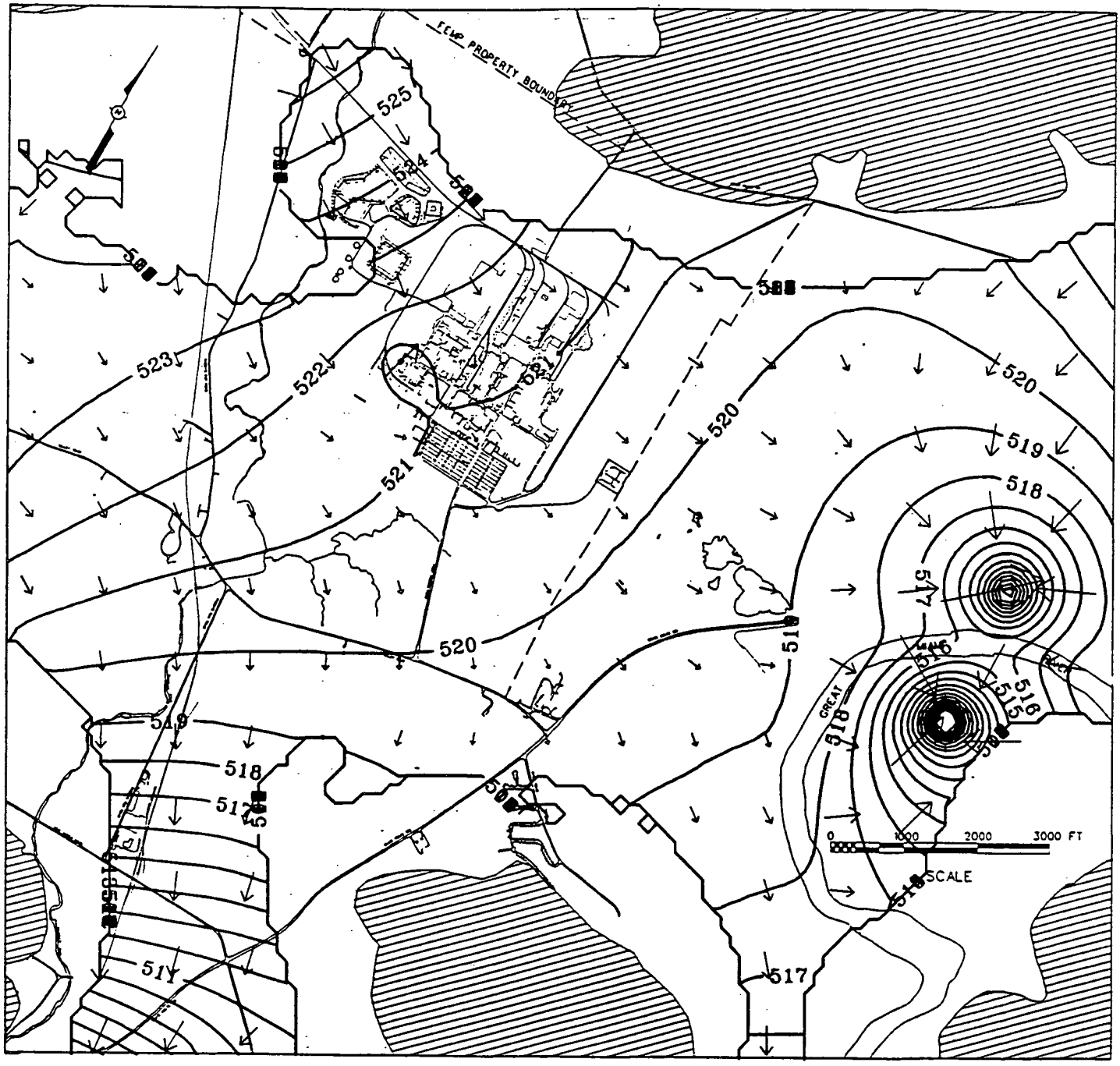
Note: Contours in ft-MSL

Figure 4.3-31 - Steady State Flow Model Velocity Vectors - Layer 4



Note: Contours in ft-MSL

Figure 4.3-32 - Steady State Flow Model Velocity Vectors - Layer 5



Note: Contours in ft-MSL

Figure 4.3-33 - Steady State Flow Model Velocity Vectors - Layer 6

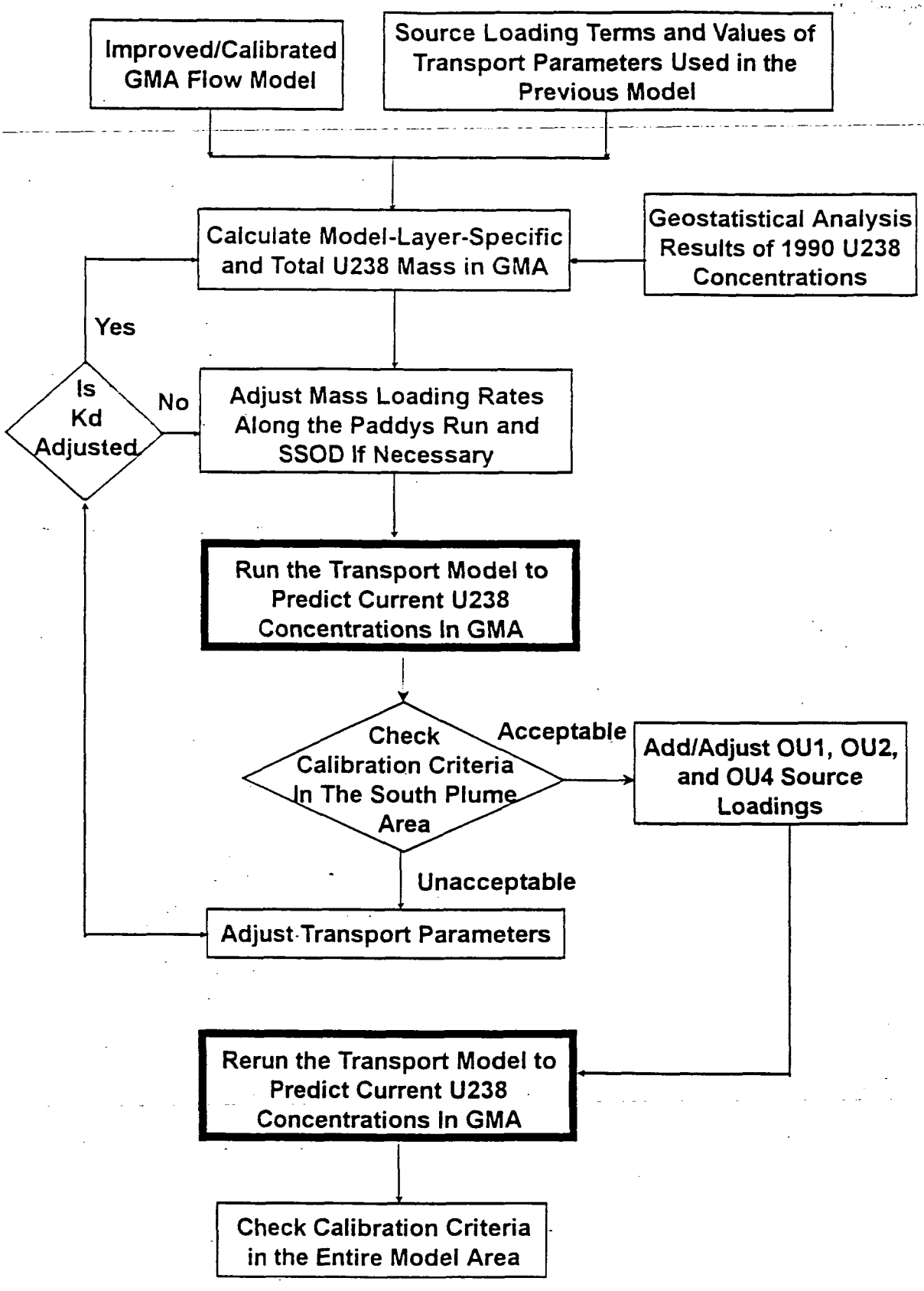
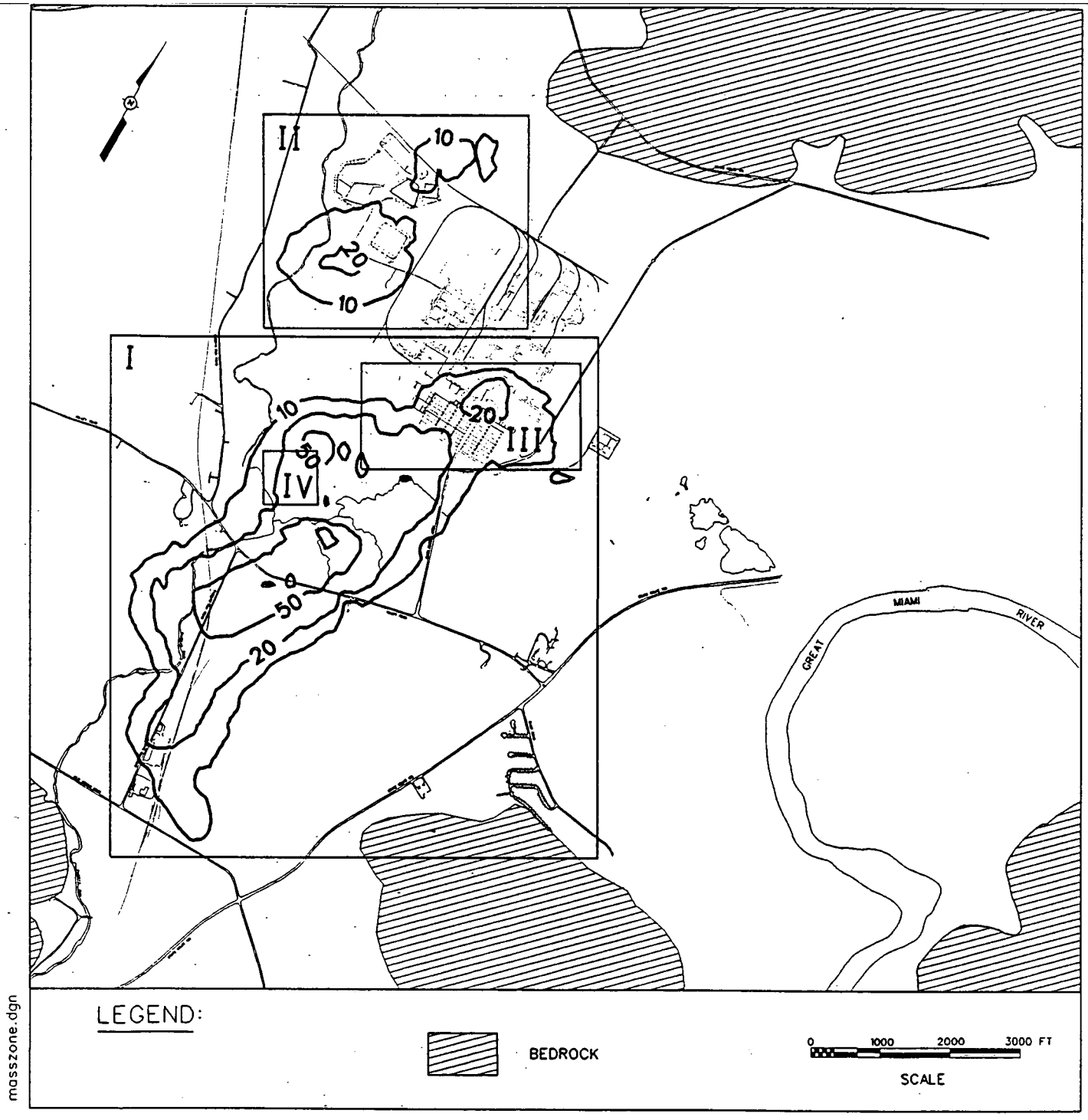
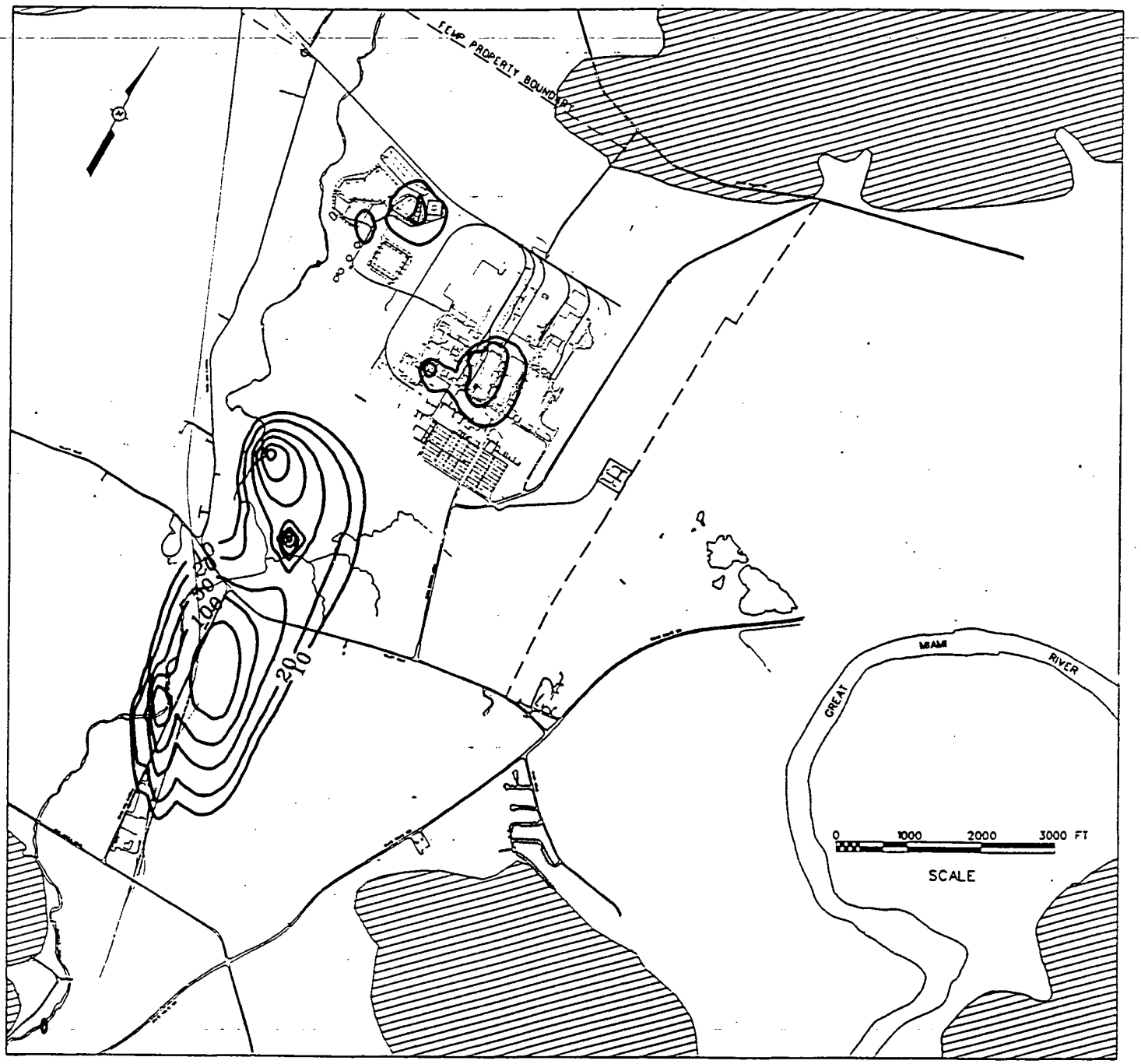


Figure 4.4-1 - Calibration of the GMA Solute Transport Model - Overview



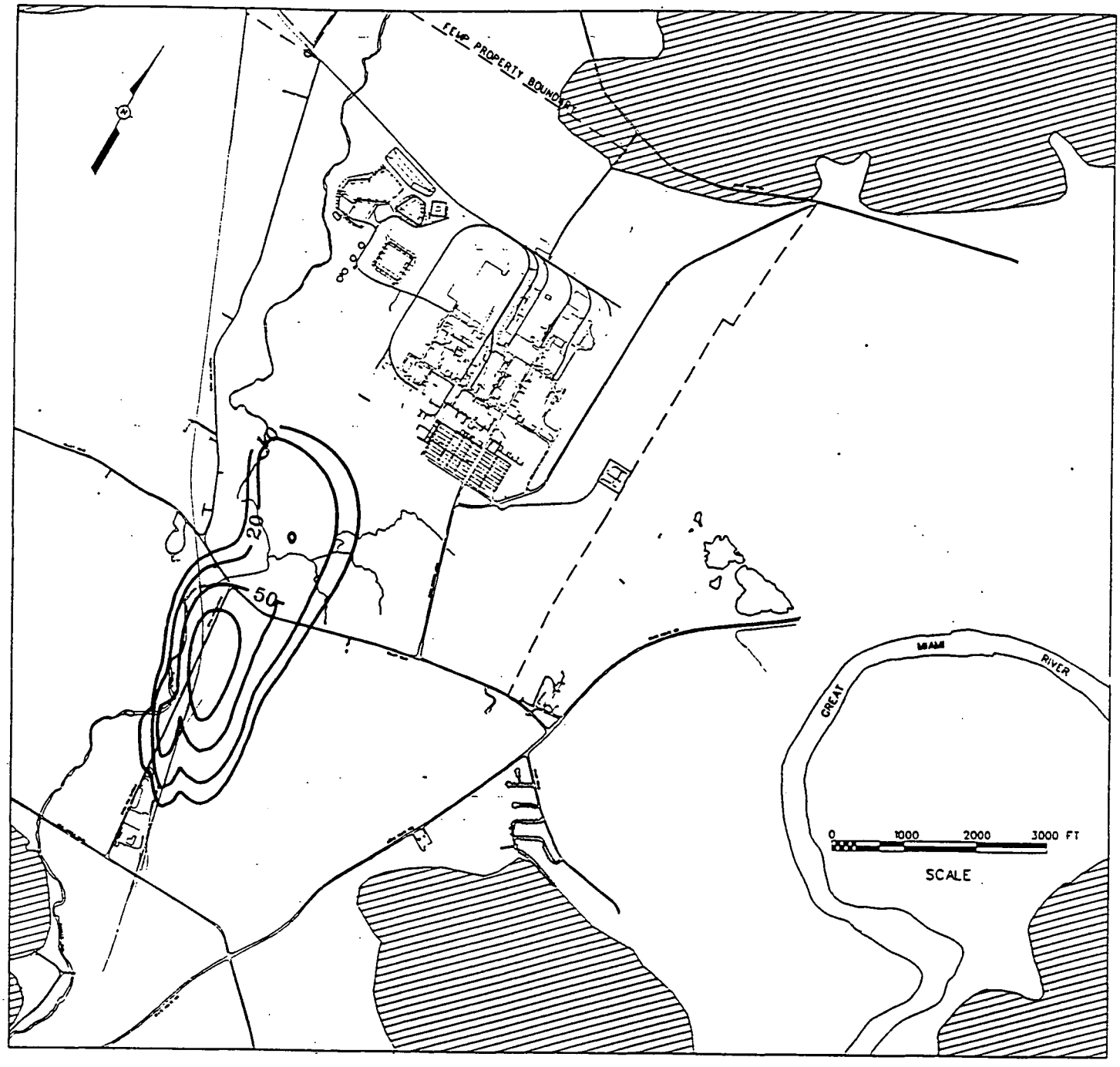
Contours in ppb

Figure 4.4-2 - Zones for Calculating Uranium Mass



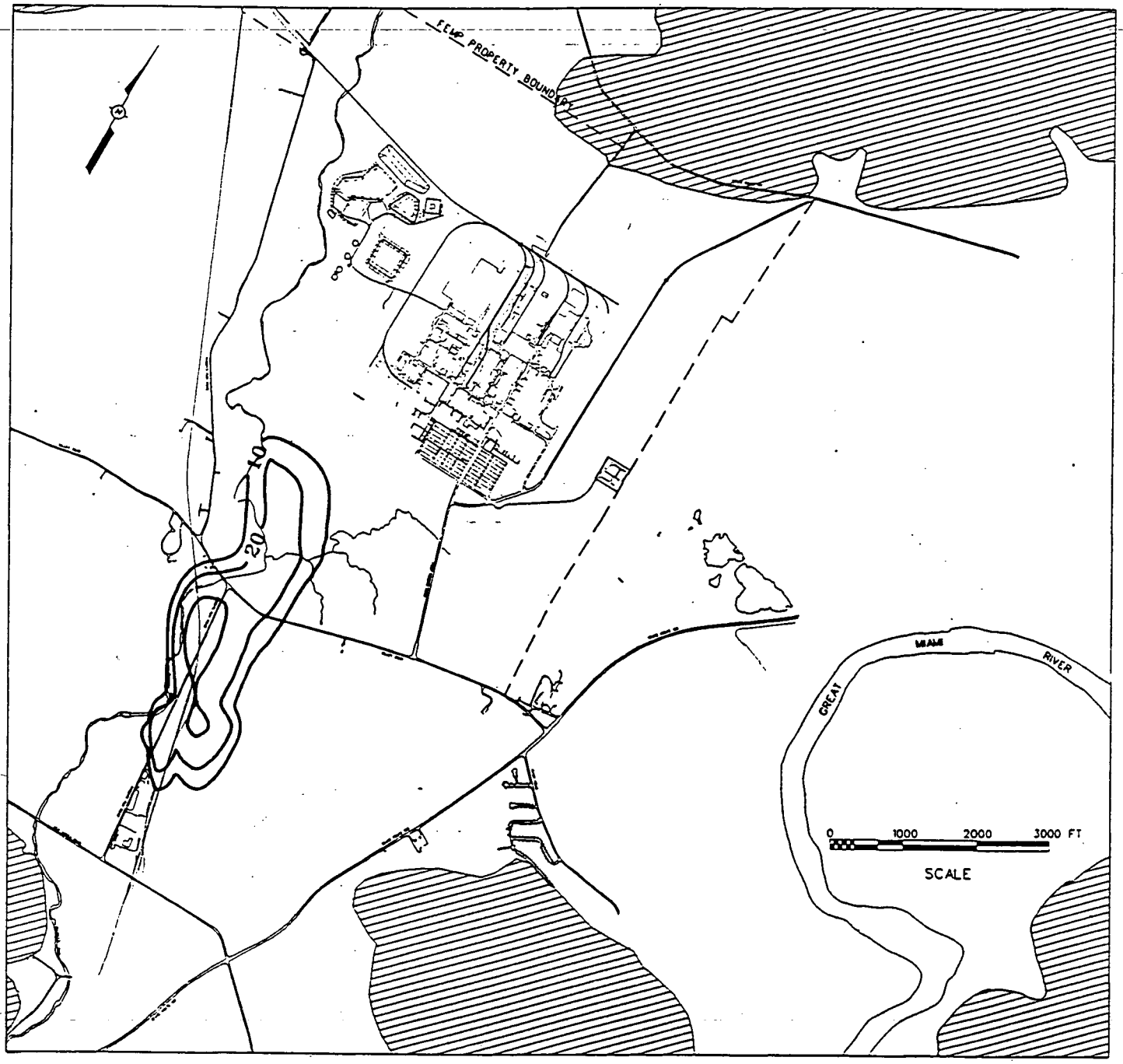
Contours in ppb

Figure 4.4-3 - Solute Transport Model Uranium Contours - Layer 1



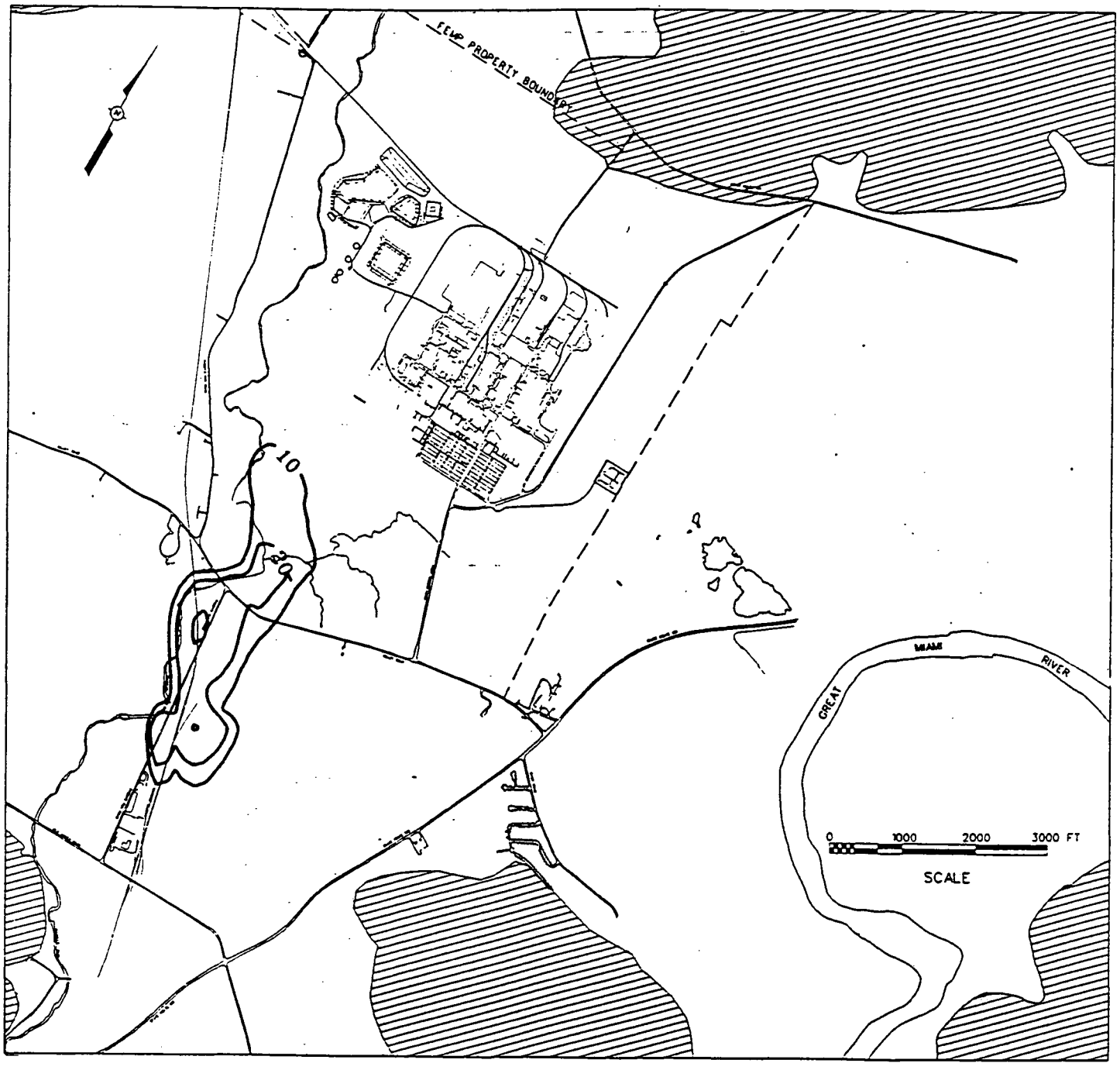
Contours in ppb

Figure 4.4-4 - Solute Transport Model Uranium Contours - Layer 2



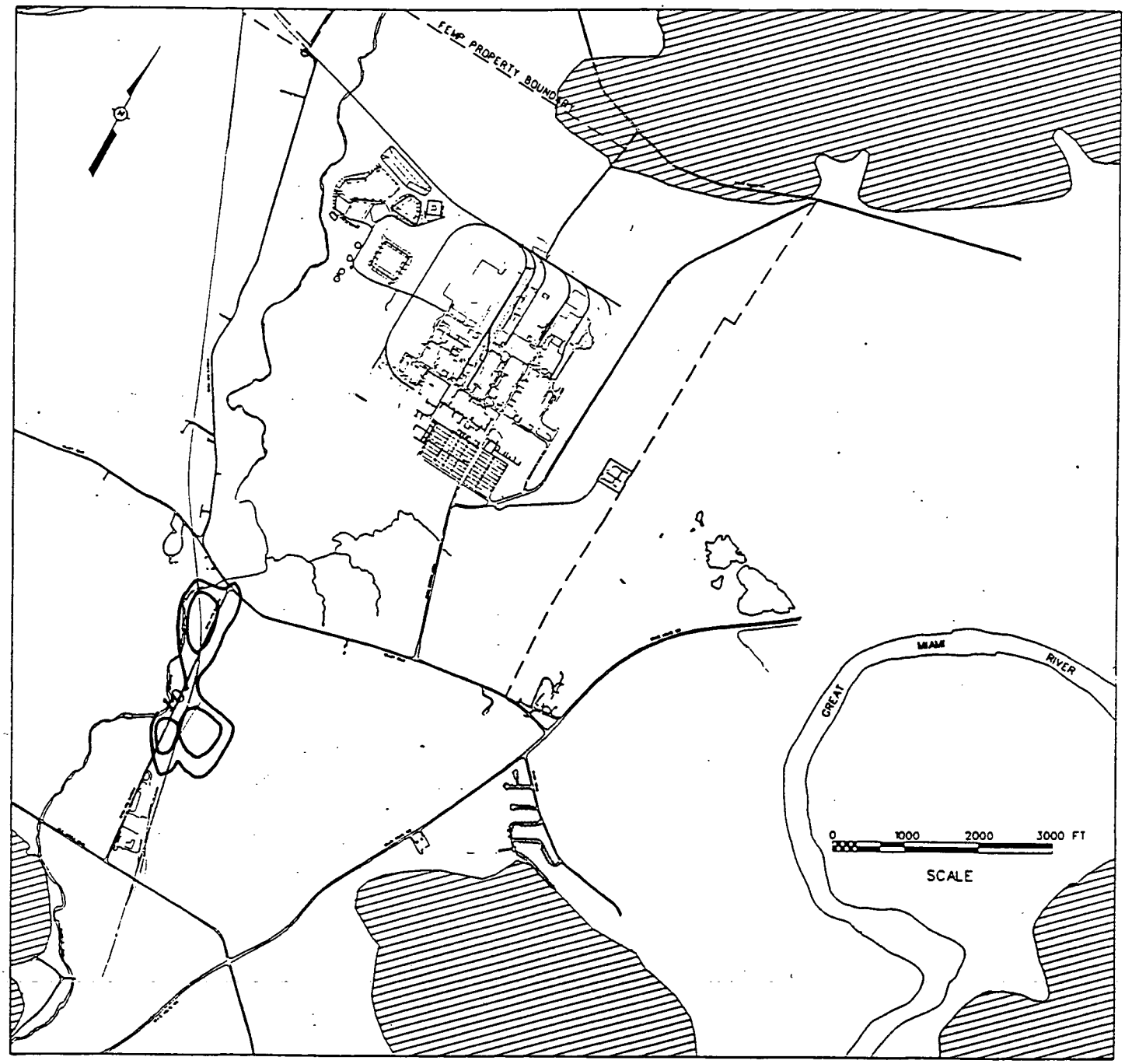
Contours in ppb

Figure 4.4-5 - Solute Transport Model Uranium Contours - Layer 3



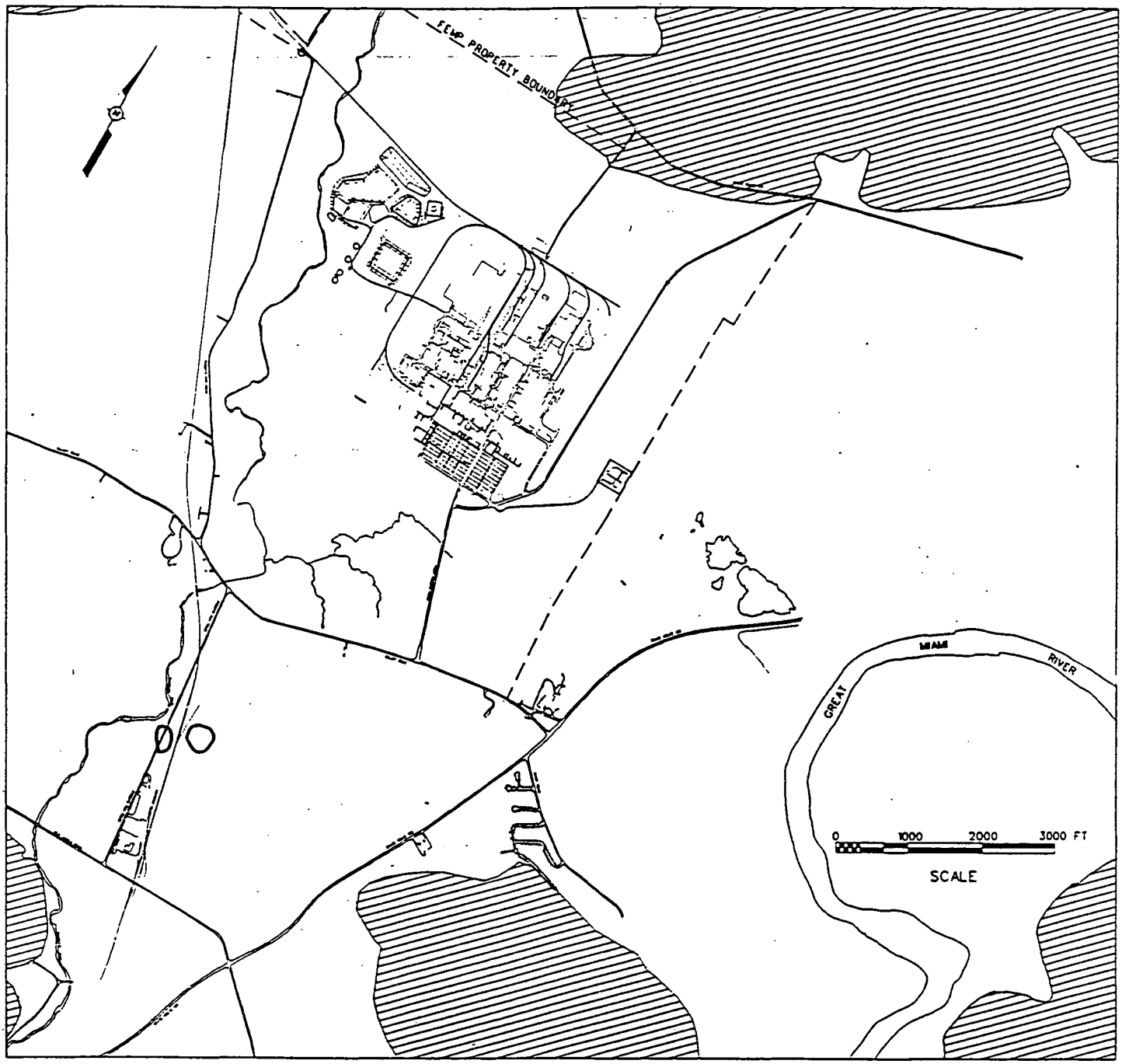
Contours in ppb

Figure 4.4-6 - Solute Transport Model Uranium Contours - Layer 4



Contours in ppb

Figure 4.4-7 - Solute Transport Model Uranium Contours - Layer 5



Contours in ppb

Figure 4.4-8 - Solute Transport Model Uranium Contours - Layer 6

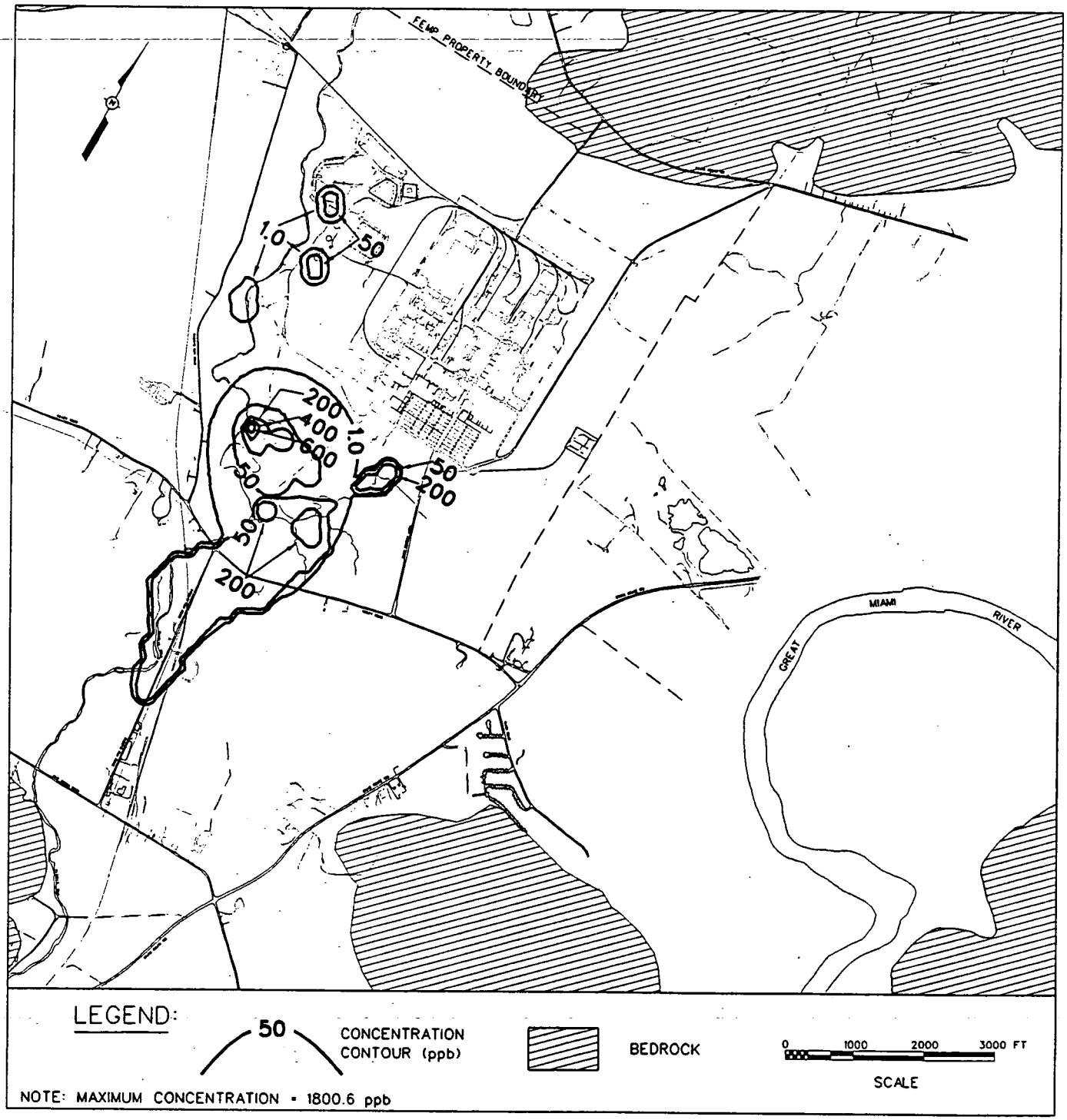


Figure 4.4-9 - Initial Concentration of U-238 for SWIFT GMA Modeling

Table 4.2-1 - Calibration Criteria and Summary of Parameter Ranges

Calibration Modeling Result	Criteria
Maximum Residual of Individual Drawdown or Recovery Modeled Data Point Versus Measured Data Point	$< \pm 15\%$ of Measured Data Point
Average Residual for Modeled Individual Well (Approx. 20 Total Points of Comparison)	$< \pm 10\%$ of Measured Data
Average Residual for All Wells (Approx. 9 Wells)	$< \pm 10\%$ of Measured Data
Variance of Residuals for All Wells (Approx. 9 Wells)	0.20 ft^2
Time of Change of Curvature of the Modeled Drawdown and Recovery Curves	Time of Change in Curvature Matches Measured Within 10%
Calibration Parameter	**Range**
Horizontal Hydraulic Conductivity	161 to 672 ft/day
Vertical Hydraulic Conductivity	8 to 129 ft/day
Porosity	0.2 to 0.4
Rock Compressibility	Typical Literature Range
Water Compressibility	Typical Literature Range
Layer Allocation for Pumping	Based on Screen Interval Within Layer
Pumping Rate	424 gpm (Constant)

Table 4.2-2 - Summary of Head Measurements for Just Prior to CRT

Well No.	Grid Coordinates		Top of Casing (ft)	Depth to Water Table (ft)	Head Elevation (ft)
	X (ft)	Y (ft)			
3927	1437.22	1437.64	591.103	70.550	520.553
3910	1487.07	1437.08	594.109	73.555	520.554
3911	1432.52	1419.27	594.249	73.810	520.439
3916	1442.61	1408.86	589.856	69.270	520.586
3917	1432.72	1413.74	591.071	70.470	520.601
3918	1442.56	1413.80	592.101	71.950	520.151
3921	1439.93	1389.53	591.486	70.920	520.566
3922	1437.32	1238.53	592.631	72.250	520.381
3923	1437.88	1487.09	592.750	72.100	520.650
2002	1533.38	1623.66	587.175	66.350	520.825
2128	344.80	834.95	531.270	13.660	517.610
3128	343.38	824.45	530.990	13.220	517.770
2636	429.50	613.98	531.750	14.480	517.270
3636	437.51	614.43	531.080	13.880	517.200
2548	737.76	358.49	529.940	13.300	516.640
2543	1518.63	-31.63	531.820	15.760	516.060
2394	1657.26	76.43	536.870	19.980	516.890
2093	2484.45	1894.15	588.400	67.000	521.400
3093	2472.37	1900.05	588.400	66.710	521.690
3015	1663.18	3094.83	579.630	57.620	522.010
2106	1070.11	3283.60	541.070	18.880	522.190
3106	1077.99	3277.94	541.360	19.120	522.240
2095	679.10	2314.66	536.100	14.280	521.820
3095	667.34	2316.46	535.920	14.620	521.300
2624	489.80	1877.68	533.390	13.450	519.940
3624	488.92	1866.64	533.000	13.040	519.960
2125	342.28	1697.94	529.930	9.040	520.890
3125	338.83	1688.02	530.090	9.300	520.790
2625	307.88	1013.32	531.290	11.410	519.880

Table 4.2-3 - Summary of CRT Statistics

Well Number	Individual Well Statistics			
	Time-Weighted Residual (ft)	Time-Weighted Residual % Difference (%)	Time-Weighted Absolute Residual (ft)	Time-Weighted Absolute Residual % Difference (%)
RW-4 (3927)	0.1371	-9.958	0.3609	12.750
SPPZ-1 (3910)	-0.0496	-7.905	0.0522	8.359
SPPZ-2A (3911)	-0.0430	2.770	0.1050	13.450
SPPZ-2C (3916)	0.0457	-3.076	0.0894	16.220
SPPZ-2E (3918)	0.1257	9.970	0.1433	17.630
SPPZ-3 (3921)	-0.1383	-15.690	0.1396	15.960
SPPZ-4 (3922)	-0.0059	-3.169	0.0243	7.978
SPPZ-5 (3923)	-0.0528	-6.809	0.0557	7.325
2002	-0.0362	-8.216	0.0387	9.979
Run Time-Weighted Average % Difference				-4.676
Run Time-Weighted Average Absolute % Difference				12.180
Run Time-Weighted Residual Variance (ft^2)				0.0080

Table 4.2-4 - Comparison of Initial CRT and SDT Heads

Well No.	Top of Casing (ft)	CRT Depth to Water Table (ft)	SDT Depth to Water Table (ft)	CRT Head Elevation (ft)	SDT Head Elevation (ft)
3927	591.103	70.550	70.440	520.553	520.663
3910	594.109	73.555	73.410	520.554	520.699
3911	594.249	73.810	73.640	520.439	520.609
3916	589.856	69.270	69.120	520.586	520.736
3917	591.071	70.470	70.300	520.601	520.771
3918	592.101	71.950	71.780	520.151	520.321
3921	591.486	70.920	70.760	520.566	520.726
3922	592.631	72.250	72.085	520.381	520.546
3923	592.750	72.100	71.940	520.650	520.810
2002	587.175	66.350	66.200	520.825	520.975
2128	531.270	13.660	13.440	517.610	517.830
3128	530.990	13.220	13.040	517.770	517.950
2636	531.750	14.480	14.260	517.270	517.490
3636	531.080	13.880	13.660	517.200	517.420
2548	529.940	13.300	13.080	516.640	516.860
2543	531.820	15.760	15.560	516.060	516.260
2394	536.870	19.980	19.810	516.890	517.060
2093	588.400	67.000	66.800	521.400	521.600
3093	588.400	66.710	66.520	521.690	521.880
3015	579.630	57.620	57.360	522.010	522.270
2106	541.070	18.880	18.540	522.190	522.530
3106	541.360	19.120	18.760	522.240	522.600
2095	536.100	14.280	14.080	521.820	522.020
3095	535.920	14.620	14.400	521.300	521.520
2624	533.390	13.450	13.240	519.940	520.150
3624	533.000	13.040	12.870	519.960	520.130
2125	529.930	9.040	8.820	520.890	521.110
3125	530.090	9.300	9.100	520.790	520.990
2625	531.290	11.410	10.940	519.880	520.350

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Table 4.2-5 - SDT Pumping Rates and Selected Drawdowns

Summary of Measured Drawdowns Taken During the Step Drawdown Test									
Time (min)	Well-by-Well Summary of Measured Step Drawdowns (ft)								
	RW4	SPPZ-1	SPPZ-2A	SPPZ-2C	SPPZ-2E	SPPZ-3	SPPZ-4	SPPZ-5	2002
0	0	0	0	0	0	0	0	0	0
110	5.288	0.366	0.194	0.288	0.135	0.316	0.087	0.298	0.078
230	8.692	0.489	0.270	0.436	0.260	0.467	0.167	0.453	0.138
330	12.113	0.571	0.248	0.550	0.411	0.591	0.217	0.583	0.186
430	15.613	0.647	0.321	0.677	0.493	0.708	0.279	0.713	0.224
530	23.913	0.855	0.616	0.879	0.684	0.913	0.363	0.935	0.290
574	35.747	1.051	0.880	1.057	0.835	1.068	0.419	1.138	0.334

Summary of Step Drawdown Test Times and Pumping Rates			
Time (min)	Time (day)	Pumping Rate (gpm)	Pumping Rate (cfd)
0	0	200	38502.67
110	7.639×10^{-2}	275	52941.18
230	1.597×10^{-1}	350	67379.68
330	2.292×10^{-1}	425	81818.18
430	2.986×10^{-1}	575	110695.19
530	3.681×10^{-1}	750	144385.03
574	3.986×10^{-1}	0	0

Table 4.2-6 - Summary of SDT Statistics

Well Number	Individual Well Statistics			
	Time-Weighted Residual (ft)	Time-Weighted Residual % Difference (%)	Time-Weighted Absolute Residual (ft)	Time-Weighted Absolute Residual % Difference (%)
RW-4 (3927)	-2.248	-27.03	2.749	28.43
SPPZ-1 (3910)	0.103	20.93	0.103	20.93
SPPZ-2A (3911)	-0.436	-126.40	0.436	126.40
SPPZ-2C (3916)	0.216	38.81	0.216	38.81
SPPZ-2E (3918)	0.171	39.550	0.171	39.550
SPPZ-3 (3921)	0.109	20.750	0.109	20.750
SPPZ-4 (3922)	0.123	56.610	0.123	56.610
SPPZ-5 (3923)	0.128	22.890	0.128	22.890
2002	0.110	63.410	0.110	63.410
Time-Weighted Average Absolute % Difference For All Wells				46.430
Time-Weighted Residual Variance (ft^2) For All Wells				0.6318
Time-Weighted Average Absolute % Difference For All Wells Except SPPZ-2A and SPPZ-2E				35.98
Time-Weighted Residual Variance (ft^2) For All Wells Except SPPZ-2A and SPPZ-2E				0.8103

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Table 4.2-7 - Comparison of CRT and SDT Results at 430 Minutes

Well No.	CRT Drawdown (ft)	SDT Drawdown (ft)	Residual (ft)	% Difference (%)	Difference Without Outliers (%)	Absolute % Difference Without Outliers (%)
3927	17.1085	15.6130	1.4955	9.5786	9.5786	9.5786
3910	0.7255	0.6470	0.0785	12.1329	12.1329	12.1329
3911	0.9355	0.3210	0.6145	191.4330	NA	NA
3916	0.6955	0.6770	0.0185	2.7326	2.7326	2.7326
3918	0.6155	0.4930	0.1225	24.8479	NA	NA
3921	0.6455	0.7080	-0.0625	-8.8277	-8.8277	8.8277
3922	0.2955	0.2790	0.0165	5.9140	5.9140	5.9140
3923	0.6955	0.7130	-0.0175	-2.4544	-2.4544	2.4544
2002	0.1905	0.2240	-0.0335	-14.9554	-14.9554	14.9554
		Average	0.2481	24.4891	0.5887	8.0851

Table 4.3-1 - Steady-State Flow Calibration Measures

Calibration Parameter	Criteria
Mean Residual Head	< +/- 0.5 feet
Mean of the Absolute Residuals of Head	< +/- 2 feet
Standard Deviation of Differences of Head	< +/- 3 feet
Regression Coefficient Between Measured and Computed Values of Head	0.95
Maximum Residual	Within the kriged confidence interval for the defined block
Water Balance	Within 5 percent

Table 4.3-2 - Steady-State Flow Calibration Parameter Ranges

Calibration Parameter	Projected Range from Model Calibration TO/TA
Horizontal Hydraulic Conductivity	Within 292 to 678 ft/day or tighter range as determined with Transient Flow Calibration
Vertical Hydraulic Conductivity	Within 20 to 115 ft/day or tighter range as determined with Transient Flow Calibration
Porosity	As determined with Transient Flow Calibration
Rock Compressibility	As determined with Transient Flow Calibration
Boundary Conditions	Constant heads determined with geostatistical analysis. Maintain within kriged confidence interval. Other type boundary conditions possible if determined during calibration.
Recharge	0 to 16 inches/year based upon HELP* runs, surface features and interim results from the Glacial Overburden/Upper Great Miami Aquifer Model and calibration. 20 to 40 inches/year from Paddys Run based upon Paddys Run Model and calibration.
Great Miami River Leakage	Set based on latest data
Pumping Wells	Set based on latest data.

* HELP (Hydrologic Evaluation of Landfill Performance) is a computer modeling code developed by the U.S. Army Corps of Engineers to simulate water movement across, into, through, and out of landfills.

Table 4.3-3 - Target Heads for Steady-State Model Calibration

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
2559	937.5	312.5	8	3	1	504.8	0.32
2126	1062.5	3812.5	9	31	1	516.9	0.25
2393	1187.5	3312.5	10	27	1	516.1	0.4
4096	1312.5	7687.5	11	62	6	523	0.3
2096	1312.5	7687.5	11	62	1	523	0.3
3096	1312.5	7687.5	11	62	3	523	0.3
3094	1437.5	1062.5	12	9	3	507.85	0.3
2094	1437.5	1062.5	12	9	1	507.8	0.32
2552	1687.5	4437.5	14	36	1	519.08	0.24
2129	1687.5	3062.5	14	25	1	515.6	0.38
3552	1687.5	4437.5	14	36	3	519.1	0.2
3396	1812.5	4687.5	15	38	3	519.7	0.2
2396	1812.5	4687.5	15	38	1	519.7	0.3
2128	2062.5	3812.5	17	31	1	517.18	0.3
3128	2062.5	3812.5	17	31	3	516.75	0.23
4125	2187.5	4687.5	18	38	6	519.9	0.2
2125	2187.5	4687.5	18	38	1	519.9	0.22
3125	2187.5	4687.5	18	38	3	519.9	0.2
2551	2312.5	5812.5	19	47	1	521.6	0.31
3551	2312.5	5812.5	19	47	3	521.6	0.3
3095	2562.5	5312.5	21	43	3	520.57	0.3
2095	2562.5	5312.5	21	43	1	520.81	0.33
2392	2562.5	1062.5	21	9	1	510.77	0.4
2044	2687.5	312.5	22	3	1	509.36	1.67

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
3044	2687.5	8312.5	22	67	3	523.3	0.3
3550	2812.5	5937.5	23	48	3	521.6	0.3
2017	2812.5	6562.5	23	53	1	522.4	0.4
2391	2812.5	1812.5	23	15	1	513.3	0.27
2550	2812.5	5937.5	23	48	1	521.6	0.36
2384	2812.5	9687.5	23	78	1	523.9	0.4
3017	2812.5	6562.5	23	53	3	522.3	0.4
3391	2812.5	1812.5	23	15	3	513.3	0.2
2394	3187.5	2937.5	26	24	1	516.7	0.38
3106	3187.5	6187.5	26	50	3	521.9	0.3
2106	3187.5	6187.5	26	50	1	521.9	0.33
2107	3437.5	8812.5	28	71	1	523.6	0.25
3014	3437.5	6812.5	28	55	3	522.4	0.3
2009	3437.5	9937.5	28	80	1	524.1	0.32
2402	3437.5	8437.5	28	68	1	522.74	0.4
4014	3437.5	6812.5	28	55	6	522.4	0.3
3107	3437.5	8812.5	28	71	3	523.7	0.2
2014	3437.5	6812.5	28	55	1	522.4	0.34
2383	3437.5	11062.5	28	89	1	524	0.25
2060	3437.5	5687.5	28	46	1	521.4	0.4
3402	3437.5	8312.5	28	67	3	523.1	0.4
2955	3562.5	8187.5	29	66	1	523.1	0.23
4016	3562.5	7687.5	29	62	6	522.6	0.3
2016	3562.5	7687.5	29	62	1	522.73	0.27

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
3390	3562.5	6437.5	29	52	3	522.2	0.3
2390	3562.5	6437.5	29	52	1	522.2	0.31
3009	3562.5	9937.5	29	80	3	524.23	0.3
3016	3562.5	7687.5	29	62	3	522.7	0.2
3015	3687.5	5937.5	30	48	3	521.7	0.3
2945	3687.5	8062.5	30	65	1	522.95	0.2
2108	3687.5	10437.5	30	84	1	524.17	0.25
2015	3687.5	5937.5	30	48	1	521.7	0.3
2401	3687.5	8187.5	30	66	1	523.07	0.2
3108	3687.5	10437.5	30	84	3	523.85	0.2
2043	3812.5	12312.5	31	99	1	523.57	0.3
2045	3812.5	6937.5	31	56	1	522.3	0.26
2047	3812.5	8312.5	31	67	1	522.7	0.31
2943	3812.5	7312.5	31	59	1	522.4	0.3
3045	3812.5	6937.5	31	56	3	522.3	0.2
3043	3812.5	12312.5	31	99	3	523.5	0.3
2046	3937.5	7937.5	32	64	1	521.81	0.26
3046	3937.5	7937.5	32	64	3	522.23	0.23
3018	4062.5	9562.5	33	77	3	526.93	0.3
2018	4062.5	9562.5	33	77	1	524.87	0.33
3049	4062.5	6687.5	33	54	3	522	0.3
2048	4062.5	7187.5	33	58	1	522.3	0.25
3034	4187.5	10312.5	34	83	3	523.9	0.2
2032	4187.5	10562.5	34	85	1	524.1	0.3

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
2034	4187.5	10312.5	34	83	1	523.9	0.23
3032	4187.5	10562.5	34	85	3	524.1	0.3
2103	4187.5	6937.5	34	56	1	522	0.4
3004	4312.5	11562.5	35	93	3	523.7	0.38
2093	4312.5	4562.5	35	37	1	520.57	0.23
2069	4312.5	5812.5	35	47	1	521.5	0.4
3069	4312.5	5812.5	35	47	3	521.4	0.4
3093	4312.5	4562.5	35	37	3	520.5	0.2
3385	4312.5	7562.5	35	61	3	522.2	0.3
3387	4437.5	6562.5	36	53	3	521.82	0.3
2649	4437.5	11312.5	36	91	1	523.9	0.3
2387	4437.5	6562.5	36	53	1	521.8	0.4
2033	4562.5	10312.5	37	83	1	523.5	0.3
2020	4562.5	8812.5	37	71	1	522.57	0.37
3020	4687.5	8812.5	38	71	3	522.45	0.4
2822	4687.5	11187.5	38	90	1	523.6	0.37
2166	4687.5	5812.5	38	47	1	521.4	0.32
3065	4687.5	7312.5	38	59	3	522.1	0.3
3011	4812.5	12312.5	39	99	3	523.1	0.2
4011	4812.5	12312.5	39	99	6	523.1	0.2
2008	4812.5	10437.5	39	84	1	523.1	0.25
2011	4812.5	12312.5	39	99	1	523.1	0.4
2065	4812.5	7312.5	39	59	1	522.3	0.4
2821	4937.5	11187.5	40	90	1	523.3	0.2

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
3821	4937.5	11187.5	40	90	3	523.3	0.2
2386	4937.5	6937.5	40	56	1	521.9	0.3
2398	4937.5	5687.5	40	46	1	521.2	0.29
4398	4937.5	5687.5	40	46	6	521.3	0.3
3398	4937.5	5687.5	40	46	3	521.3	0.2
3008	5062.5	10312.5	41	83	3	522.1	0.2
4008	5062.5	10312.5	41	83	6	522.4	0.3
4001	5062.5	11062.5	41	89	6	522.7	0.3
2042	5187.5	9937.5	42	80	1	522.41	0.4
2643	5312.5	11562.5	43	93	1	523	0.3
2728	5312.5	13187.5	43	106	1	523.25	0.3
2397	5437.5	7312.5	44	59	1	521.8	0.25
3397	5437.5	7312.5	44	59	3	521.8	0.2
3084	5437.5	11562.5	44	93	3	522.9	0.3
2084	5437.5	11562.5	44	93	1	522.9	0.3
2399	5437.5	6187.5	44	50	1	521.2	0.3
3070	5562.5	5562.5	45	45	3	520.9	0.3
2070	5562.5	5562.5	45	45	1	521	0.39
2024	5687.5	12062.5	46	97	1	523	0.3
3024	5687.5	12062.5	46	97	3	523	0.3
2936	5687.5	9937.5	46	80	1	522.3	0.3
2027	5812.5	11437.5	47	92	1	522.6	0.31
3452	5937.5	11812.5	48	95	3	523	0.3
3679	5937.5	13562.5	48	109	3	522.8	0.3

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
2010	5937.5	10687.5	48	86	1	522.49	0.36
3068	5937.5	7437.5	48	60	3	521.6	0.3
2068	5937.5	7437.5	48	60	1	521.6	0.4
2679	5937.5	13562.5	48	109	1	522.9	0.3
4010	5937.5	10687.5	48	86	6	522.5	0.3
3010	6062.5	10812.5	49	87	3	522.3	0.2
2006	6062.5	9312.5	49	75	1	521.82	0.4
2951	6187.5	11437.5	50	92	1	522.3	0.3
2949	6312.5	11437.5	51	92	1	522.31	0.3
2037	6312.5	11312.5	51	91	1	522.3	0.24
3037	6312.5	11312.5	51	91	3	522.3	0.2
2947	6437.5	11187.5	52	90	1	522.3	0.25
2389	6687.5	8812.5	54	71	1	521.9	0.24
3733	6687.5	5187.5	54	42	3	520.75	0.3
2055	6812.5	10312.5	55	83	1	522	0.3
2052	6812.5	11437.5	55	92	1	522.3	0.23
2054	6812.5	8562.5	55	69	1	521.6	0.3
2388	6937.5	9062.5	56	73	1	521.8	0.3
2432	7062.5	6062.5	57	49	1	520.66	0.3
2446	7062.5	7687.5	57	62	1	521.5	0.26
4446	7062.5	7687.5	57	62	6	521.4	0.2
2118	7062.5	8437.5	57	68	1	521.4	0.3
3432	7062.5	6062.5	57	49	3	520.13	0.3
2109	7187.5	8812.5	58	71	1	521.4	0.4

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
4432	7187.5	6062.5	58	49	6	518.7	0.3
2171	7187.5	8187.5	58	66	1	521.6	0.31
2092	7312.5	4312.5	59	35	1	520.44	0.36
3120	7312.5	8437.5	59	68	3	521.5	0.2
2120	7437.5	8437.5	60	68	1	521.4	0.33
3092	7437.5	4312.5	60	35	3	520.4	0.35
2431	7562.5	6812.5	61	55	1	520.99	0.24
3431	7562.5	6812.5	61	55	3	520.9	0.2
3064	7687.5	8812.5	62	71	3	521.4	0.3
4064	7687.5	8812.5	62	71	6	521.4	0.3
2064	7687.5	8812.5	62	71	1	521.5	0.3
3678	7812.5	11562.5	63	93	3	521.9	0.4
2430	7937.5	7562.5	64	61	1	521	0.33
2439	7937.5	9187.5	64	74	1	521.5	0.3
4439	7937.5	9187.5	64	74	6	521.88	1.05
2067	7937.5	7562.5	64	61	1	521	0.33
4067	7937.5	7687.5	64	62	6	521	0.3
3067	7937.5	7687.5	64	62	3	521	0.3
4013	8062.5	9812.5	65	79	6	522.18	1.31
3421	8062.5	9687.5	65	78	3	521.5	0.23
2421	8062.5	9687.5	65	78	1	521.7	0.29
3417	8187.5	8062.5	66	65	3	520.45	0.4
3423	8187.5	10687.5	66	86	3	521.7	0.3
2417	8187.5	8187.5	66	66	1	521.01	0.4

Table 4.3-3 - Target Heads for Steady-State Model Calibration (Continued)

Well	East	North	I-Block	J-Block	K-Block	Head (ft)	Precision (ft)
2091	8187.5	5187.5	66	42	1	520.39	0.31
3091	8187.5	5187.5	66	42	3	520.35	0.3
4091	8187.5	5187.5	66	42	6	520.3	0.3
2423	8312.5	10687.5	67	86	1	521.7	0.4
3426	8687.5	8437.5	70	68	3	521	0.3
4426	8687.5	8437.5	70	68	6	520.9	0.3
2426	8687.5	8437.5	70	68	1	520.9	0.33
2119	9062.5	6437.5	73	52	1	519.91	0.23
3051	9062.5	9062.5	73	73	3	519.6	0.21
3424	9437.5	9687.5	76	78	3	521.1	0.3
4424	9437.5	9687.5	76	78	6	522.02	1.63
2424	9437.5	9687.5	76	78	1	521.1	0.3
2754	10562.5	11187.5	85	90	1	521.5	0.36
3097	11562.5	6062.5	93	49	3	518.7	0.3
2097	11562.5	6062.5	93	49	1	518.7	0.36
4097	11562.5	6062.5	93	49	6	518.7	0.4
2098	12562.5	9062.5	101	73	1	520.33	0.4
SW2D	12562.5	4562.5	101	37	5	501.5	0.22
3098	12562.5	9062.5	101	73	3	519.97	0.3
H-2	13062.5	2937.5	105	24	3	516.9	0.4
R6	13187.5	5062.5	106	41	2	515.38	0.33
SW1RR	13312.5	3562.5	107	29	3	512.63	0.3
COLL2	13562.5	6312.5	109	51	5	501.2	0.3
H-4	14437.5	6937.5	116	56	3	518.67	0.4

Table 4.3-4 - Historical Pumping Rates of SOWC Collector Wells

Year	Ave MGD	5-Year Ave MGD	5-Year Ave gpm	10-Year Ave MGD	10-Year Ave gpm
1952	9.77				
1953	11.86				
1954	11.39				
1955	13.93				
1956	13.35	12.06	8,375		
1957	14.72	13.05	9,063		
1958	13.05	13.29	9,228		
1959	14.79	13.97	9,700		
1960	14.37	14.06	9,761		
1961	12.95	13.98	9,706	13.02	9,040
1962	12.61	13.55	9,413	13.30	9,238
1963	12.86	13.52	9,386	13.40	9,307
1964	13.87	13.33	9,258	13.65	9,479
1965	14.20	13.30	9,235	13.68	9,498
1966	15.69	13.85	9,615	13.91	9,660
1967	17.89	14.90	10,349	14.23	9,881
1968	18.34	16.00	11,110	14.76	10,248
1969	17.08	16.64	11,556	14.99	10,407
1970	16.99	17.20	11,943	15.25	10,589
1971	16.77	17.41	12,093	15.63	10,854
1972	17.19	17.27	11,996	16.09	11,172
1973	17.68	17.14	11,904	16.57	11,507
1974	16.71	17.07	11,853	16.85	11,704

Table 4.3-4 - Historical Pumping Rates of SOWC Collector Wells (Continued)

Year	Ave MGD	5-Year Ave MGD	5-Year Ave gpm	10-Year Ave MGD	10-Year Ave gpm
1975	14.85	16.64	11,556	16.92	11,749
1976	16.04	16.49	11,454	16.95	11,774
1977	16.72	16.40	11,389	16.84	11,692
1978	17.66	16.40	11,386	16.77	11,645
1979	18.07	16.67	11,575	16.87	11,714
1980	17.84	17.27	11,990	16.95	11,773
1981	16.75	17.41	12,089	16.95	11,772
1982	16.12	17.29	12,006	16.84	11,697
1983	16.46	17.05	11,839	16.72	11,613
1984	17.38	16.91	11,743	16.79	11,659
1985	17.98	16.94	11,763	17.10	11,876
1986	18.44	17.28	11,997	17.34	12,043
1987	18.94	17.84	12,389	17.56	12,197
1988	17.93	18.13	12,593	17.59	12,216
1989	17.17	18.09	12,564	17.50	12,153
1990	17.12	17.92	12,444	17.43	12,103
1991	18.51	17.93	12,454	17.61	12,226
1992	18.09	17.76	12,336	17.80	12,363

Table 4.3-5 - June 1993 Pumping Rates at SOWC Collector Wells

Date	Collector #1		Collector #2		Total	Total
	MGD	gpm	MGD	gpm	MGD	gpm
01-Jun	11.212	7,786	5.158	3,582	16.370	11,368
02-Jun	9.536	6,622	7.235	5,024	16.771	11,647
03-Jun	8.994	6,246	10.129	7,034	19.123	13,280
04-Jun	7.365	5,115	9.393	6,523	16.758	11,638
05-Jun	6.478	4,499	10.368	7,200	16.846	11,699
06-Jun	5.328	3,700	10.513	7,301	15.841	11,001
07-Jun	8.686	6,032	10.184	7,072	18.870	13,104
08-Jun	10.980	7,625	10.089	7,006	21.069	14,631
09-Jun	13.258	9,207	9.790	6,799	23.048	16,006
10-Jun	11.034	7,663	9.607	6,672	20.641	14,334
11-Jun	11.046	7,671	7.705	5,351	18.751	13,022
12-Jun	11.256	7,817	5.108	3,547	16.364	11,364
13-Jun	8.832	6,133	8.496	5,900	17.328	12,033
14-Jun	9.736	6,761	8.375	5,816	18.111	12,577
15-Jun	13.611	9,452	6.147	4,269	19.758	13,721
16-Jun	12.937	8,984	9.833	6,828	22.770	15,813
17-Jun	10.733	7,453	10.143	7,044	20.876	14,497
18-Jun	9.621	6,681	9.537	6,623	19.158	13,304
19-Jun	9.347	6,491	10.291	7,147	19.638	13,638
20-Jun	12.246	8,504	9.843	6,835	22.089	15,340
21-Jun	12.320	8,556	10.028	6,964	22.348	15,519
22-Jun	11.152	7,744	10.160	7,056	21.312	14,800
23-Jun	12.851	8,924	9.722	6,751	22.573	15,676
24-Jun	11.418	7,929	10.100	7,014	21.518	14,943
25-Jun	11.409	7,923	10.092	7,008	21.501	14,931
26-Jun	6.455	4,483	10.507	7,297	16.962	11,779
27-Jun	8.965	6,226	10.133	7,037	19.098	13,263
28-Jun	11.236	7,803	10.075	6,997	21.311	14,799
29-Jun	11.047	7,672	10.147	7,047	21.194	14,718
30-Jun	11.027	7,658	10.132	7,036	21.159	14,694

Table 4.3-6 - Determination of Infiltration Rates Along Paddys Run and SSOD

Reach	CC to DD	DD to EE	EE to FF	II to KK
1-yr Storm Infiltration Volume (CF)	1,380,000	569,000	66,100	279,000
Length (Ft)	3,093	2,773	2,613	2,400
Average Width (Ft)	21	22	26	10
Surface Area (Ft^2)	64,953	61,006	67,938	24,000
Infiltration Rate in Riverbed (Inches/year)	255.0	111.9	11.7	139.5
Annual to 1-yr Storm Factor	4	4	4	4
Annual Infiltration Rate River (Inches/year)	1,019.8	447.7	46.7	558.0
% of Block River	0.17	0.18	0.21	0.08
% of Block Non-River	0.832	0.824	0.792	0.92
Infiltration Rate SWIFT Cell (Inches/year)	176.32	83.74	14.47	50.16

Table 4.3-7 - Calibration Runs Summary

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
3DM8	A	1	638	280	280	638			V1	R1	P1	B1
		2	544	286	286	544						
		3	213	213	213	213						
		4	0.38	0.38	0.38	0.38						
		5	200	200	200	200						
		6	200	200	200	200						
3DM9	A	1	350	280	280	638			V1	R1	P1	B1
		2	350	286	286	544						
		3	350	213	213	213						
		4	350	0.38	0.38	0.38						
		5	350	200	200	200						
		6	350	200	200	200						
3DM10	B	1	638	280	280	638	270		V1	R1	P1	B1
		2	544	286	286	544	270					
		3	213	213	213	213	270					
		4	0.38	0.38	0.38	0.38	270					

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Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
		5	200	200	200	200	270					
		6	200	200	200	200	270					
3DM11	B	1	350	280	280	638	270		V1	R1	P2	B1
		2	350	286	286	544	270					
		3	350	213	213	213	270					
		4	350	0.38	0.38	0.38	270					
		5	350	200	200	200	270					
		6	350	200	200	200	270					
3DM12	B	1	350	280	280	638	200		V1	R1	P2	B1
		2	350	286	286	544	200					
		3	350	213	213	213	200					
		4	350	0.38	0.38	0.38	200					
		5	350	200	200	200	200					
		6	350	200	200	200	200					

Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
3DM13	C	1	638	280	280	638	270	270	V1	R1	P2	B1
		2	544	286	286	544	270	270				
		3	213	213	213	213	270	270				
		4	0.38	0.38	0.38	0.38	270	270				
		5	200	200	200	200	270	270				
		6	200	200	200	200	270	270				
3DM14	C	1	375	280	280	638	270	270	V1	R1	P2	B1
		2	375	286	286	544	270	270				
		3	375	213	213	213	270	270				
		4	375	0.38	0.38	0.38	270	270				
		5	375	200	200	200	270	270				
		6	375	200	200	200	270	270				
3DM15	C	1	375	280	280	638	270	270	V2	R1	P2	B1
		2	375	286	286	544	270	270				
		3	375	213	213	213	270	270				
		4	375	0.38	0.38	0.38	270	270				

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Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
		5	375	200	200	200	270	270				
		6	375	200	200	200	270	270				
3DM16	C	1	400	375	280	638	270	270	V3	R1	P2	B1
		2	400	375	286	544	270	270				
		3	400	375	213	213	270	270				
		4	400	375	0.38	0.38	270	270				
		5	400	375	200	200	270	270				
		6	400	375	200	200	270	270				
3DM17	C	1	400	375	280	638	270	270	V3	R1	P3	B1
		2	400	375	286	544	270	270				
		3	400	375	213	213	270	270				
		4	400	375	0.38	0.38	270	270				
		5	400	375	200	200	270	270				
		6	400	375	200	200	270	270				

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Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
3DM17A	C	1	400	375	280	638	135	135	V3	R1	P3	B1
		2	400	375	286	544	135	135				
		3	400	375	213	213	135	135				
		4	400	375	0.38	0.38	135	135				
		5	400	375	200	200	135	135				
		6	400	375	200	200	135	135				
3DM17B	C	1	400	375	280	638	135	135	V3	R2	P3	B1
		2	400	375	286	544	135	135				
		3	400	375	213	213	135	135				
		4	400	375	0.38	0.38	135	135				
		5	400	375	200	200	135	135				
		6	400	375	200	200	135	135				
3DM18	C	1	400	375	280	638	270	120	V3	R3	P3	B2
		2	400	375	286	544	270	120				
		3	400	375	213	213	270	120				
		4	400	375	0.38	0.38	270	120				

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Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
		5	400	375	200	200	270	120				
		6	400	375	200	200	270	120				
3DM19A	C	1	400	375	280	638	270	100	V3	R4	P3	B2
		2	400	375	286	544	270	100				
		3	400	375	213	213	270	100				
		4	400	375	0.38	0.38	270	100				
		5	400	375	200	200	270	100				
		6	400	375	200	200	270	100				
3DM19B	C	1	400	375	280	638	270	120	V3	R4	P3	B2
		2	400	375	286	544	270	120				
		3	400	375	213	213	270	120				
		4	400	375	0.38	0.38	270	120				
		5	400	375	200	200	270	120				
		6	400	375	200	200	270	120				

Table 4.3-7 - Calibration Runs Summary (Continued)

Run #	Zone Map #	Layer	Zone I K_h (ft/day)	Zone II K_h (ft/day)	Zone III K_h (ft/day)	Zone IV K_h (ft/day)	Zone V K_h (ft/day)	Zone VI K_h (ft/day)	K_v/K_h Code	Recharge Code	Pumping Rate Code	Eastern Boundary Code
3DM20	C	1	400	375	280	638	270	120	V3	R5	P3	B2
		2	400	375	286	544	270	120				
		3	400	375	213	213	270	120				
		4	400	375	0.38	0.38	270	120				
		5	400	375	200	200	270	120				
		6	400	375	200	200	270	120				

Zone Maps - A, B, C: see Figures 4.3-10 and 4.3-12

K_h/K_v

V-1 - All zones have the following K_v/K_h ratios

Layer 1 - 0.08
Layer 2 - 0.09
Layer 3 - 0.12
Layer 4 - 0.10
Layer 5 - 0.17
Layer 6 - 0.17

V-2 - All zones have the K_v/K_h ratios shown for V1 except Zone I which has a 0.01 value for all layers

V-3 - All zones have the K_v/K_h ratios shown for V1 except Zones I and II which have a 0.05 value for all layers

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Table 4.3-7 - Calibration Runs Summary (Continued)

Recharge - R

- R1 - Values shown on Figure 4.3-9, except Paddys Run and SSOD set at 32 in/yr
- R2 - Values shown on Figure 4.3-9, except Paddys Run and SSOD set at 32 in/yr and till zone set at 2 in/yr
- R3 - Values shown on Figure 4.3-9, except Paddys Run and SSOD set at 50 in/yr
- R4 - Values shown on Figure 4.3-9 (with 4X factor)
- R5 - Values shown on Figure 4.3-9, except Paddys Run and SSOD set at 5X factor

Pumping - P

- P1 - SWOC wells pumping at 25 MGD
- P2 - SWOC wells pumping at 16 MGD
- P3 - SWOC wells pumping at 21 MGD

Eastern Boundary - B

- B1 - Eastern boundary based on Dove 1961
- B2 - Eastern boundary modified from Dove 1961 based on revised pumping rates at SWOC wells.

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2556	812.50	1937.50	1	511.70	0.33	512.92	1.22	1.22	0.89
2559	937.50	312.50	1	504.80	0.32	506.19	1.39	1.39	1.07
2126	1062.50	3812.50	1	516.90	0.25	517.56	0.66	0.66	0.41
2393	1187.50	3312.50	1	516.10	0.40	516.41	0.31	0.31	-0.09
4096	1312.50	7687.50	6	523.00	0.30	522.27	-0.73	0.73	0.43
2096	1312.50	7687.50	1	523.00	0.30	522.27	-0.73	0.73	0.43
3096	1312.50	7687.50	3	523.00	0.30	522.27	-0.73	0.73	0.43
2094	1437.50	1062.50	1	507.80	0.32	509.90	2.10	2.10	1.78
3094	1437.50	1062.50	3	507.85	0.30	509.90	2.05	2.05	1.75
2129	1687.50	3062.50	1	515.60	0.38	515.89	0.29	0.29	-0.09
3552	1687.50	4437.50	3	519.10	0.20	518.90	-0.20	0.20	0.00
2552	1687.50	4437.50	1	519.08	0.24	518.92	-0.16	0.16	-0.08
2396	1812.50	4687.50	1	519.70	0.30	519.22	-0.48	0.48	0.18
3396	1812.50	4687.50	3	519.70	0.20	519.22	-0.48	0.48	0.28
2128	2062.50	3812.50	1	517.18	0.30	517.62	0.44	0.44	0.14
3128	2062.50	3812.50	3	516.75	0.23	517.61	0.86	0.86	0.63

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2125	2187.50	4687.50	1	519.90	0.22	519.19	-0.71	0.71	0.49
3125	2187.50	4687.50	3	519.90	0.20	519.19	-0.71	0.71	0.51
4125	2187.50	4687.50	6	519.90	0.20	519.18	-0.72	0.72	0.52
2551	2312.50	5812.50	1	521.60	0.31	520.38	-1.22	1.22	0.91
3551	2312.50	5812.50	3	521.60	0.30	520.37	-1.23	1.23	0.93
2392	2562.50	1062.50	1	510.77	0.40	511.13	0.36	0.36	-0.04
3095	2562.50	5312.50	3	520.57	0.30	519.85	-0.72	0.72	0.42
2095	2562.50	5312.50	1	520.81	0.33	519.85	-0.96	0.96	0.63
3044	2687.50	8312.50	3	523.30	0.30	522.22	-1.08	1.08	0.78
2044	2687.50	312.50	1	509.36	1.67	509.56	0.20	0.20	-1.47
3017	2812.50	6562.50	3	522.30	0.40	520.94	-1.36	1.36	0.96
3550	2812.50	5937.50	3	521.60	0.30	520.41	-1.19	1.19	0.89
2550	2812.50	5937.50	1	521.60	0.36	520.41	-1.19	1.19	0.83
2017	2812.50	6562.50	1	522.40	0.40	520.94	-1.46	1.46	1.06
2391	2812.50	1812.50	1	513.30	0.27	513.16	-0.14	0.14	-0.13
3391	2812.50	1812.50	3	513.30	0.20	513.14	-0.16	0.16	-0.04

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2384	2812.50	9687.50	1	523.90	0.40	523.07	-0.83	0.83	0.43
2394	3187.50	2937.50	1	516.70	0.38	516.02	-0.68	0.68	0.30
3106	3187.50	6187.50	3	521.90	0.30	520.57	-1.33	1.33	1.03
2106	3187.50	6187.50	1	521.90	0.33	520.57	-1.33	1.33	1.00
2402	3437.50	8437.50	1	522.74	0.40	522.08	-0.66	0.66	0.26
3107	3437.50	8812.50	3	523.70	0.20	522.31	-1.39	1.39	1.19
2383	3437.50	11062.50	1	524.00	0.25	524.41	0.41	0.41	0.16
2060	3437.50	5687.50	1	521.40	0.40	520.14	-1.26	1.26	0.86
4014	3437.50	6812.50	6	522.40	0.30	520.98	-1.42	1.42	1.12
2014	3437.50	6812.50	1	522.40	0.34	521.01	-1.39	1.39	1.05
2107	3437.50	8812.50	1	523.60	0.25	522.31	-1.29	1.29	1.04
3402	3437.50	8312.50	3	523.10	0.40	522.00	-1.10	1.10	0.70
3014	3437.50	6812.50	3	522.40	0.30	521.00	-1.40	1.40	1.10
2009	3437.50	9937.50	1	524.10	0.32	523.07	-1.03	1.03	0.71
3390	3562.50	6437.50	3	522.20	0.30	520.70	-1.50	1.50	1.20
3016	3562.50	7687.50	3	522.70	0.20	521.56	-1.14	1.14	0.94

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
3009	3562.50	9937.50	3	524.23	0.30	523.04	-1.19	1.19	0.89
2955	3562.50	8187.50	1	523.10	0.23	521.88	-1.22	1.22	0.99
2016	3562.50	7687.50	1	522.73	0.27	521.56	-1.17	1.17	0.90
2390	3562.50	6437.50	1	522.20	0.31	520.71	-1.49	1.49	1.18
4016	3562.50	7687.50	6	522.60	0.30	521.50	-1.10	1.10	0.80
3108	3687.50	10437.50	3	523.85	0.20	523.56	-0.29	0.29	0.09
3015	3687.50	5937.50	3	521.70	0.30	520.32	-1.38	1.38	1.08
2015	3687.50	5937.50	1	521.70	0.30	520.31	-1.39	1.39	1.09
2945	3687.50	8062.50	1	522.95	0.20	521.76	-1.19	1.19	0.99
2401	3687.50	8187.50	1	523.07	0.20	521.84	-1.23	1.23	1.03
2108	3687.50	10437.50	1	524.17	0.25	523.56	-0.61	0.61	0.36
2043	3812.50	12312.50	1	523.57	0.30	526.05	2.48	2.48	2.18
3043	3812.50	12312.50	3	523.50	0.30	526.03	2.53	2.53	2.23
2047	3812.50	8312.50	1	522.70	0.31	521.88	-0.82	0.82	0.51
2045	3812.50	6937.50	1	522.30	0.26	521.01	-1.29	1.29	1.03
2943	3812.50	7312.50	1	522.40	0.30	521.25	-1.15	1.15	0.85

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
3045	3812.50	6937.50	3	522.30	0.20	521.01	-1.29	1.29	1.09
2046	3937.50	7937.50	1	521.81	0.26	521.61	-0.20	0.20	-0.06
3046	3937.50	7937.50	3	522.23	0.23	521.61	-0.62	0.62	0.39
3049	4062.50	6687.50	3	522.00	0.30	520.79	-1.21	1.21	0.91
3018	4062.50	9562.50	3	526.93	0.30	522.54	-4.39	4.39	4.09
2018	4062.50	9562.50	1	524.87	0.33	522.54	-2.33	2.33	2.00
2048	4062.50	7187.50	1	522.30	0.25	521.11	-1.19	1.19	0.94
2034	4187.50	10312.50	1	523.90	0.23	523.20	-0.70	0.70	0.47
3034	4187.50	10312.50	3	523.90	0.20	523.19	-0.71	0.71	0.51
3032	4187.50	10562.50	3	524.10	0.30	523.49	-0.61	0.61	0.31
2103	4187.50	6937.50	1	522.00	0.40	520.93	-1.07	1.07	0.67
2032	4187.50	10562.50	1	524.10	0.30	523.50	-0.60	0.60	0.30
3385	4312.50	7562.50	3	522.20	0.30	521.27	-0.93	0.93	0.63
3069	4312.50	5812.50	3	521.40	0.40	520.18	-1.22	1.22	0.82
2069	4312.50	5812.50	1	521.50	0.40	520.18	-1.32	1.32	0.92
3004	4312.50	11562.50	3	523.70	0.38	524.72	1.02	1.02	0.64

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
3093	4312.50	4562.50	3	520.50	0.20	519.30	-1.20	1.20	1.00
2093	4312.50	4562.50	1	520.57	0.23	519.31	-1.26	1.26	1.03
2387	4437.50	6562.50	1	521.80	0.40	520.65	-1.15	1.15	0.75
3387	4437.50	6562.50	3	521.82	0.30	520.65	-1.17	1.17	0.87
2649	4437.50	11312.50	1	523.90	0.30	524.30	0.40	0.40	0.10
2020	4562.50	8812.50	1	522.57	0.37	521.91	-0.66	0.66	0.29
2033	4562.50	10312.50	1	523.50	0.30	523.01	-0.49	0.49	0.19
3020	4687.50	8812.50	3	522.45	0.40	521.86	-0.59	0.59	0.19
2822	4687.50	11187.50	1	523.60	0.37	523.98	0.38	0.38	0.01
3065	4687.50	7312.50	3	522.10	0.30	521.03	-1.07	1.07	0.77
2166	4687.50	5812.50	1	521.40	0.32	520.16	-1.24	1.24	0.92
2008	4812.50	10437.50	1	523.10	0.25	523.03	-0.07	0.07	-0.18
4011	4812.50	12312.50	6	523.10	0.20	525.25	2.15	2.15	1.95
2011	4812.50	12312.50	1	523.10	0.40	525.42	2.32	2.32	1.92
2065	4812.50	7312.50	1	522.30	0.40	521.00	-1.30	1.30	0.90
3011	4812.50	12312.50	3	523.10	0.20	525.42	2.32	2.32	2.12

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2386	4937.50	6937.50	1	521.90	0.30	520.77	-1.13	1.13	0.83
3821	4937.50	11187.50	3	523.30	0.20	523.81	0.51	0.51	0.31
2398	4937.50	5687.50	1	521.20	0.29	520.08	-1.12	1.12	0.83
3398	4937.50	5687.50	3	521.30	0.20	520.08	-1.22	1.22	1.02
2821	4937.50	11187.50	1	523.30	0.20	523.82	0.52	0.52	0.32
4398	4937.50	5687.50	6	521.30	0.30	520.08	-1.22	1.22	0.92
4008	5062.50	10312.50	6	522.40	0.30	522.65	0.25	0.25	-0.05
4001	5062.50	11062.50	6	522.70	0.30	523.61	0.91	0.91	0.61
3008	5062.50	10312.50	3	522.10	0.20	522.77	0.67	0.67	0.47
2042	5187.50	9937.50	1	522.41	0.40	522.32	-0.09	0.09	-0.31
2643	5312.50	11562.50	1	523.00	0.30	524.00	1.00	1.00	0.70
2728	5312.50	13187.50	1	523.25	0.30	525.95	2.70	2.70	2.40
3084	5437.50	11562.50	3	522.90	0.30	523.90	1.00	1.00	0.70
3397	5437.50	7312.50	3	521.80	0.20	520.85	-0.95	0.95	0.75
2397	5437.50	7312.50	1	521.80	0.25	520.85	-0.95	0.95	0.70
2399	5437.50	6187.50	1	521.20	0.30	520.30	-0.90	0.90	0.60

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2084	5437.50	11562.50	1	522.90	0.30	523.91	1.01	1.01	0.71
3070	5562.50	5562.50	3	520.90	0.30	519.99	-0.91	0.91	0.61
2070	5562.50	5562.50	1	521.00	0.39	519.99	-1.01	1.01	0.62
2936	5687.50	9937.50	1	522.30	0.30	522.10	-0.20	0.20	-0.10
3024	5687.50	12062.50	3	523.00	0.30	524.28	1.28	1.28	0.98
2024	5687.50	12062.50	1	523.00	0.30	524.28	1.28	1.28	0.98
2027	5812.50	11437.50	1	522.60	0.31	523.50	0.90	0.90	0.59
2010	5937.50	10687.50	1	522.49	0.36	522.70	0.21	0.21	-0.15
2679	5937.50	13562.50	1	522.90	0.30	525.08	2.18	2.18	1.88
2068	5937.50	7437.50	1	521.60	0.40	520.78	-0.82	0.82	0.42
3068	5937.50	7437.50	3	521.60	0.30	520.78	-0.82	0.82	0.52
3452	5937.50	11812.50	3	523.00	0.30	523.80	0.80	0.80	0.50
4010	5937.50	10687.50	6	522.50	0.30	522.59	0.09	0.09	-0.21
3679	5937.50	13562.50	3	522.80	0.30	525.08	2.28	2.28	1.98
2006	6062.50	9312.50	1	521.82	0.40	521.61	-0.21	0.21	-0.19
3010	6062.50	10812.50	3	522.30	0.20	522.74	0.44	0.44	0.24

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2951	6187.50	11437.50	1	522.30	0.30	523.24	0.94	0.94	0.64
2949	6312.50	11437.50	1	522.31	0.30	523.16	0.85	0.85	0.55
3037	6312.50	11312.50	3	522.30	0.20	523.04	0.74	0.74	0.54
2037	6312.50	11312.50	1	522.30	0.24	523.04	0.74	0.74	0.50
2947	6437.50	11187.50	1	522.30	0.25	522.85	0.55	0.55	0.30
3733	6687.50	5187.50	3	520.75	0.30	519.78	-0.97	0.97	0.67
2389	6687.50	8812.50	1	521.90	0.24	521.15	-0.75	0.75	0.51
2055	6812.50	10312.50	1	522.00	0.30	521.90	-0.10	0.10	-0.20
2052	6812.50	11437.50	1	522.30	0.23	522.81	0.51	0.51	0.28
2054	6812.50	8562.50	1	521.60	0.30	521.00	-0.60	0.60	0.30
2388	6937.50	9062.50	1	521.80	0.30	521.16	-0.64	0.64	0.34
2446	7062.50	7687.50	1	521.50	0.26	520.58	-0.92	0.92	0.66
2432	7062.50	6062.50	1	520.66	0.30	520.02	-0.64	0.64	0.34
3432	7062.50	6062.50	3	520.13	0.30	520.02	-0.11	0.11	-0.19
4446	7062.50	7687.50	6	521.40	0.20	520.55	-0.85	0.85	0.65
2118	7062.50	8437.50	1	521.40	0.30	520.87	-0.53	0.53	0.23

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2171	7187.50	8187.50	1	521.60	0.31	520.73	-0.87	0.87	0.56
2109	7187.50	8812.50	1	521.40	0.40	520.97	-0.43	0.43	0.03
4432	7187.50	6062.50	6	518.70	0.30	519.99	1.29	1.29	0.99
3120	7312.50	8437.50	3	521.50	0.20	520.78	-0.72	0.72	0.52
2092	7312.50	4312.50	1	520.44	0.36	519.47	-0.97	0.97	0.61
2120	7437.50	8437.50	1	521.40	0.33	520.74	-0.66	0.66	0.33
3092	7437.50	4312.50	3	520.40	0.35	519.45	-0.95	0.95	0.60
3431	7562.50	6812.50	3	520.90	0.20	520.14	-0.76	0.76	0.56
2431	7562.50	6812.50	1	520.99	0.24	520.14	-0.85	0.85	0.61
3064	7687.50	8812.50	3	521.40	0.30	520.78	-0.62	0.62	0.32
2064	7687.50	8812.50	1	521.50	0.30	520.79	-0.71	0.71	0.41
4064	7687.50	8812.50	6	521.40	0.30	520.68	-0.72	0.72	0.42
3678	7812.50	11562.50	3	521.90	0.40	522.07	0.17	0.17	-0.23
4067	7937.50	7687.50	6	521.00	0.30	520.29	-0.71	0.71	0.41
3067	7937.50	7687.50	3	521.00	0.30	520.30	-0.70	0.70	0.40
4439	7937.50	9187.50	6	521.88	1.05	520.70	-1.18	1.18	0.13

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2067	7937.50	7562.50	1	521.00	0.33	520.26	-0.74	0.74	0.41
2439	7937.50	9187.50	1	521.50	0.30	520.82	-0.68	0.68	0.38
2430	7937.50	7562.50	1	521.00	0.33	520.26	-0.74	0.74	0.41
4013	8062.50	9812.50	6	522.18	1.31	520.86	-1.32	1.32	0.01
2421	8062.50	9687.50	1	521.70	0.29	520.93	-0.77	0.77	0.48
3421	8062.50	9687.50	3	521.50	0.23	520.92	-0.58	0.58	0.35
3417	8187.50	8062.50	3	520.45	0.40	520.32	-0.13	0.13	-0.27
4091	8187.50	5187.50	6	520.30	0.30	519.55	-0.75	0.75	0.45
3423	8187.50	10687.50	3	521.70	0.30	521.32	-0.38	0.38	0.08
2417	8187.50	8187.50	1	521.01	0.40	520.38	-0.63	0.63	0.23
2091	8187.50	5187.50	1	520.39	0.31	519.57	-0.82	0.82	0.51
3091	8187.50	5187.50	3	520.35	0.30	519.55	-0.80	0.80	0.50
2423	8312.50	10687.50	1	521.70	0.40	521.24	-0.46	0.46	0.06
3426	8687.50	8437.50	3	521.00	0.30	520.26	-0.74	0.74	0.44
4426	8687.50	8437.50	6	520.90	0.30	520.25	-0.65	0.65	0.35
2426	8687.50	8437.50	1	520.90	0.33	520.27	-0.63	0.63	0.30

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Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
2119	9062.50	6437.50	1	519.91	0.23	519.62	-0.29	0.29	0.06
3051	9062.50	9062.50	3	519.60	0.21	520.31	0.71	0.71	0.50
2424	9437.50	9687.50	1	521.10	0.30	520.34	-0.76	0.76	0.46
3424	9437.50	9687.50	3	521.10	0.30	520.33	-0.77	0.77	0.47
4424	9437.50	9687.50	6	522.02	1.63	520.33	-1.69	1.69	0.06
2754	10562.50	11187.50	1	521.50	0.36	520.36	-1.14	1.14	0.78
3097	11562.50	6062.50	3	518.70	0.30	518.27	-0.43	0.43	0.13
2097	11562.50	6062.50	1	518.70	0.36	518.30	-0.40	0.40	0.04
4097	11562.50	6062.50	6	518.70	0.40	518.24	-0.46	0.46	0.06
3098	12562.50	9062.50	3	519.97	0.30	519.48	-0.49	0.49	0.19
2098	12562.50	9062.50	1	520.33	0.40	519.48	-0.85	0.85	0.45
SW2D	12562.50	4562.50	5	501.50	0.22	500.53	-0.97	0.97	0.75
COLL1	12687.50	4562.50	5	499.39	0.33	492.35	-7.04	7.04	6.71
H-2	13062.50	2937.50	3	516.90	0.40	515.15	-1.75	1.75	1.35
R6	13187.50	5062.50	2	515.38	0.33	513.94	-1.44	1.44	1.11
SWIRR	13312.50	3562.50	3	512.63	0.30	514.01	1.38	1.38	1.08

Table 4.3-8 - Steady-State Calibration Run 19B Statistical Results (Continued)

Well No.	X	Y	Z	Head (Geostat)	Std (Geostat)	Head SWIFT	Residual (SWIFT-Geostat)	Abs. Res	Target Abs. Res-Pre
COLL3	13437.50	3312.50	2	517.25	0.38	514.61	-2.64	2.64	2.26
COLL2	13562.50	6312.50	5	501.20	0.30	501.77	0.57	0.57	0.27
K5	13687.50	6312.50	2	506.02	0.24	511.87	5.85	5.85	5.61
H-4	14437.50	6937.50	3	518.67	0.40	516.94	-1.73	1.73	1.33

Notes:

Output for the Run: 3ds19cs7.xyz

Data Range: X < 7437.5

Date: 12/20/1993; Time: 12:40 pm

Sum of Weighted Residuals = $-0.1042 \times 10^{+5}$

Sum of Weighted Absolute Residuals = $0.2914 \times 10^{+5}$

Total Number of Active Blocks = 33,589

Total Number of Blocks with Well Control = 192

Total Number of Blocks without Well Control = 33,397

Total Number of Active Blocks within the Interval = 22,769

Total Number of Active Blocks within the Interval with Well Control = 24

Total Number of Active Blocks within the Interval without Well Control = 22,745

Ratio of the Blocks = 67.79%

Ratio of Blocks without Well Control = 68.10%

Average of Weighted Residuals = -0.3101

Average of Absolute Weighted Residuals = 0.8675

Mean Residual Head (ft) = -0.437

Mean Abs. Residual Head (ft) = 0.877

Standard Deviation of Residual = 0.892

Regression Output:

Constant = 0.000

Std. Err. of Y Est. = 0.884

R Squared = 0.97

No. of Observations = 192

Degrees of Freedom = 191

X Coefficient(s) = 0.999

Std. Err. of Coef. = 0.000

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Table 4.3-9 - Steady-State Flow Calibration Criteria Results for Blocks with Well Control

Calibration Parameter	Criteria	Results
Mean Residual Head	$< \pm 0.5$ feet	-0.437
Mean of the Absolute Residuals of Head	$< \pm 2$ feet	0.877
Standard Deviation of Differences of Head	$< \pm 3$ feet	0.892
Regression Coefficient Between Measured and Computed Values of Head	0.95	0.97
Maximum Residual	Within the kriged confidence interval for the defined block	No
Water Balance	Within 5 percent	$< 1\%$

Table 4.3-10 - Steady-State Flow Calibration Parameters

Calibration Parameter	Projected Range from Model Calibration TO/TA	Actual Range from Calibration Results
Horizontal Hydraulic Conductivity	Within 292 to 678 ft/day or tighter range as determined with Transient Flow Calibration	200 to 638 ft/day based on Transient Flow Calibration
Vertical Hydraulic Conductivity	Within 20 to 155 ft/day or tighter range as determined with Transient Flow Calibration	19 to 51 ft/day - K_v/K_h ratio varied from 0.05 to 0.17
Porosity	As determined with Transient Flow Calibration	0.30 determined with Transient Flow Calibration
Rock Compressibility	As determined with Transient Flow Calibration	1.45×10^{-12} psi^{-1} determined with Transient Flow Calibration
Boundary Conditions	Constant heads determined with geostatistical analysis. Maintain within kriged confidence interval. Other type boundary conditions possible if determined during calibration.	Constant heads maintained within geostatistic kriged confidence interval. Dove (1961, Figure 47) used to set boundary heads near river.

Table 4.4-1 - Solute Transport Calibration Analysis Goals for Blocks with Well Control

Calibration Parameter	Criteria
Mean Residual Concentration	< +/- 5.0 ppb
Mean of the Absolute Residuals of Concentration	< +/- 10.0 ppb
Standard Deviation of Differences of Concentration	< +/- 10.0 ppb
Regression Coefficient Between Measured and Computed Values of Concentrations	0.90
Maximum Residual	Within the kriged confidence interval for the defined block
Total Mass	Within 5 percent of mass determined through operations

Table 4.4-2 - Mass of Uranium Used in the Development of the ST Model

Layer	Geostatistics Calculated Dissolved Rd = 12&9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=12 Mass (lbs)
Zone I: South Plume Area			
1	81.50	660.79	903.08
2	220.26	1806.17	2422.91
3	12.78	101.32	140.97
4	0.40	3.30	4.41
5	0.26	2.14	2.86
6	0.00	0.00	0.00
Total	315.20	2573.72	3474.23

Layer	Geostatistics Calculated Dissolved Rd = 12&9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=12 Mass (lbs)
Zone III: Plant 6 Area			
1	14.32	114.54	156.39
2	5.29	41.85	59.47
3	0.06	0.48	0.66
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
Total	19.66	156.87	216.52

Layer	Geostatistics Calculated Dissolved Rd = 12&9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=12 Mass (lbs)
Zone II: OU-1 and 4 Areas			
1	5.51	44.05	61.67
2	28.63	220.26	308.37
3	11.67	94.71	129.96
4	0.00	0.00	0.00
5	3.08	24.23	33.04
6	0.00	0.00	0.00
Total	48.90	383.26	533.04

Layer	Geostatistics Calculated Dissolved Rd = 12&9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=9 Mass (lbs)	Geostatistics Calculated Adsorbed Rd=12 Mass (lbs)
Zone IV: South Field Area			
1	4.19	33.04	46.26
2	13.22	105.73	145.37
3	0.00	0.00	0.00
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
Total	17.40	138.77	191.63

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Table 4.4-3 - Uranium Mass in the GMA Based on the 1990 Geostatistics Plume

Layer	Geostat Calc Mass, Rd=9 Dissolved (lbs)	Geostat Calc Mass, Rd=9 Adsorbed (lbs)	Geostat Calc Mass, Rd=9 Total (lbs)	Geostat Calc Mass, Rd=9 Ratio (%)	Geostat Calc Mass, Rd=12 Dissolved (lbs)	Geostat Calc Mass, Rd=12 Adsorbed (lbs)	Geostat Calc Mass, Rd=12 Total (lbs)	Geostat Calc Mass, Rd=12 Ratio (%)	IT Total Mass (%)
1	114.54	925.11	1039.65	25.39	114.54	1277.53	1392.07	25.61	
2	308.37	2422.91	2731.28	66.70	308.37	3303.96	3612.33	66.46	51
3	30.84	242.29	273.13	6.67	30.84	330.40	361.23	6.65	
4	0.42	3.30	3.72	0.09	0.42	4.63	5.04	0.09	
5	5.29	41.85	47.14	1.15	5.29	59.47	64.76	1.19	
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49
Total	459.45	3635.46	4094.91		459.45	4975.99	5435.44		

*Geostat mass calculated based on model blocks that are equal to or above 10 ppb.

SWIFT Total Mass includes all uranium concentrations in the GMA.

Table 4.4-4 - Summary Table of Solute Transport Calibration SWIFT Runs

No.	File Name	R	α_h, α_v, ft	Comments
1	3ds19bs1.dat	12	100, 10	With scaled IT's loading terms based on the 1990 geostatistical data for u-238.
2	3ds19cs2.dat	9	100, 10	Same as Run No.1
3	3ds19cs3.dat	12	100, 0.1	Inclusion of OU-1 , OU-2 & OU-3 loading terms plus the loading terms as used in Run No.2.
4	3ds19cs4.dat	12	100, 0.1	Increase of loading mass in SSOD and Silo area, and reduction of loading mass in South Plume area.
5	3ds19cs5.dat	12	100, 0.1	Inclusion of finalized OU-1 and OU2 loading terms

Table 4.4-5 - Comparison of Solute Transport Calibration Analysis Goals for Blocks with Well Control with Results

Calibration Parameter	Criteria	Results
Mean Residual Concentration	< +/- 5.0 ppb	12.29 ppb
Mean of the Absolute Residuals of Concentration	< +/- 10.0 ppb	20.58 ppb
Standard Deviation of Differences of Concentration	< +/- 10.0 ppb	99.68 ppb
Regression Coefficient Between Measured and Computed Values of Concentrations	0.90	0.32
Maximum Residual	Within the kriged confidence interval for the defined block	152 of 166 blocks
Total Mass	Within 5 percent of mass determined through operations	No data provided

Table 4.4-6 - Statistical Correlation of SWIFT Run # 5 Results with Well Control Blocks

WELL	X	Y	Z	C (BUX)	UNC	C(SWIFT)	SWIFT/BUX RATIO	PREDICTED UNC	OK/FAI
2045	3812.50	6937.50	1	48.99	5.34	1283.50	26.20	26.20	FAIL
3019	5562.50	11187.50	3	78.88	3.92	3.75	0.05	21.03	FAIL
2397	5437.50	7312.50	1	45.03	6.97	3.02	0.07	14.91	FAIL
2125	2187.50	4687.50	1	22.18	4.74	265.97	11.99	11.99	FAIL
3108	3687.50	10437.50	3	21.55	3.05	2.26	0.10	9.54	FAIL
2016	3562.50	7687.50	1	19.67	5.97	171.65	8.73	8.73	FAIL
3095	2562.50	5312.50	3	8.83	3.82	67.15	7.60	7.60	FAIL
3017	2812.50	6562.50	3	2.26	4.44	15.19	6.72	6.72	FAIL
3016	3562.50	7687.50	3	4.48	4.78	24.69	5.51	5.51	FAIL
3106	3187.50	6187.50	3	7.08	4.34	37.29	5.27	5.27	FAIL
3001	4937.50	11062.50	3	14.63	4.43	2.92	0.20	5.01	FAIL
3046	3937.50	7937.50	3	3.80	4.33	16.93	4.46	4.46	FAIL
3385	4312.50	7562.50	3	3.13	3.45	13.18	4.21	4.21	FAIL
3010	6062.50	10812.50	3	10.45	3.60	2.80	0.27	3.73	FAIL
2068	5937.50	7437.50	1	14.86	8.77	2.22	0.15	6.69	OK
2061	2562.50	4937.50	1	37.89	6.63	231.37	6.11	6.11	OK
2108	3687.50	10437.50	1	14.73	5.97	2.63	0.18	5.60	OK
4067	7937.50	7687.50	6	0.40	6.60	2.01	5.03	5.03	OK
3014	3437.50	6812.50	3	5.68	5.06	28.03	4.93	4.93	OK
2002	3312.50	4437.50	1	6.19	6.61	30.51	4.93	4.93	OK
2024	5687.50	12062.50	1	11.82	5.87	2.47	0.21	4.79	OK
4091	8187.50	5187.50	6	0.43	4.95	2.00	4.65	4.65	OK
2387	4437.50	6562.50	1	87.36	6.31	19.35	0.22	4.51	OK
2052	6812.50	11437.50	1	9.41	6.81	2.09	0.22	4.50	OK
3091	8187.50	5187.50	3	0.47	4.45	2.00	4.26	4.26	OK
2067	7937.50	7562.50	1	8.79	10.94	2.08	0.24	4.23	OK
2386	4937.50	6937.50	1	31.45	6.52	7.47	0.24	4.21	OK
4103	5312.50	9312.50	6	0.50	6.90	2.02	4.04	4.04	OK
2095	2562.50	5312.50	1	54.49	5.84	218.57	4.01	4.01	OK
3092	7437.50	4312.50	3	0.50	4.35	2.00	4.00	4.00	OK
4102	5437.50	9687.50	6	0.50	5.90	2.00	4.00	4.00	OK
3024	5687.50	12062.50	3	8.50	8.03	2.13	0.25	3.99	OK
2396	1812.50	4687.50	1	8.85	6.03	30.15	3.41	3.41	OK
2098	12562.50	9062.50	1	6.79	8.34	2.00	0.29	3.40	OK
3049	4062.50	6687.50	3	5.72	3.88	19.36	3.38	3.38	OK
3127	562.50	687.50	3	1.42	4.20	4.77	3.36	3.36	OK
2391	2812.50	1812.50	1	6.92	7.16	2.07	0.30	3.34	OK
3096	1312.50	7687.50	3	0.60	4.30	2.00	3.33	3.33	OK
2065	4812.50	7312.50	1	41.03	6.37	12.33	0.30	3.33	OK
2047	3812.50	8312.50	1	16.27	5.61	53.74	3.30	3.30	OK
3045	3812.50	6937.50	3	8.00	4.07	26.40	3.30	3.30	OK
3013	8062.50	9812.50	3	6.43	9.07	2.00	0.31	3.22	OK
3020	4687.50	8812.50	3	0.75	4.03	2.41	3.21	3.21	OK
2542	2812.50	2437.50	1	8.35	4.74	2.61	0.31	3.20	OK
3032	4187.50	10562.50	3	11.30	4.50	3.64	0.32	3.10	OK

Table 4.4-6 - Statistical Correlation of SWIFT Run # 5 Results with Well Control Blocks (Continued)

WELL	X	Y	Z	C (BUX)	UNC	C(SWIFT)	SWIFT/BUX RATIO	PREDICTED UNC	OK/FAI
2008	4812.50	10437.50	1	18.12	5.83	5.89	0.33	3.08	OK
2129	1687.50	3062.50	1	8.42	4.18	2.74	0.33	3.07	OK
2033	4562.50	10312.50	1	20.00	5.57	6.51	0.33	3.07	OK
2541	1687.50	3312.50	1	9.70	3.50	3.21	0.33	3.02	OK
3064	7687.50	8812.50	3	0.68	3.78	2.05	3.01	3.01	OK
2547	2187.50	2812.50	1	12.03	4.27	4.08	0.34	2.95	OK
2069	4312.50	5812.50	1	30.73	8.93	10.46	0.34	2.94	OK
2053	5687.50	9062.50	1	7.04	5.70	20.30	2.88	2.88	OK
4101	5687.50	10062.50	6	0.70	5.90	2.00	2.86	2.86	OK
3094	1437.50	1062.50	3	0.70	4.30	2.00	2.86	2.86	OK
2019	5437.50	11187.50	1	8.17	5.14	22.96	2.81	2.81	OK
2049	4062.50	6687.50	1	102.68	6.95	37.85	0.37	2.71	OK
3051	9062.50	9062.50	3	0.74	5.11	2.00	2.70	2.70	OK
2042	5187.50	9937.50	1	8.23	5.63	3.06	0.37	2.69	OK
4015	3437.50	5687.50	6	0.80	4.24	2.14	2.68	2.68	OK
3068	5937.50	7437.50	3	0.77	5.53	2.01	2.61	2.61	OK
3062	2062.50	4312.50	3	18.50	3.66	47.88	2.59	2.59	OK
2128	2062.50	3812.50	1	21.76	3.88	55.63	2.56	2.56	OK
3034	4187.50	10312.50	3	9.30	4.93	3.68	0.40	2.53	OK
4064	7687.50	8812.50	6	0.80	6.90	2.00	2.50	2.50	OK
2550	2812.50	5937.50	1	66.39	5.87	161.50	2.43	2.43	OK
3128	2062.50	3812.50	3	8.75	4.43	21.25	2.43	2.43	OK
2013	8062.50	9812.50	1	4.90	6.23	2.05	0.42	2.39	OK
2383	3437.50	11062.50	1	4.80	6.30	2.01	0.42	2.39	OK
3009	3562.50	9937.50	3	8.10	3.30	3.41	0.42	2.38	OK
3093	4312.50	4562.50	3	0.85	6.07	2.01	2.36	2.36	OK
2120	7437.50	8437.50	1	8.26	5.65	3.50	0.42	2.36	OK
4013	8062.50	9812.50	6	4.68	22.04	2.00	0.43	2.34	OK
3005	4312.50	11187.50	3	5.17	3.70	2.27	0.44	2.28	OK
3067	7937.50	7687.50	3	0.90	4.61	2.03	2.26	2.26	OK
2118	7062.50	8437.50	1	13.64	5.67	6.23	0.46	2.19	OK
2043	3812.50	12312.50	1	4.37	6.07	2.00	0.46	2.19	OK
2037	6312.50	11312.50	1	7.63	5.66	3.51	0.46	2.17	OK
2021	5312.50	11187.50	1	9.13	5.24	19.71	2.16	2.16	OK
3098	12562.50	9062.50	3	0.93	5.38	2.00	2.15	2.15	OK
3004	4312.50	11562.50	3	4.75	5.13	2.24	0.47	2.12	OK
2096	1312.50	7687.50	1	0.95	7.48	2.00	2.11	2.11	OK
2543	3062.50	2812.50	1	5.96	4.36	2.85	0.48	2.09	OK
3065	4687.50	7312.50	3	2.80	3.80	5.80	2.07	2.07	OK
2017	2812.50	6562.50	1	15.90	6.83	32.56	2.05	2.05	OK
2556	812.50	1937.50	1	4.40	9.42	2.16	0.49	2.04	OK
2388	6937.50	9062.50	1	6.50	5.36	13.22	2.03	2.03	OK
4008	5062.50	10312.50	6	1.00	3.95	2.02	2.02	2.02	OK
4125	2187.50	4687.50	6	1.90	4.64	3.80	2.00	2.00	OK
2094	1437.50	1062.50	1	3.91	8.60	2.01	0.51	1.95	OK
2011	4812.50	12312.50	1	3.90	8.53	2.05	0.53	1.90	OK

Table 4.4-6 - Statistical Correlation of SWIFT Run # 5 Results with Well Control Blocks (Continued)

WELL	X	Y	Z	C (BUX)	UNC	C(SWIFT)	SWIFT/BUX RATIO	PREDICTED UNC	OK/FAI
2007	6312.50	9562.50	1	3.87	6.07	7.30	1.89	1.89	OK
2015	3687.50	5937.50	1	113.17	7.24	60.28	0.53	1.88	OK
3044	2687.50	8312.50	3	1.13	3.67	2.12	1.88	1.88	OK
2394	3187.50	2937.50	1	5.00	5.44	2.67	0.53	1.87	OK
2046	3937.50	7937.50	1	67.17	5.71	123.69	1.84	1.84	OK
2055	6812.50	10312.50	1	4.19	6.06	2.30	0.55	1.82	OK
3391	2812.50	1812.50	3	3.65	4.38	2.03	0.56	1.80	OK
2028	4812.50	11812.50	1	6.22	5.53	3.47	0.56	1.79	OK
3120	7312.50	8437.50	3	1.20	3.85	2.11	1.76	1.76	OK
3037	6312.50	11312.50	3	4.05	3.65	2.31	0.57	1.75	OK
2648	5437.50	11062.50	1	10.27	5.46	17.76	1.73	1.73	OK
2393	1187.50	3312.50	1	3.50	4.26	2.03	0.58	1.72	OK
2054	6812.50	8562.50	1	18.51	5.51	10.84	0.59	1.71	OK
3053	5687.50	9062.50	3	1.50	3.90	2.56	1.71	1.71	OK
2092	7312.50	4312.50	1	3.40	7.33	2.00	0.59	1.70	OK
2006	6062.50	9312.50	1	5.22	5.88	8.82	1.69	1.69	OK
2084	5437.50	11562.50	1	10.40	5.38	17.47	1.68	1.68	OK
2032	4187.50	10562.50	1	20.43	5.85	12.24	0.60	1.67	OK
4001	5062.50	11062.50	6	1.20	5.00	2.00	1.67	1.67	OK
3008	5062.50	10312.50	3	4.17	3.63	2.55	0.61	1.64	OK
2034	4187.50	10312.50	1	13.78	5.95	8.50	0.62	1.62	OK
3387	4437.50	6562.50	3	4.38	4.38	7.08	1.62	1.62	OK
2048	4062.50	7187.50	1	41.52	6.48	66.67	1.61	1.61	OK
3003	4437.50	11812.50	3	3.55	4.78	2.22	0.63	1.60	OK
2554	687.50	3062.50	1	1.65	6.68	2.61	1.58	1.58	OK
2022	5187.50	11437.50	1	8.16	5.39	12.84	1.57	1.57	OK
2064	7687.50	8812.50	1	5.04	6.16	3.25	0.64	1.55	OK
2549	2437.50	3687.50	1	15.82	3.66	24.36	1.54	1.54	OK
3070	5562.50	5562.50	3	1.30	4.22	2.00	1.54	1.54	OK
3126	1062.50	3812.50	3	1.32	4.50	2.02	1.53	1.53	OK
2392	2562.50	1062.50	1	3.07	10.38	2.01	0.65	1.53	OK
2126	1062.50	3812.50	1	3.15	4.90	2.08	0.66	1.51	OK
2643	5312.50	11562.50	1	9.07	5.17	13.67	1.51	1.51	OK
4016	3562.50	7687.50	6	1.45	5.75	2.14	1.48	1.48	OK
2009	3437.50	9937.50	1	6.38	6.18	9.35	1.47	1.47	OK
2014	3437.50	6812.50	1	23.14	4.62	33.78	1.46	1.46	OK
4014	3437.50	6812.50	6	1.47	4.73	2.09	1.42	1.42	OK
2070	5562.50	5562.50	1	2.84	11.41	2.01	0.71	1.41	OK
2104	2187.50	8437.50	1	1.42	9.17	2.00	1.41	1.41	OK
3097	11562.50	6062.50	3	1.45	5.20	2.00	1.38	1.38	OK
2004	4312.50	11437.50	1	7.68	4.73	5.57	0.73	1.38	OK
2020	4562.50	8812.50	1	4.68	5.60	3.40	0.73	1.38	OK
2010	5937.50	10687.50	1	8.91	5.84	6.55	0.74	1.36	OK
2018	4062.50	9562.50	1	5.40	5.15	3.99	0.74	1.35	OK
2390	3562.50	6437.50	1	59.37	5.57	43.94	0.74	1.35	OK
3011	4812.50	12312.50	3	1.50	6.10	2.01	1.34	1.34	OK

Table 4.4-6.- Statistical Correlation of SWIFT Run # 5 Results with Well Control Blocks (Continued)

WELL	X	Y	Z	C (BUX)	UNC	C(SWIFT)	SWIFT/BUX RATIO	PREDICTED UNC	OK/FAI
4010	5937.50	10687.50	6	1.50	6.30	2.00	1.33	1.33	OK
2546	1812.50	3937.50	1	28.76	3.92	21.67	0.75	1.33	OK
2389	6687.50	8812.50	1	22.49	5.26	17.26	0.77	1.30	OK
2060	3437.50	5687.50	1	71.44	7.10	91.84	1.29	1.29	OK
3069	4312.50	5812.50	3	3.92	4.18	3.05	0.78	1.29	OK
2071	10562.50	8187.50	1	2.56	11.70	2.00	0.78	1.28	OK
2127	562.50	687.50	1	6.22	8.73	7.89	1.27	1.27	OK
2027	5812.50	11437.50	1	9.49	5.24	11.93	1.26	1.26	OK
2107	3437.50	8812.50	1	4.58	6.35	5.64	1.23	1.23	OK
2109	7187.50	8812.50	1	8.67	5.76	7.13	0.82	1.22	OK
2051	9062.50	9062.50	1	2.41	7.37	2.01	0.83	1.20	OK
2044	2687.50	312.50	1	2.39	19.67	2.00	0.84	1.20	OK
2548	2312.50	3312.50	1	10.84	3.66	9.09	0.84	1.19	OK
2555	62.50	3812.50	1	2.38	5.60	2.01	0.84	1.18	OK
3043	3812.50	12312.50	3	2.36	4.14	2.00	0.85	1.18	OK
4097	11562.50	6062.50	6	1.70	4.55	2.00	1.18	1.18	OK
2106	3187.50	6187.50	1	58.05	6.17	68.15	1.17	1.17	OK
3015	3687.50	5937.50	3	19.58	4.04	16.68	0.85	1.17	OK
2097	11562.50	6062.50	1	2.33	9.53	2.00	0.86	1.17	OK
3018	4062.50	9562.50	3	3.10	3.87	2.68	0.86	1.16	OK
2385	4312.50	7562.50	1	41.18	6.42	47.07	1.14	1.14	OK
3107	3437.50	8812.50	3	2.93	3.63	3.29	1.12	1.12	OK
2091	8187.50	5187.50	1	1.79	8.39	2.00	1.12	1.12	OK
2649	4437.50	11312.50	1	8.77	4.85	7.87	0.90	1.11	OK
3396	1812.50	4687.50	3	3.88	4.20	3.58	0.92	1.08	OK
3125	2187.50	4687.50	3	22.52	3.72	23.60	1.05	1.05	OK
2384	2812.50	9687.50	1	2.10	7.44	2.02	0.96	1.04	OK
2093	4312.50	4562.50	1	2.16	6.73	2.22	1.03	1.03	OK
2551	2312.50	5812.50	1	49.24	6.61	48.34	0.98	1.02	OK

Table 4.4-7 - Comparison of Solute Transport Calibration Analysis Goals for Blocks with Well Control with Results with Well # 2045 Removed

Calibration Parameter	Criteria	Results
Mean Residual Concentration	< +/- 5.0 ppb	4.88 ppb
Mean of the Absolute Residuals of Concentration	< +/- 10.0 ppb	13.23 ppb
Standard Deviation of Differences of Concentration	< +/- 10.0 ppb	31.80 ppb
Regression Coefficient Between Measured and Computed Values of Concentrations	0.90	0.42
Maximum Residual	Within the kriged confidence interval for the defined block	152 of 165 blocks
Total Mass	Within 5 percent of mass determined through operations	No data provided

Table 4.4-8 - Summary of Uranium Mass by SWIFT Layer for Run #5
($R=12$, $\alpha_h=100$ ft, $\alpha_v=0.1$ ft)

Layer	Dissolved Mass (lb)	Sorbed Mass (lb)	Total Mass (lbs)	Total Mass (%)
1	177.43	1956.67	2134.10	29.2
2	334.48	3688.60	4023.08	55.0
3	56.14	619.09	675.23	9.2
4	7.28	92.47	99.75	1.4
5	22.31	246.02	268.33	3.7
6	9.61	105.96	115.57	1.6
Total	607.25	6708.81	7316.06	100

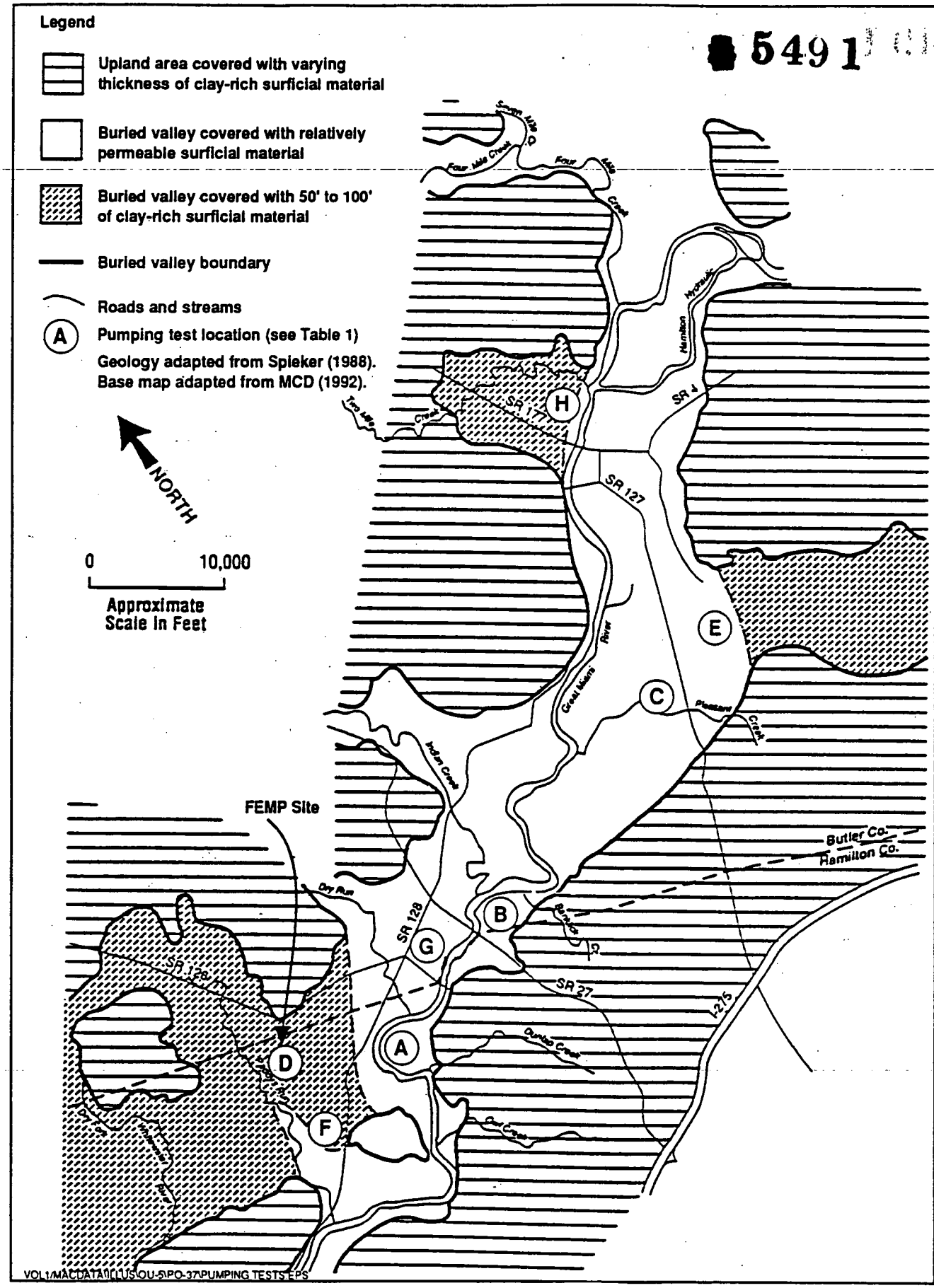


Figure 5.2-1 - Pumping Tests Conducted in the Vicinity of the FEMP

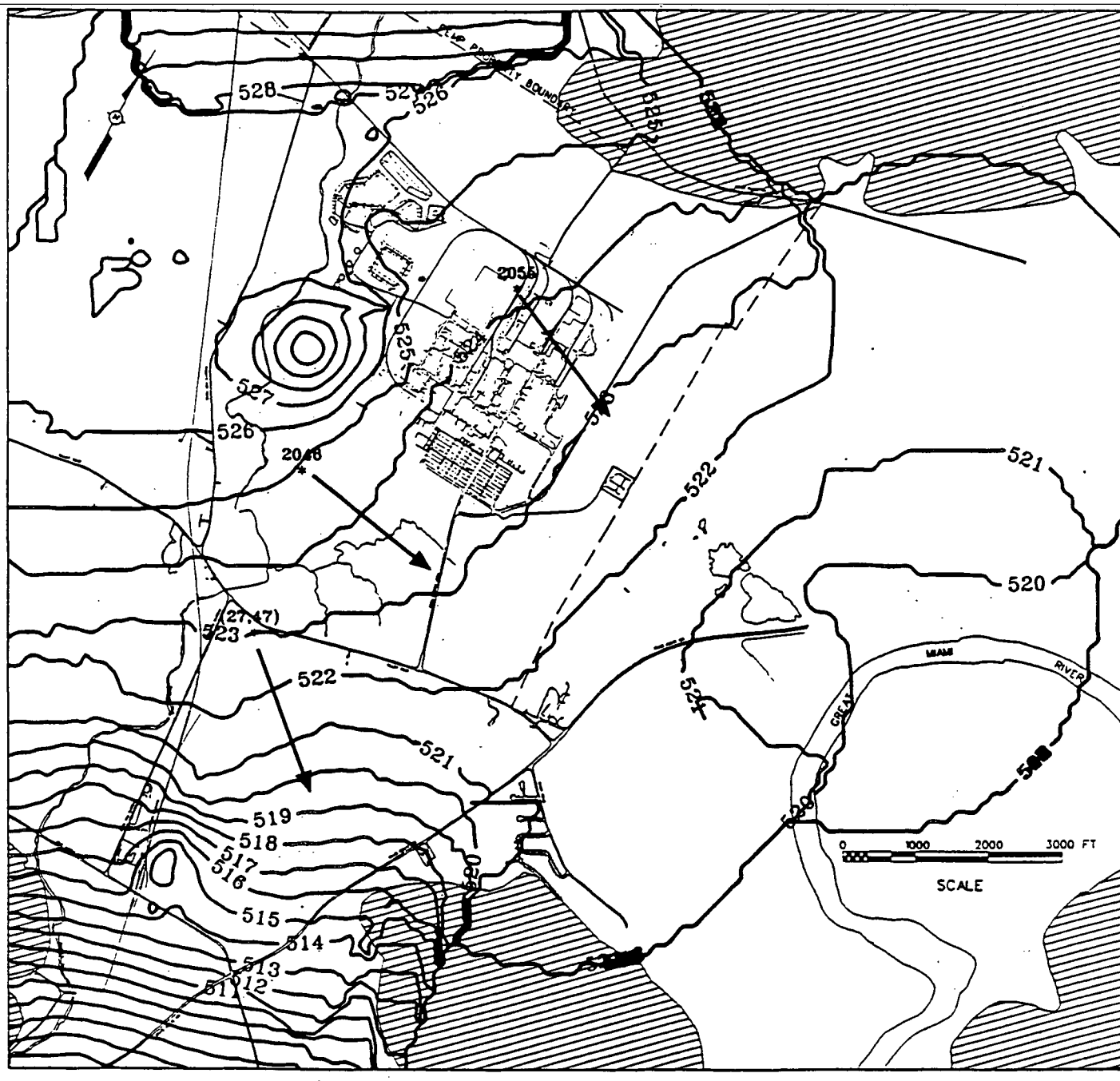


Figure 5.2-2 - Geostatistical 1991 GMA Head Contours - Spring

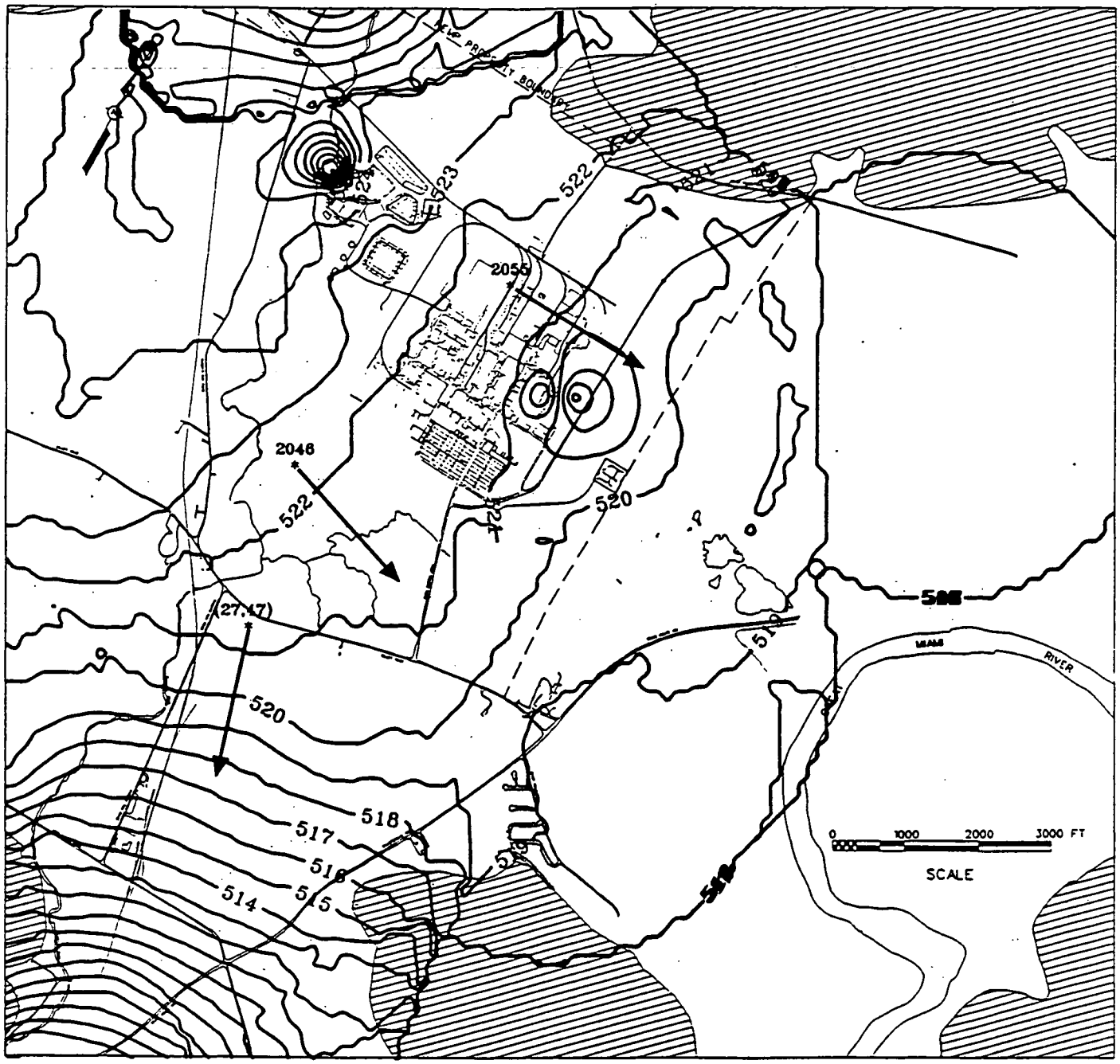


Figure 5.2-3 - Geostatistical 1991 GMA Head Contours - Summer

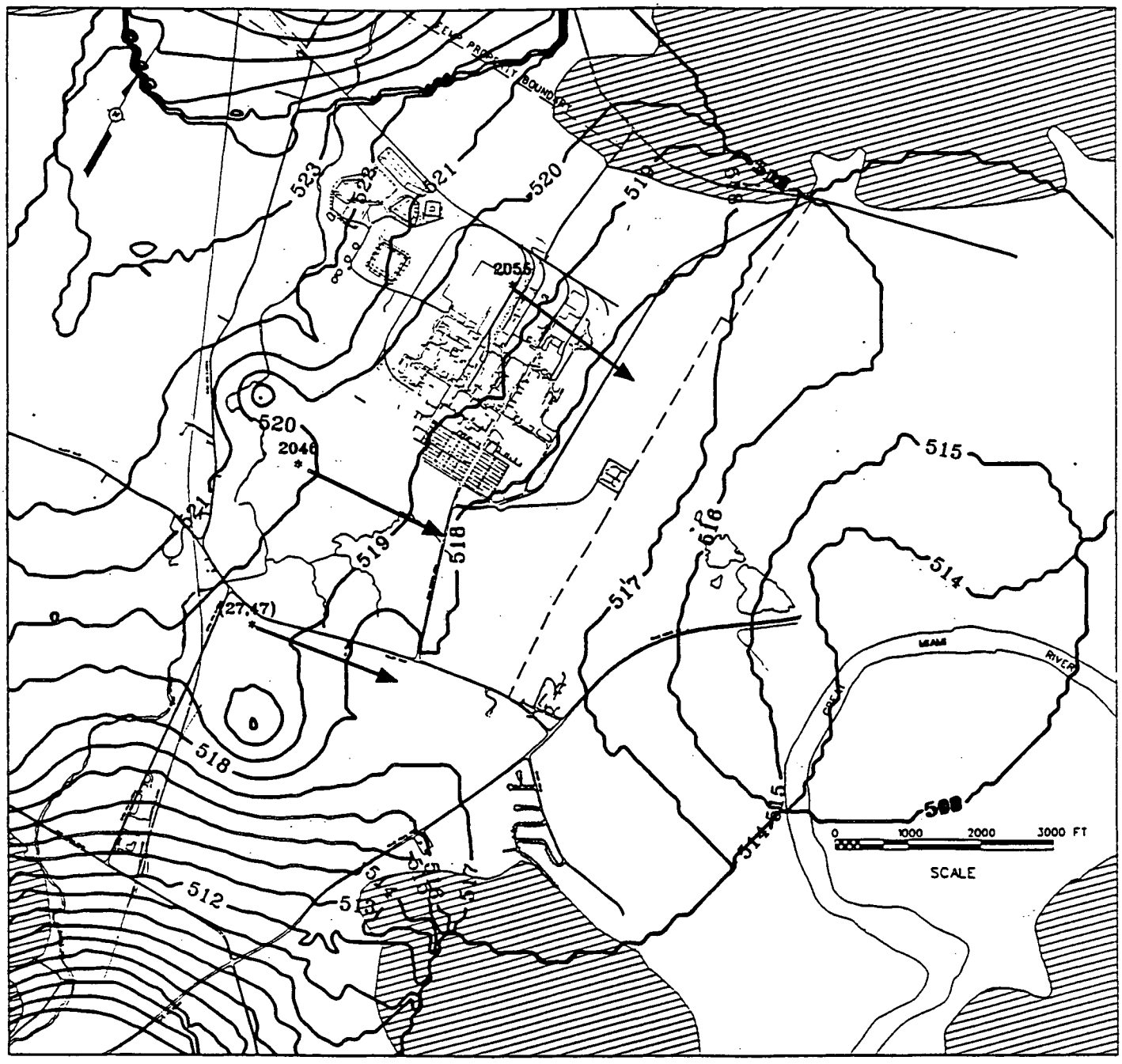


Figure 5.2-4 - Geostatistical 1991 GMA Head Contours - Autumn

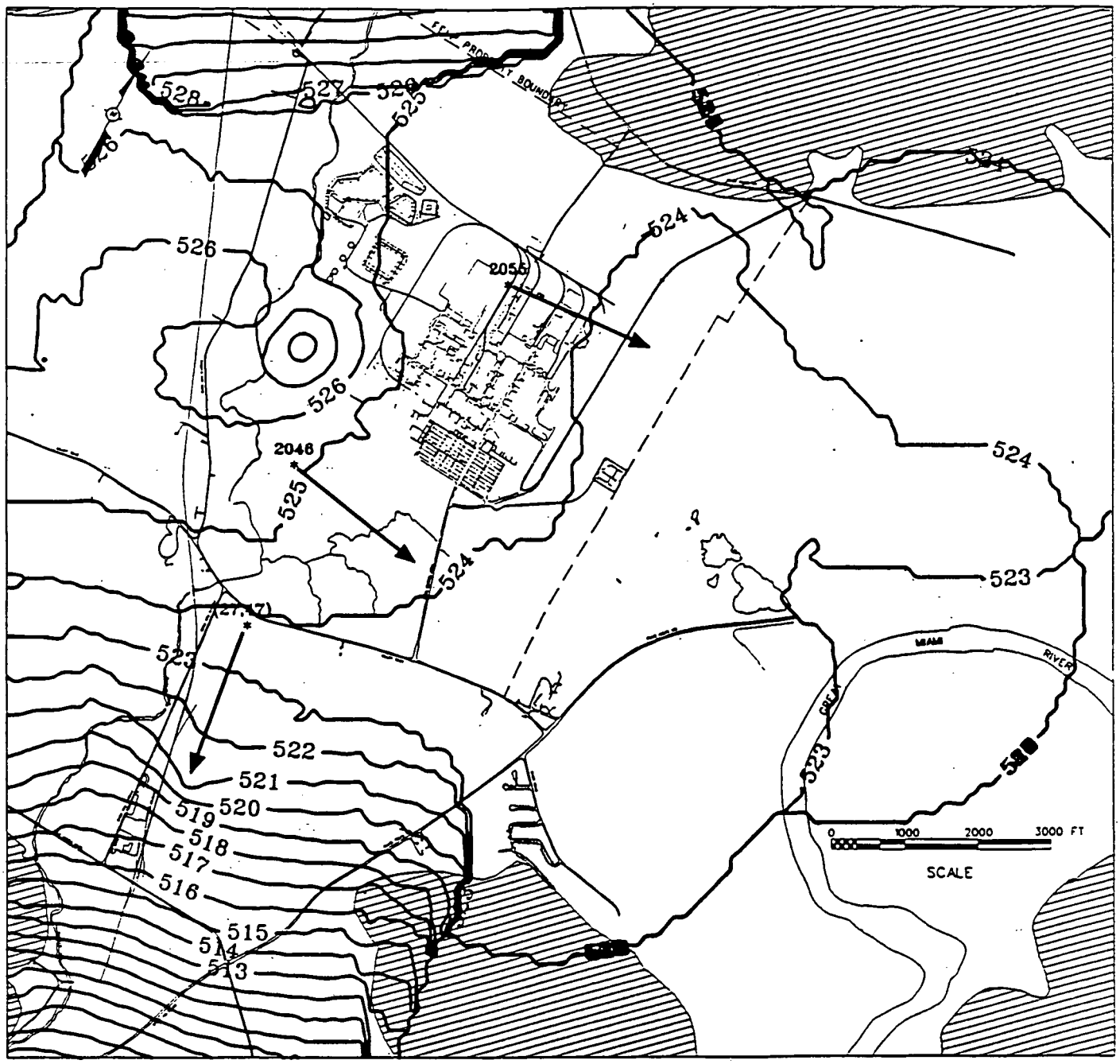


Figure 5.2-5 - Geostatistical 1991 GMA Head Contours - Winter

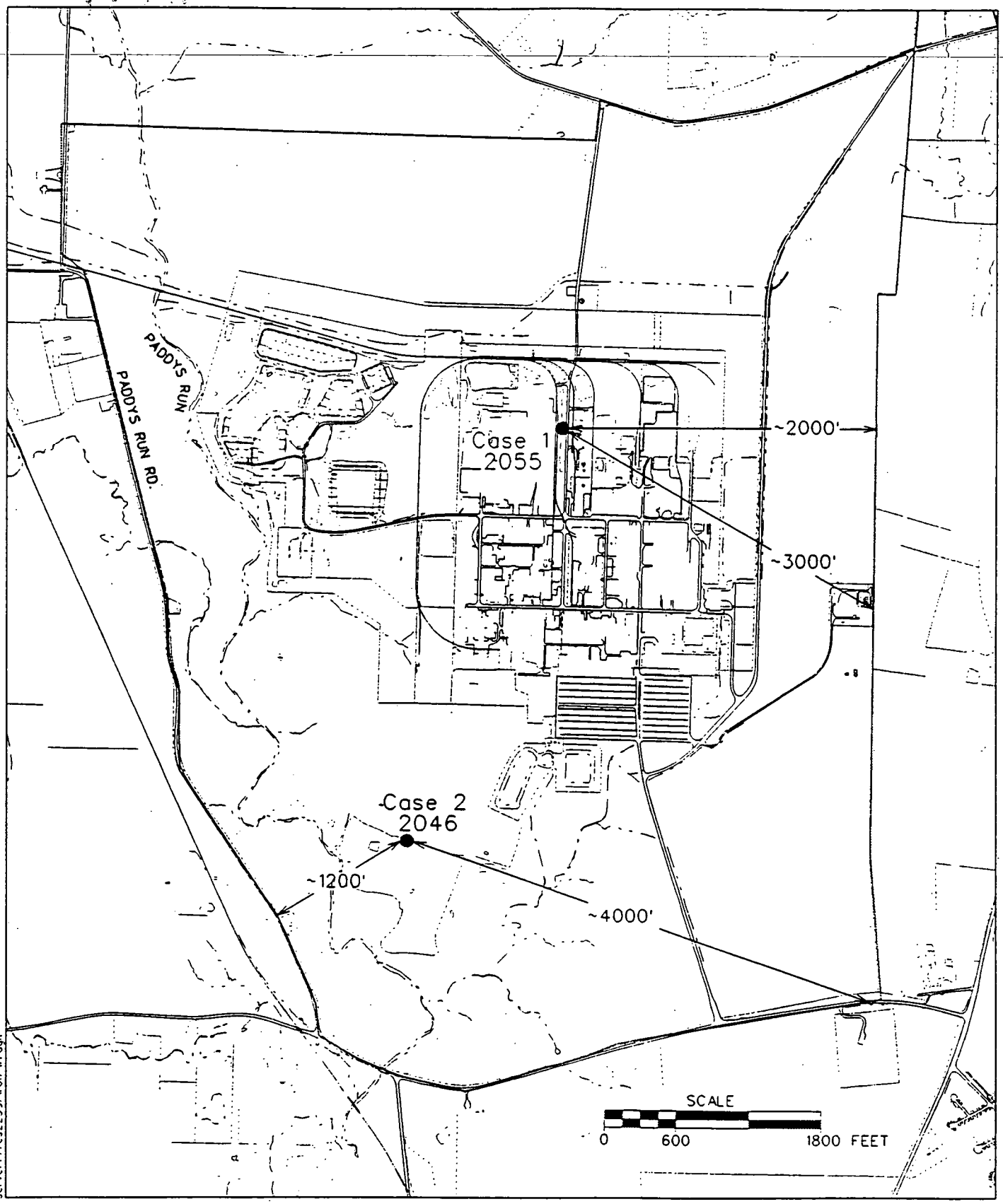


Figure 5.3-1 - ECTran Monte Carlo Simulations, Cases 1 and 2, Distances to Fenceline

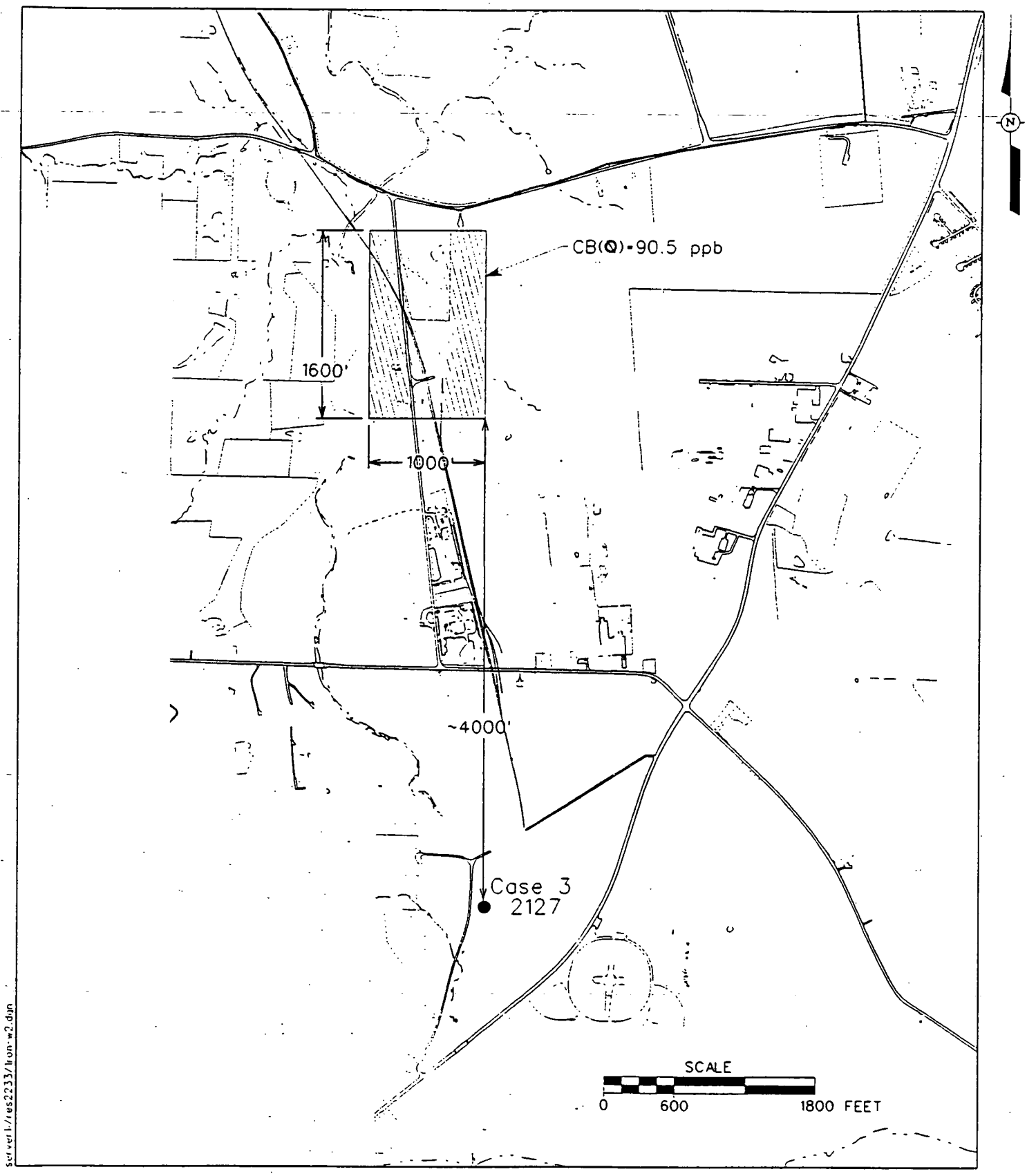


Figure 5.3-2 - ECTran Monte Carlo Simulations, Case 3

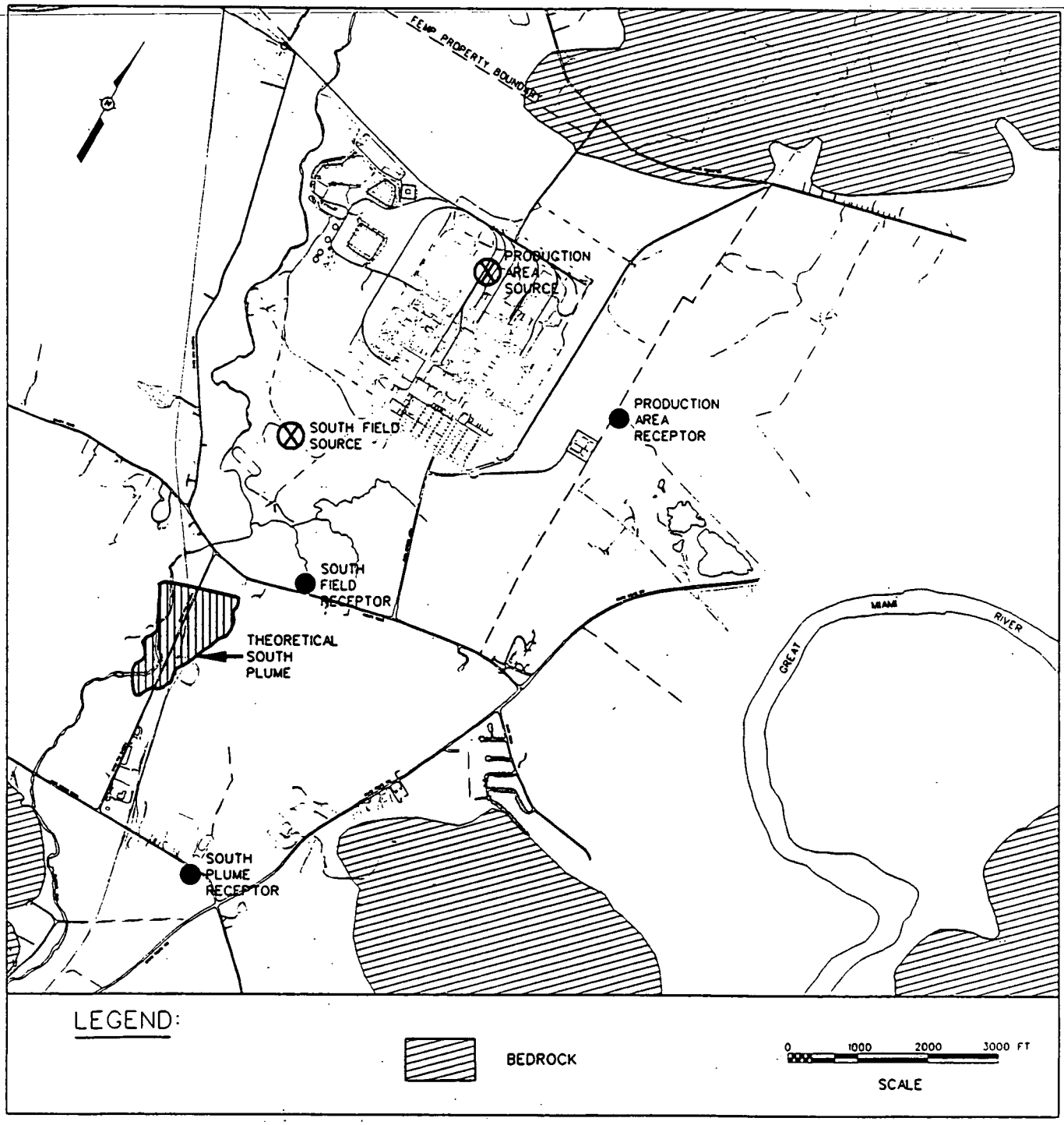
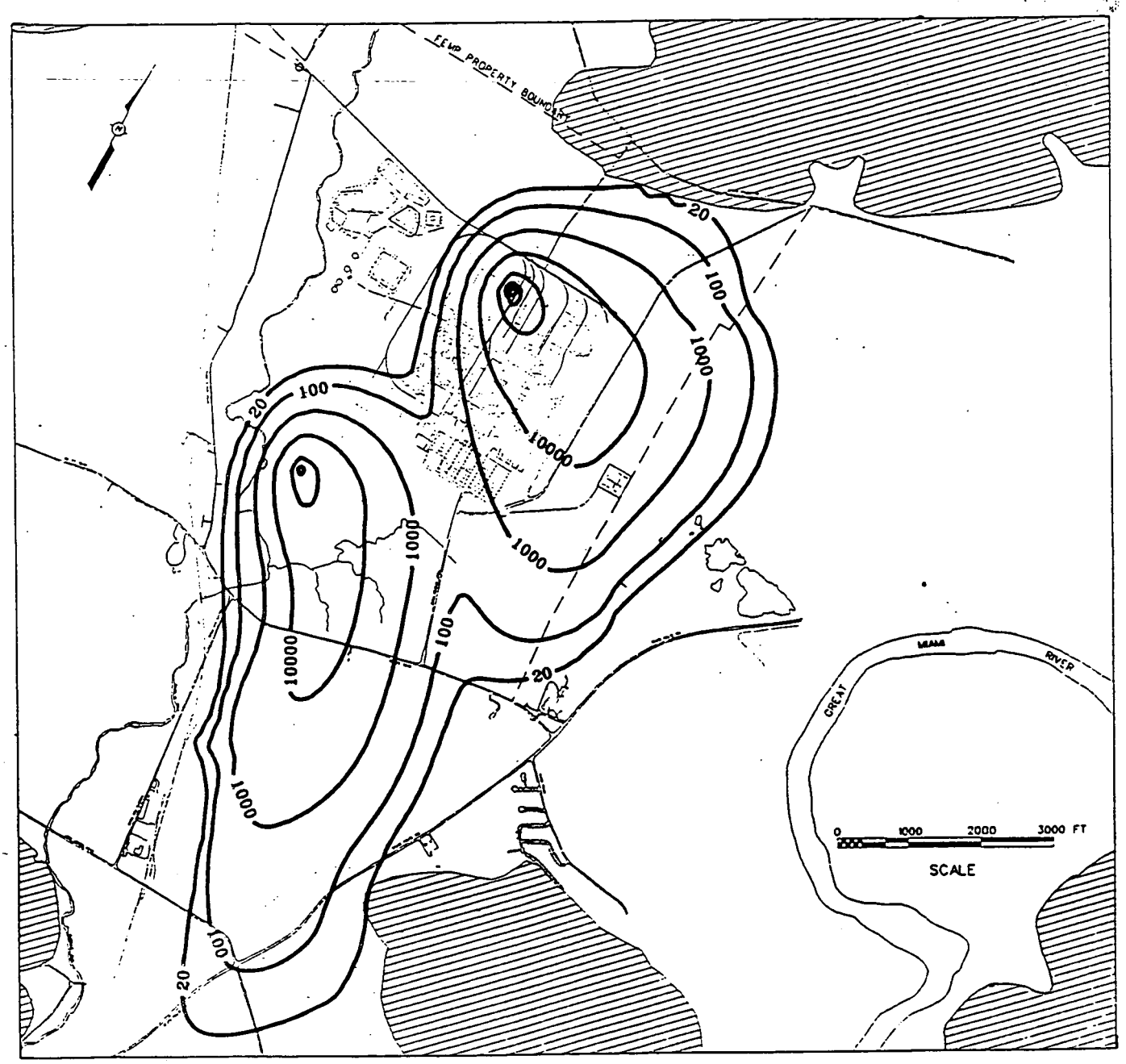
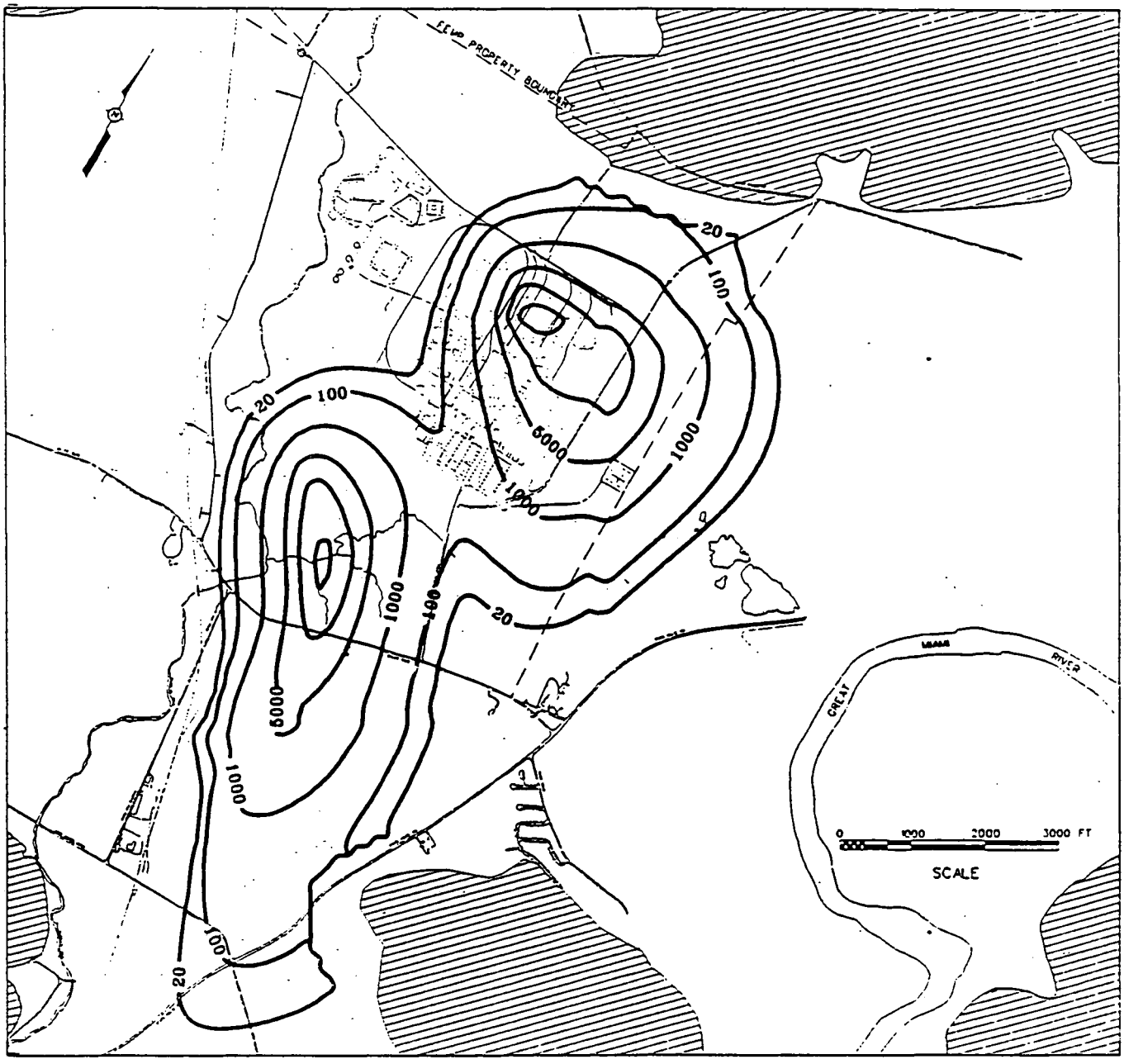


Figure 5.4-1 - Hypothetical Plume and Source Terms for Sensitivity Analysis



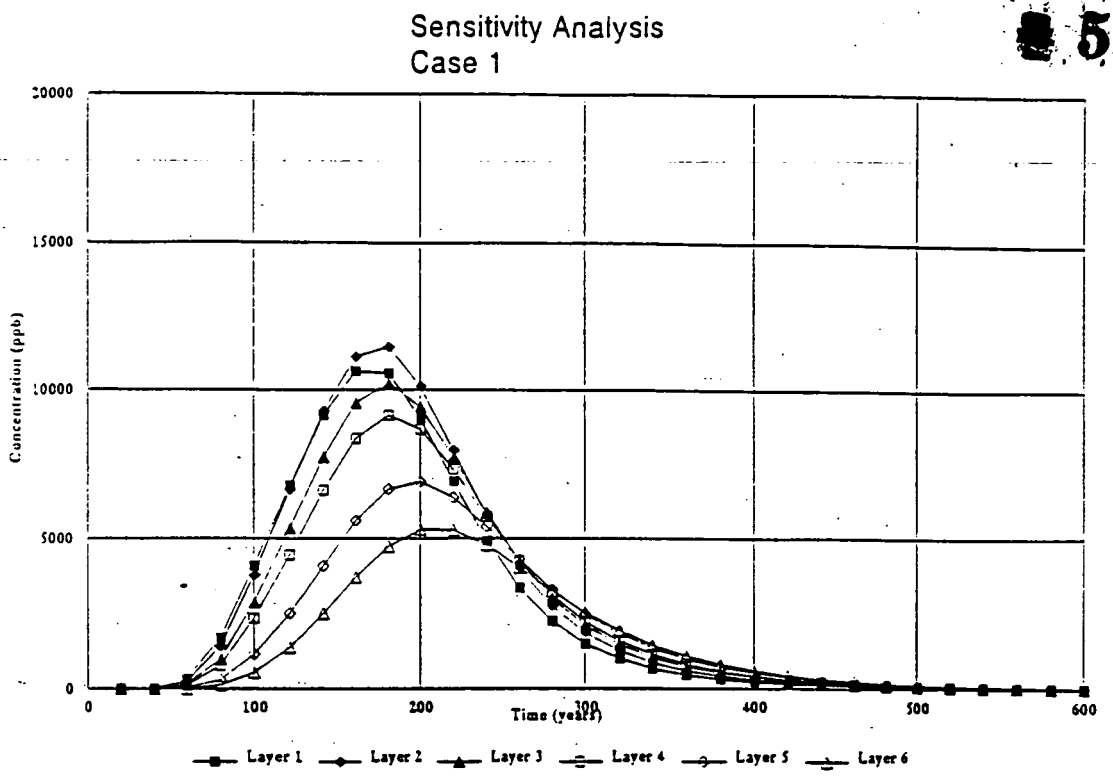
Contours in ppb

Figure 5.4-2 - SWIFT Sensitivity Analysis - Case 1 (Baseline) Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-3 - SWIFT Sensitivity Analysis - Case 1 (Baseline) Layer 3 Plume at 100 Years



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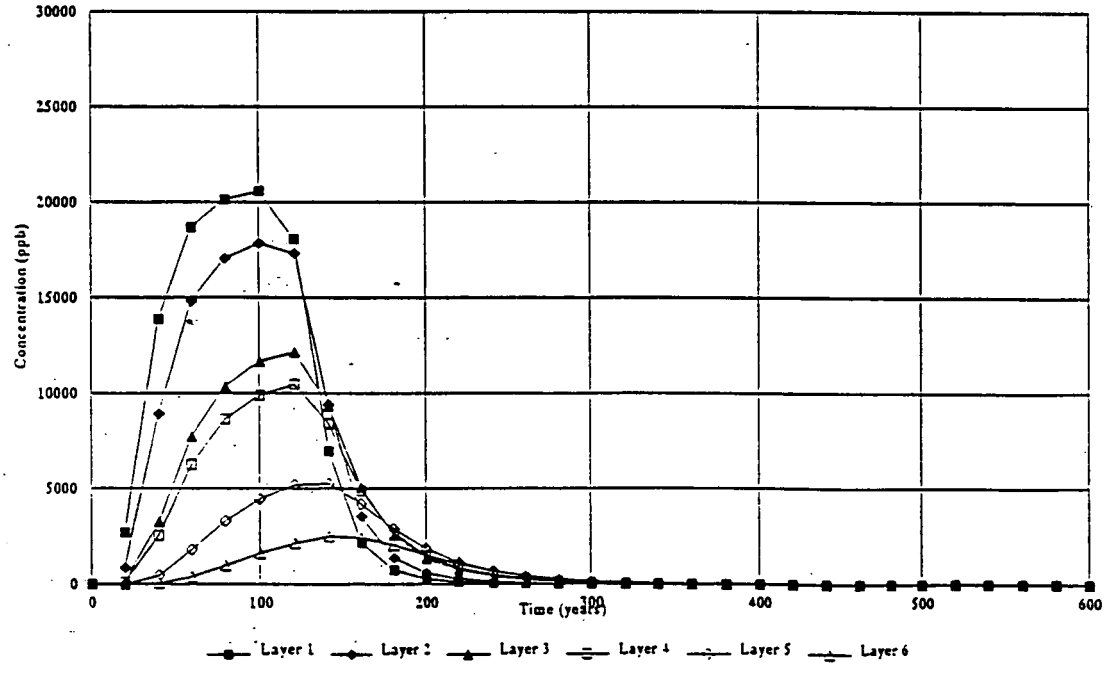

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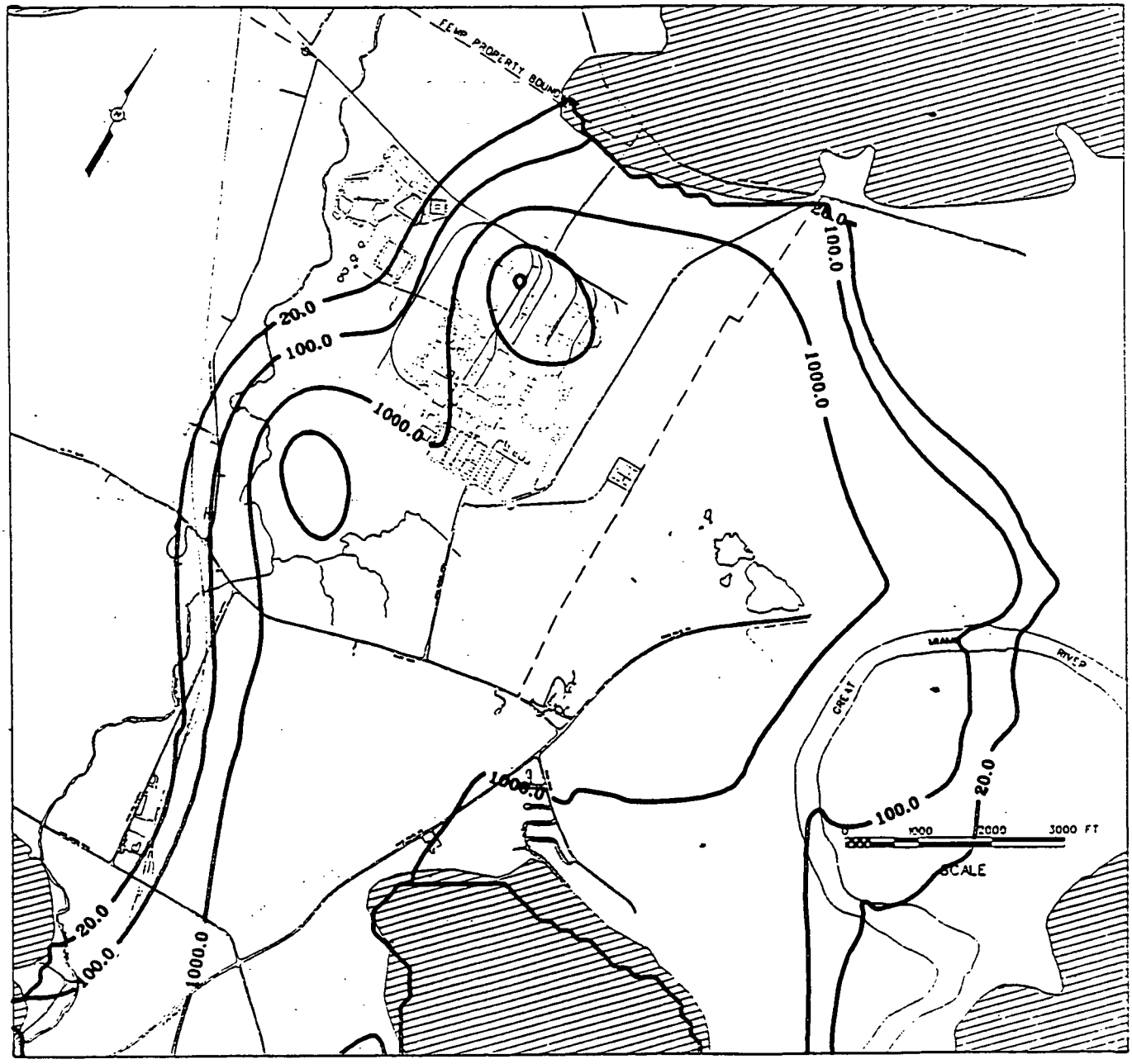
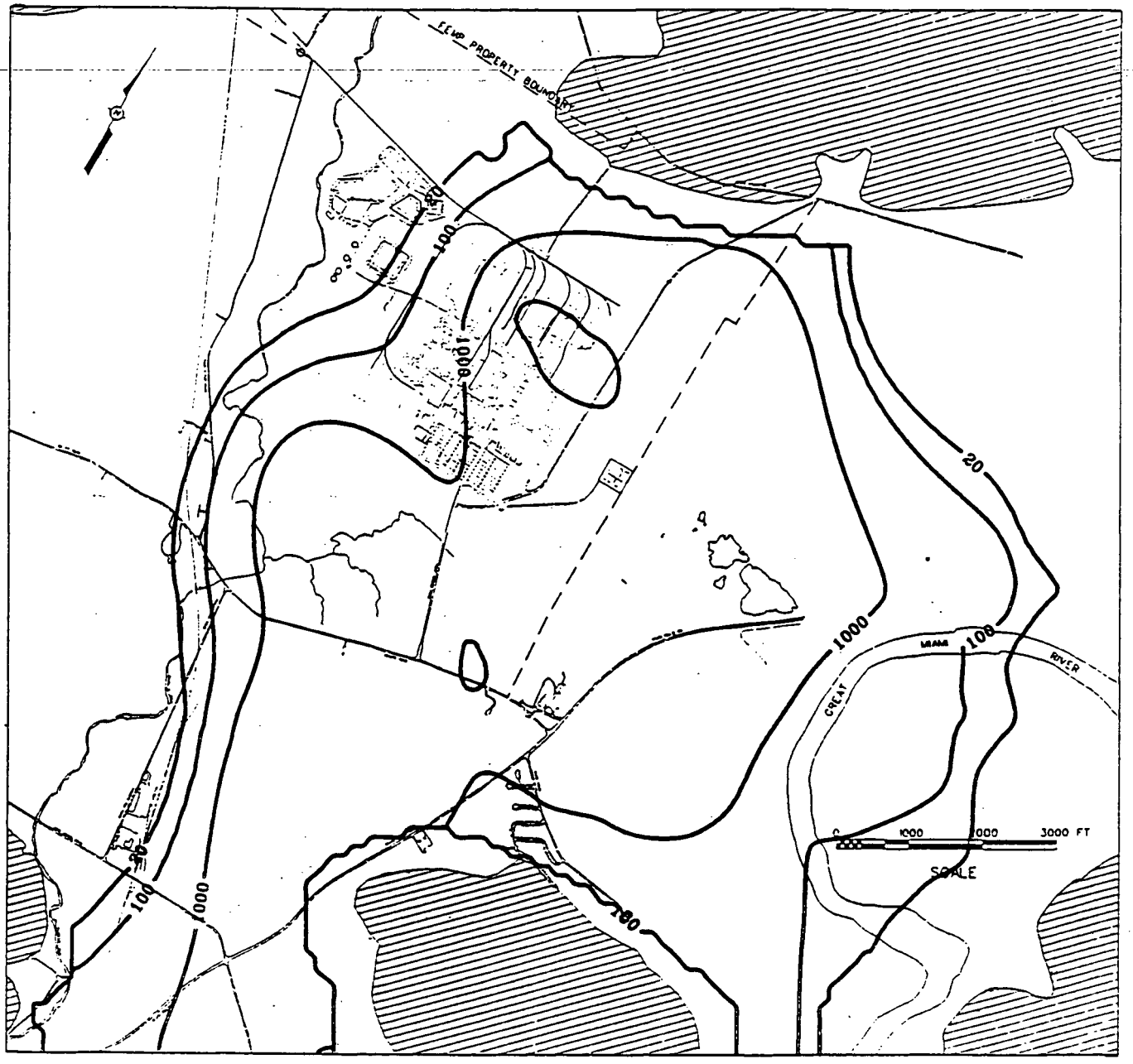
Figure 5.4-4 - SWIFT Sensitivity Analysis - Case 1 (Baseline) Concentration Over Time at Eastern and Southern Property Lines



Contours in ppb

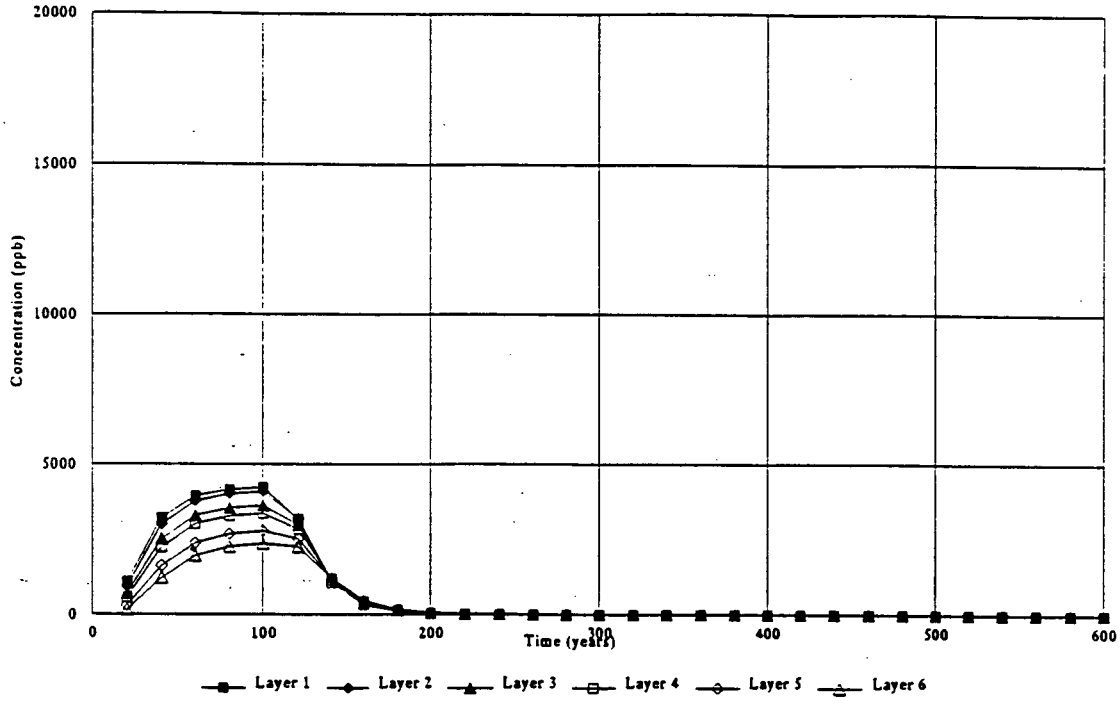
Figure 5.4-5 - SWIFT Sensitivity Analysis - Case 2 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-6 - SWIFT Sensitivity Analysis - Case 2 Layer 3 Plume at 100 Years

Sensitivity Analysis
Case 2



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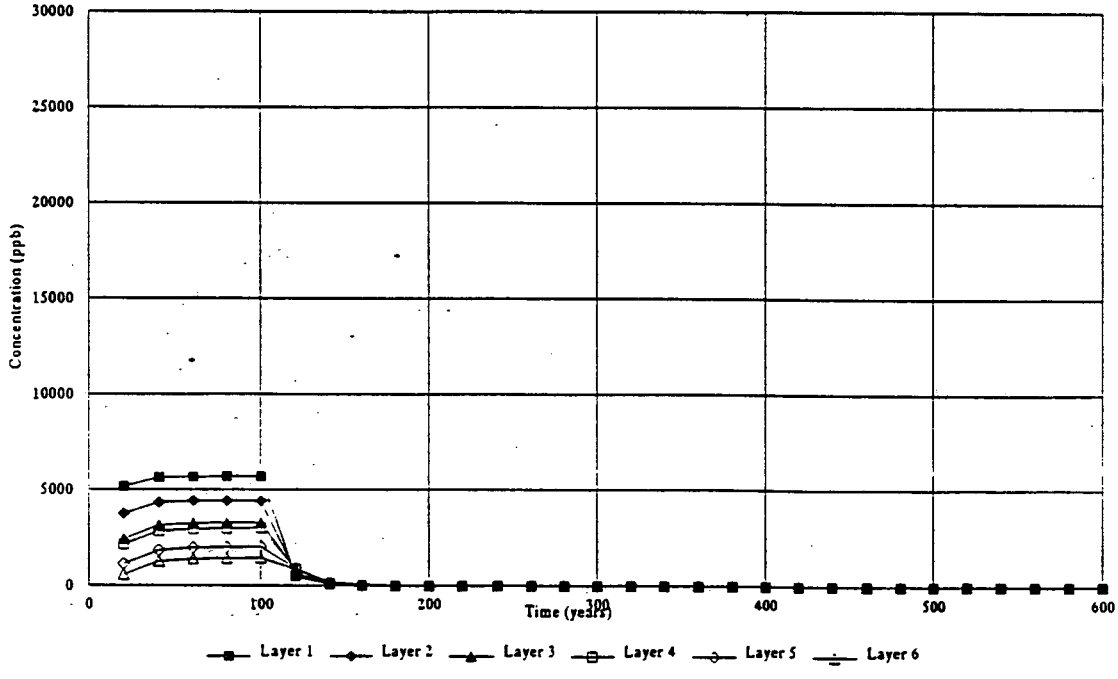

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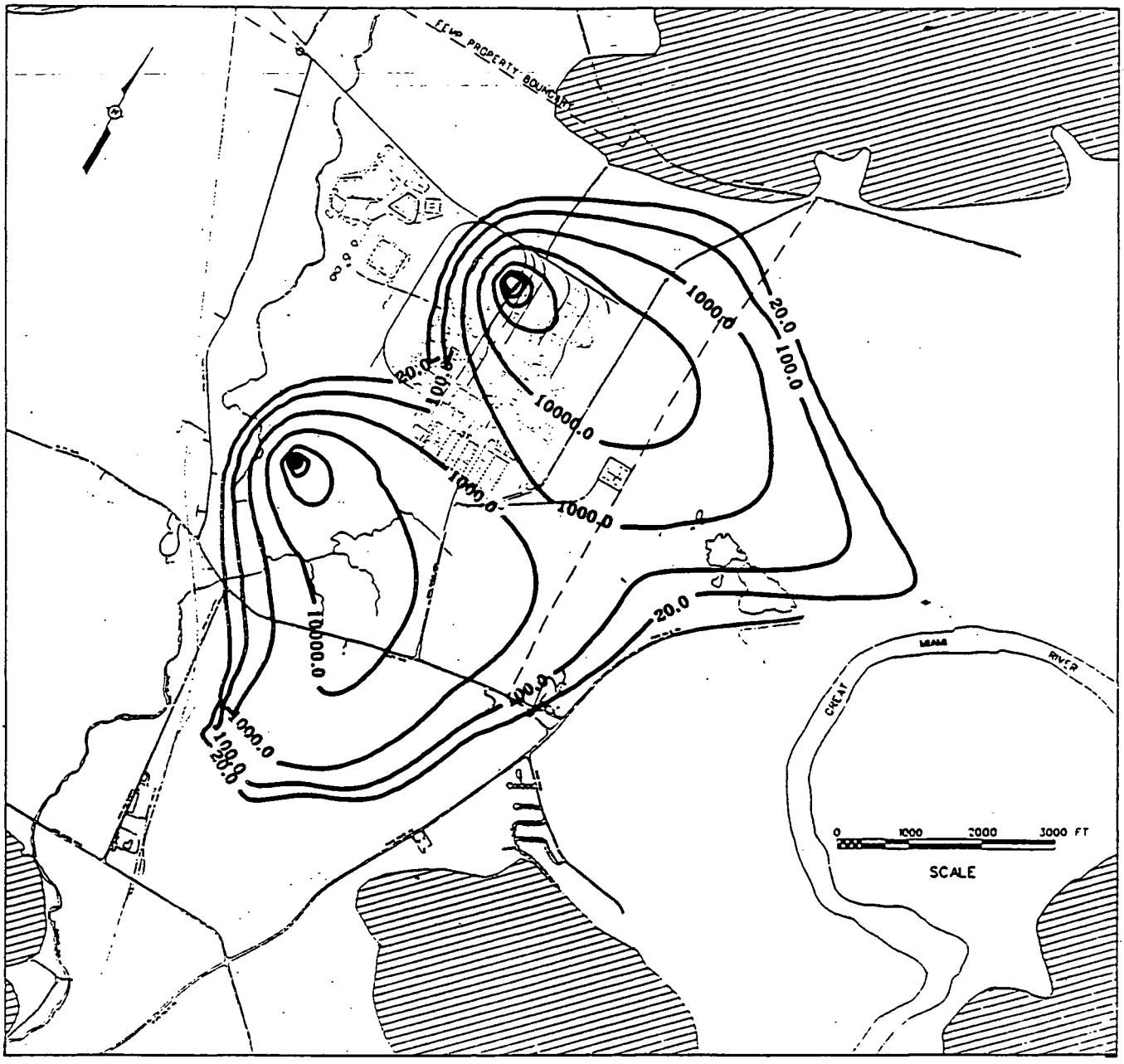
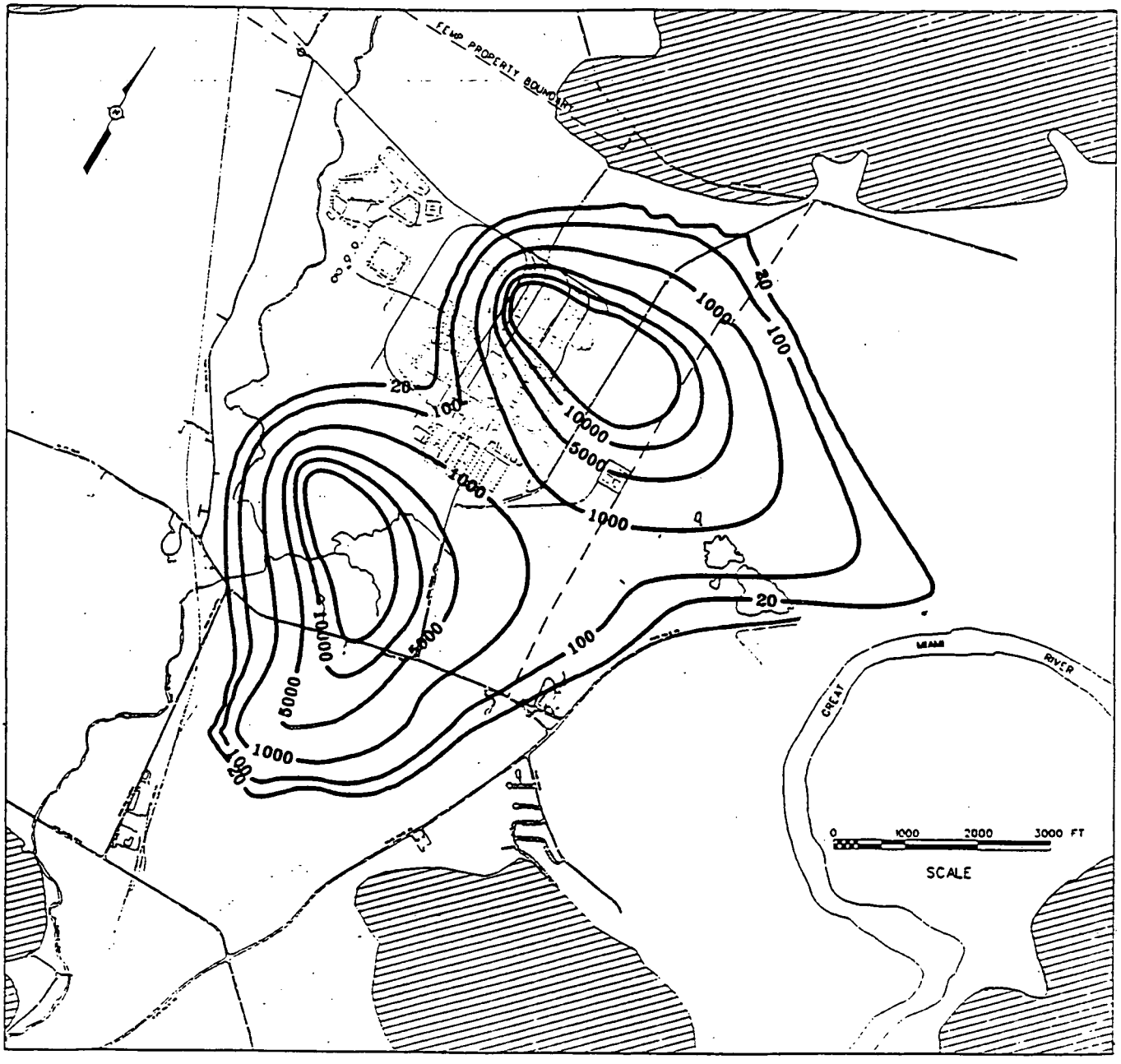
Figure 5.4-7 - SWIFT Sensitivity Analysis
Case 2 Concentration Over Time at Eastern and Southern Property Line



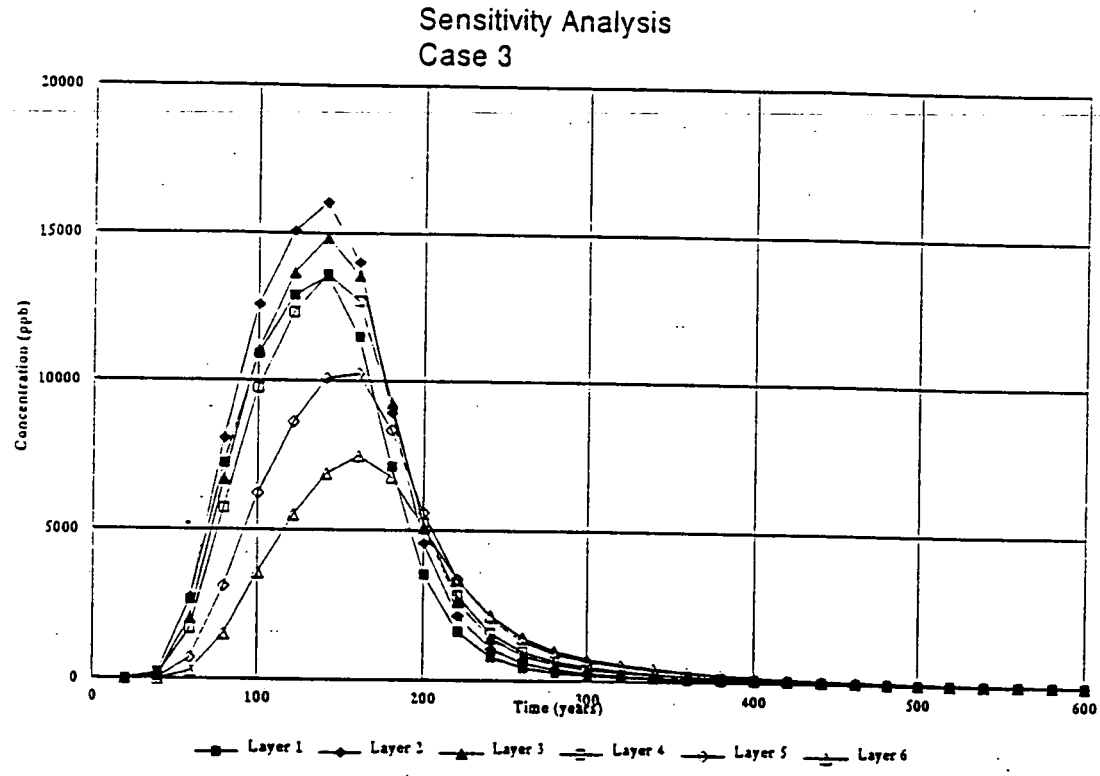
Contours in ppb

Figure 5.4-8 - SWIFT Sensitivity Analysis - Case 3 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-9 - SWIFT Sensitivity Analysis - Case 3 Layer 3 Plume at 100 Years



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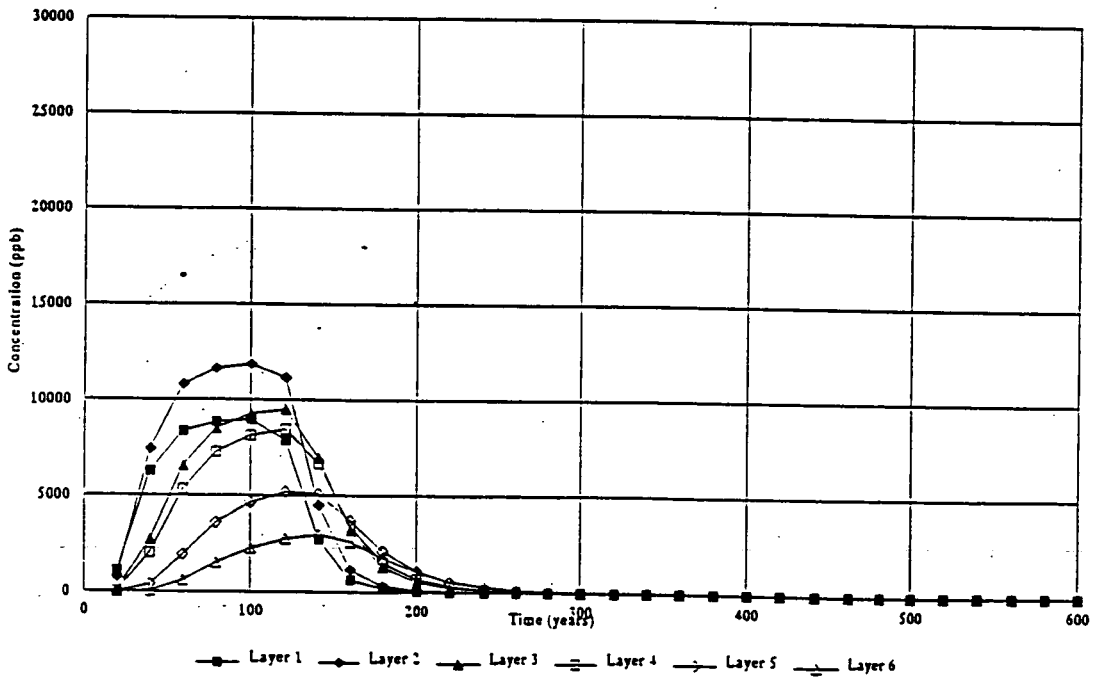

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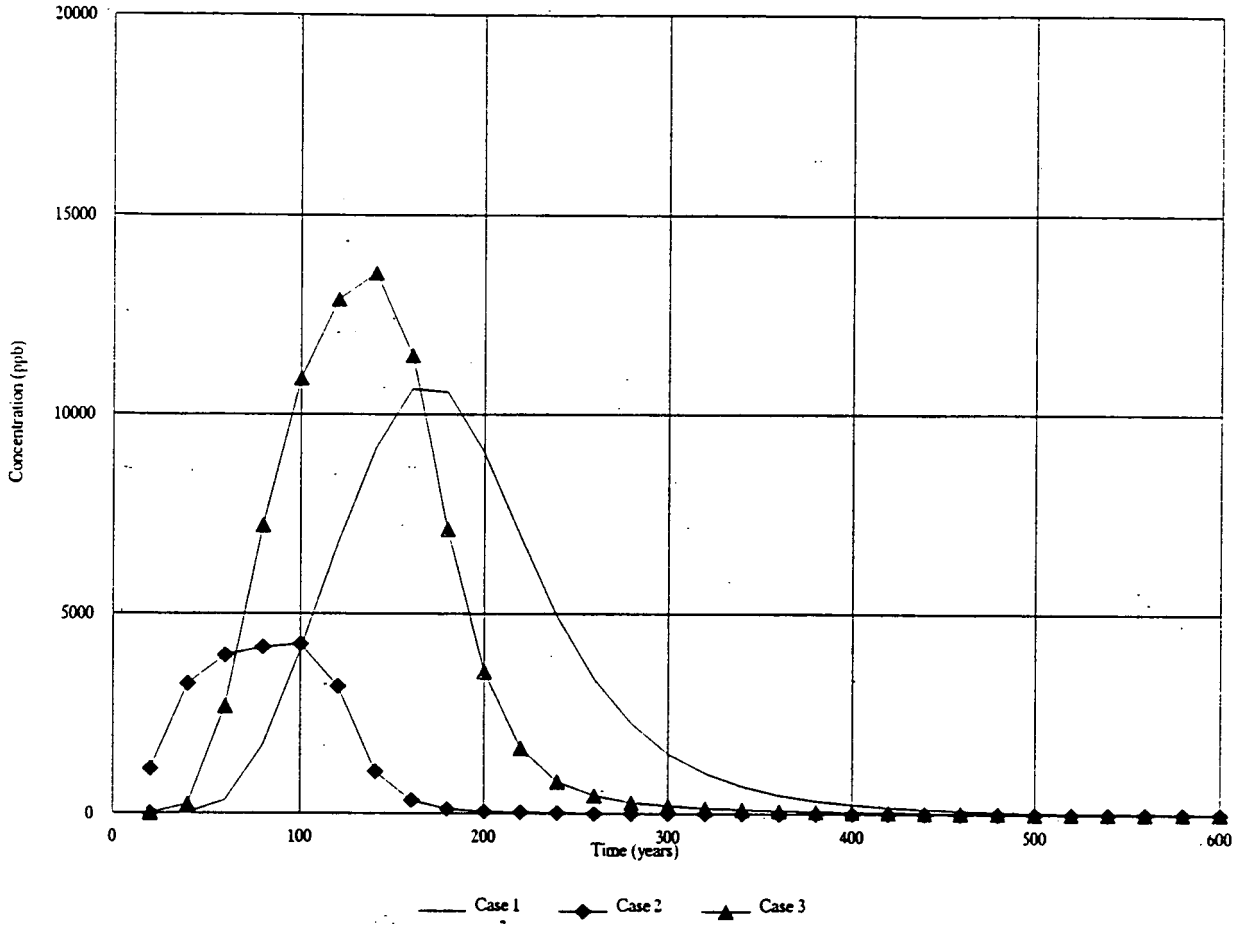
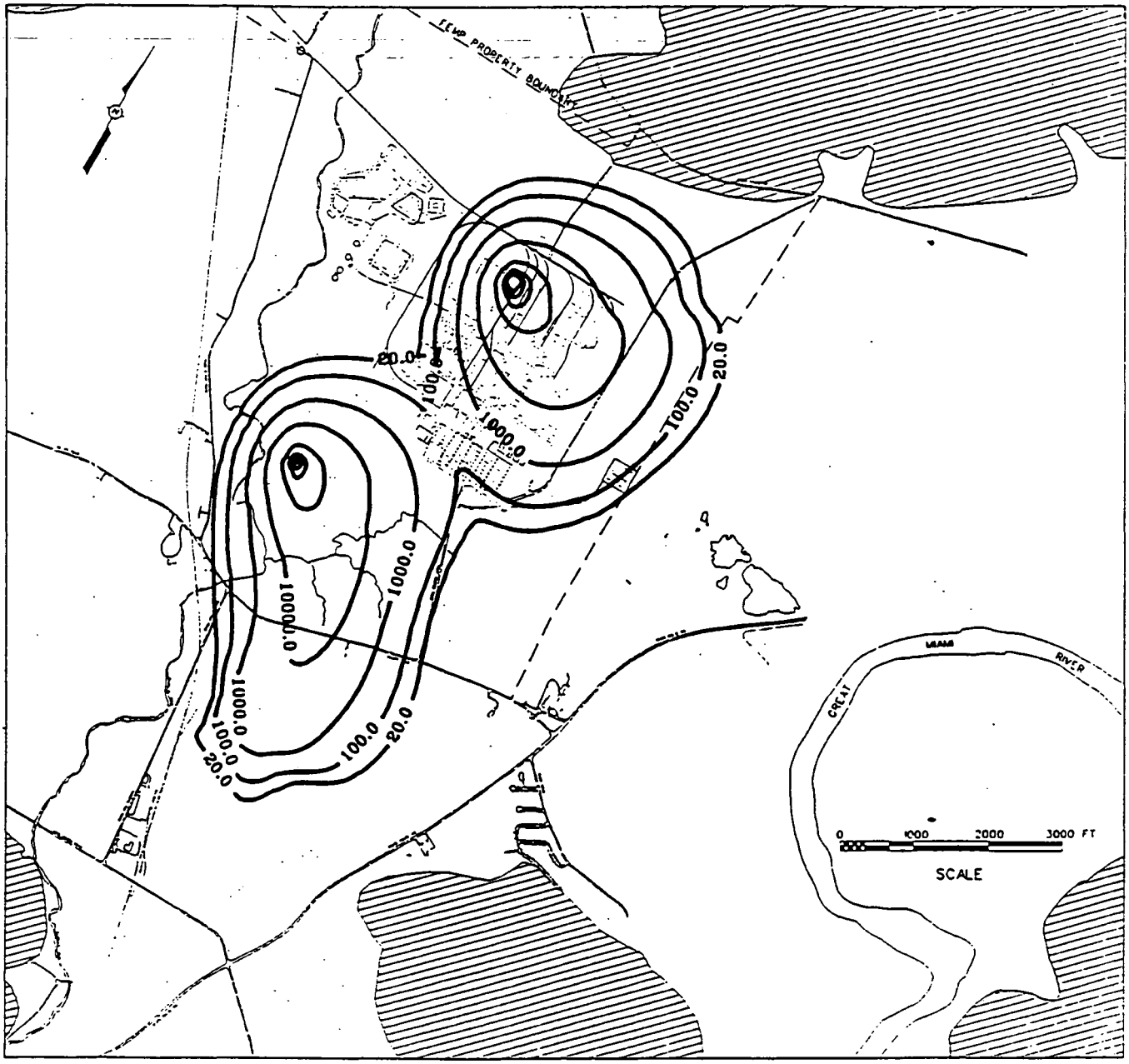
Figure 5.4-10 - SWIFT Sensitivity Analysis
Case 3 Concentration Over Time at Eastern and Southern Property Lines



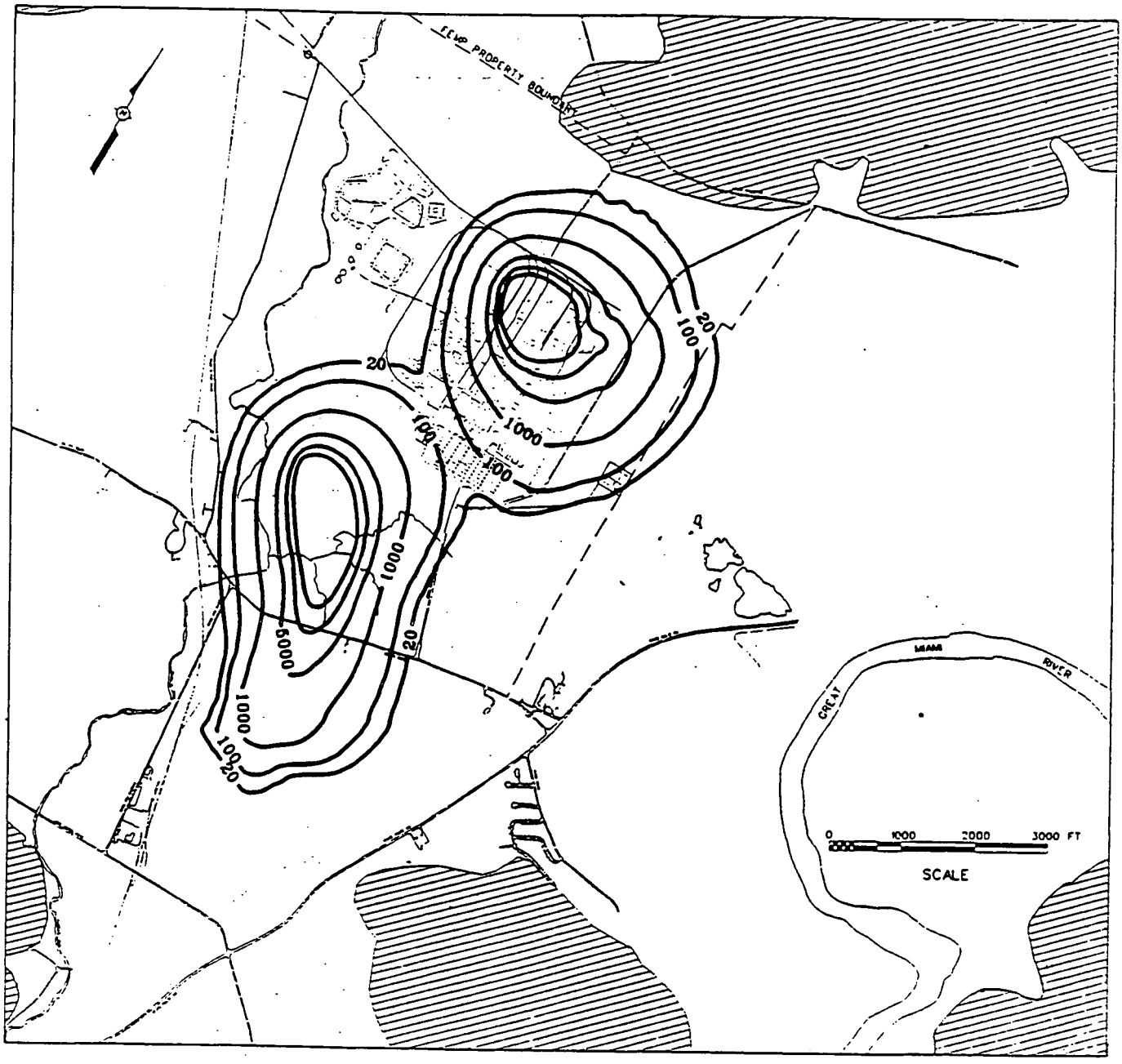
Maximum Concentration, Minimum Travel Time

Figure 5.4-11 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum Cases at Eastern Property Line



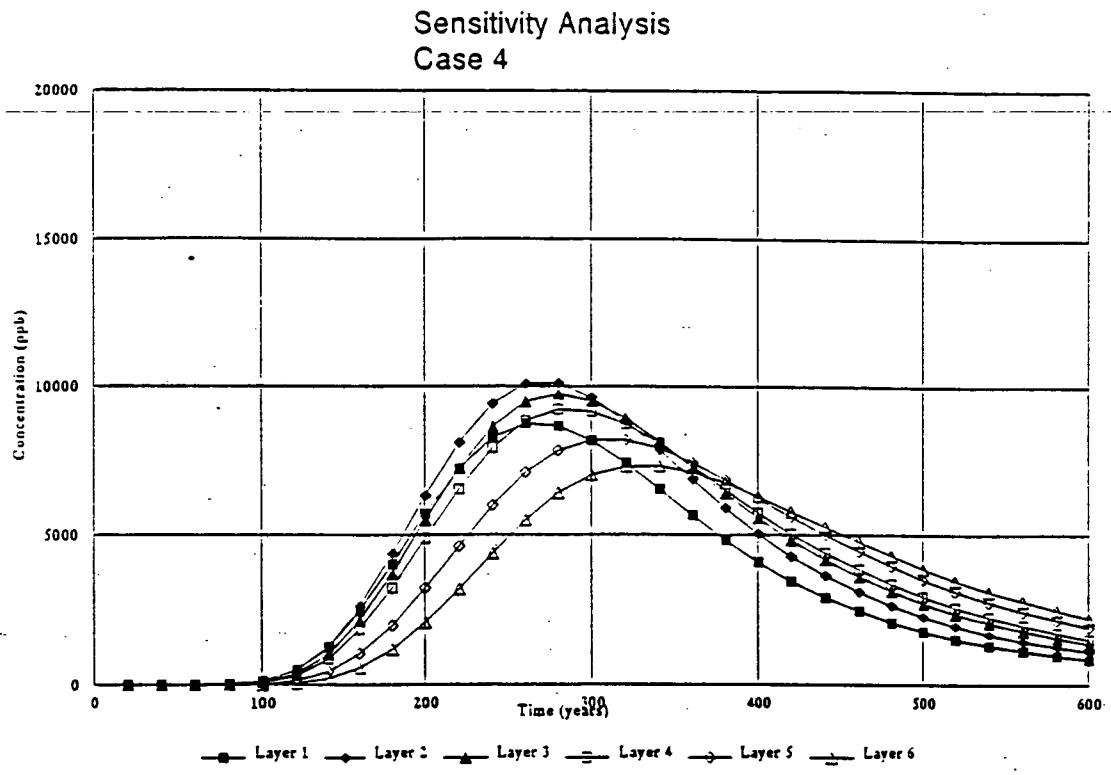
Contours in ppb

Figure 5.4-12 - SWIFT Sensitivity Analysis - Case 4 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-13 - SWIFT Sensitivity Analysis - Case 4 Layer 3 Plume at 100 Years



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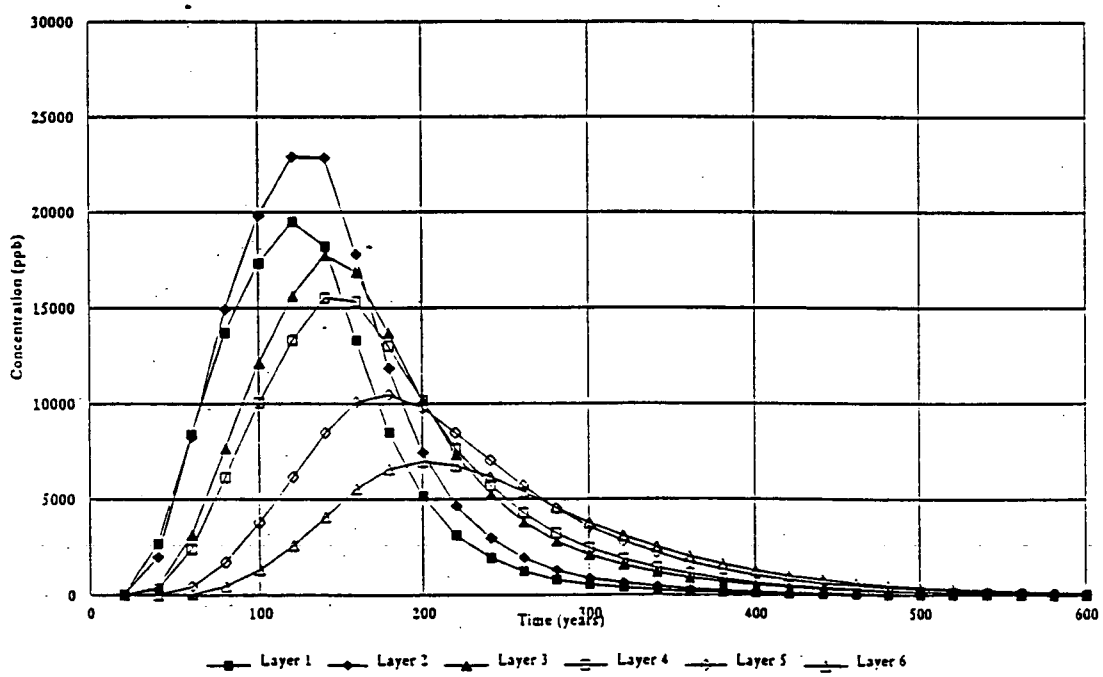

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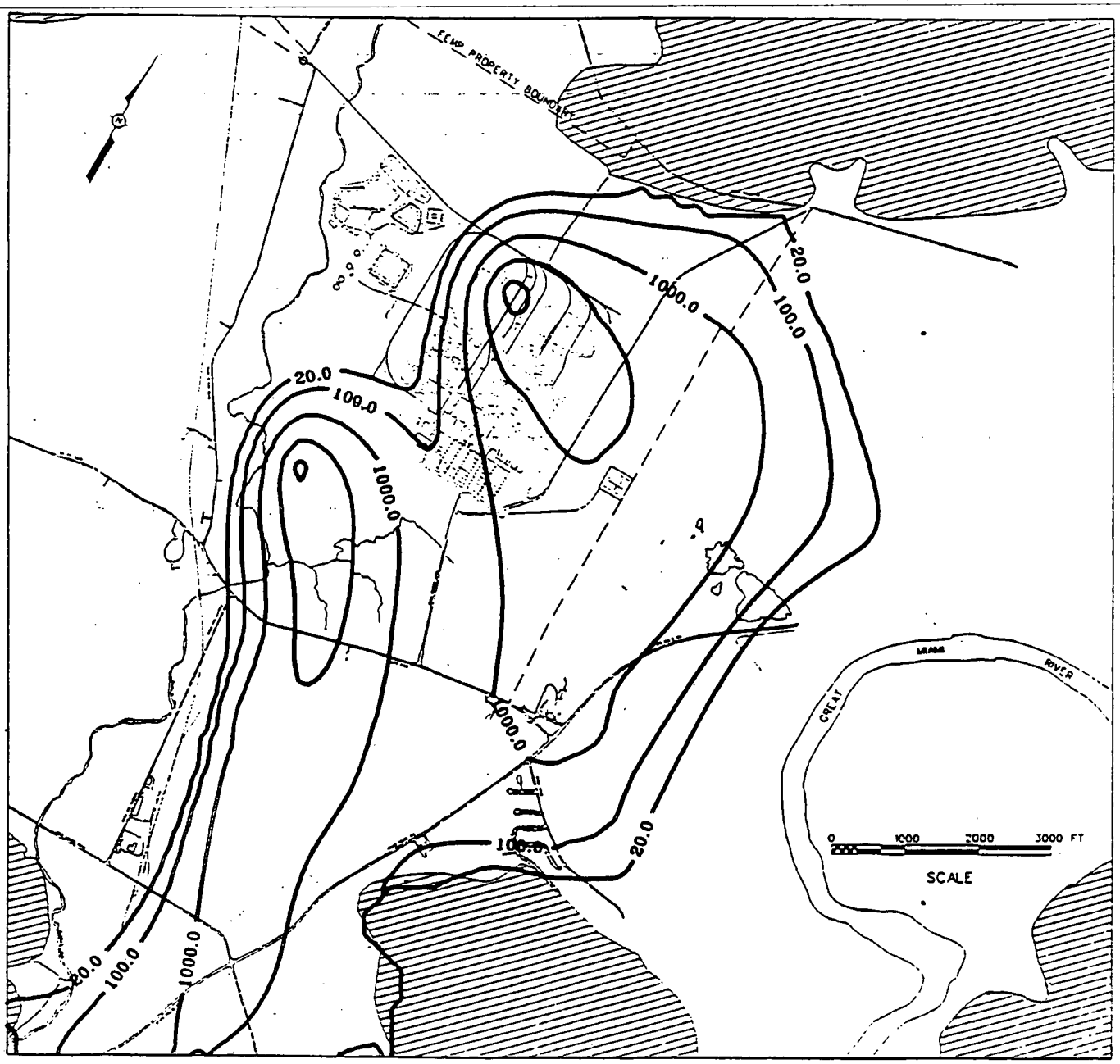
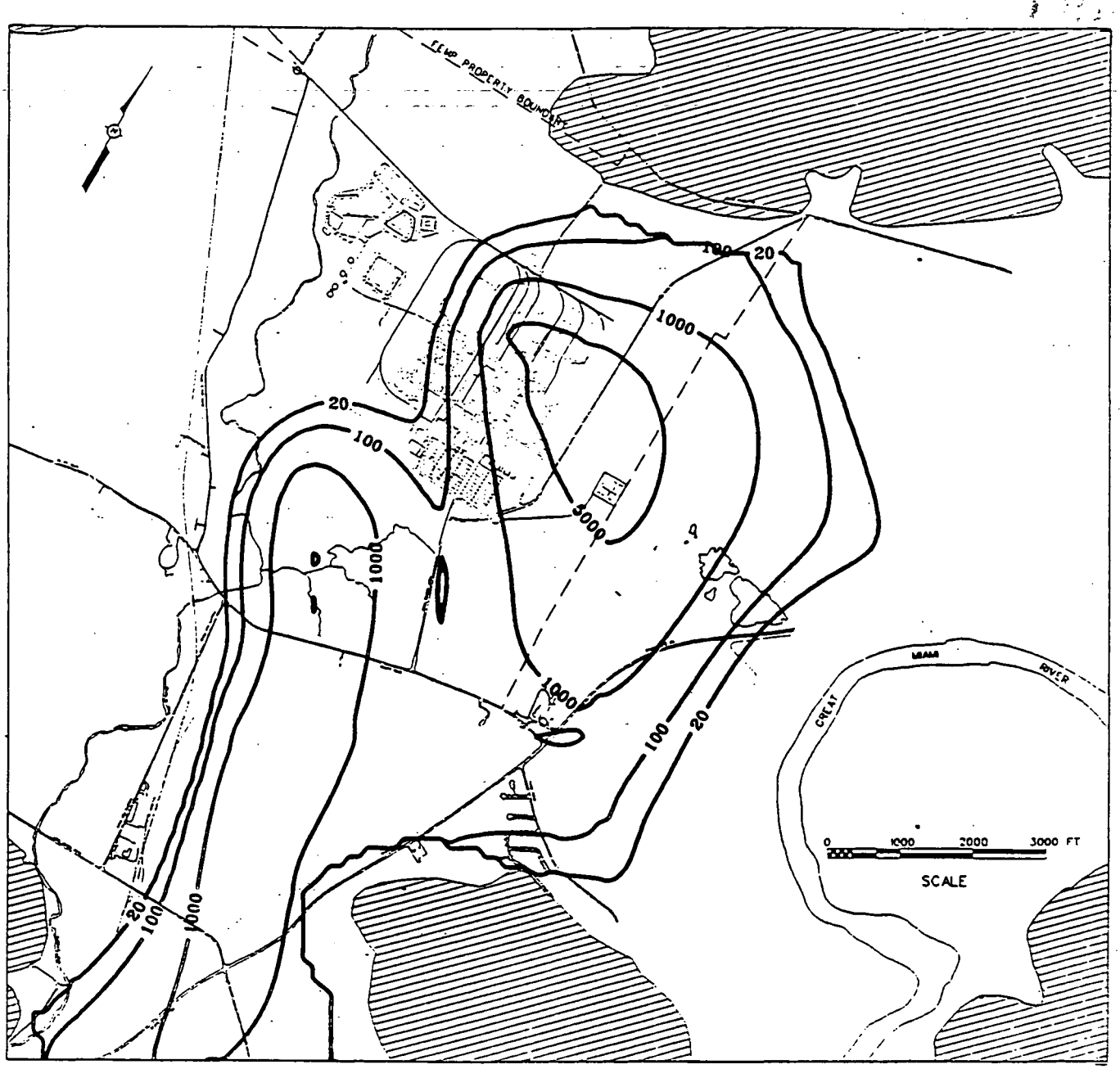
Figure 5.4-14 - SWIFT Sensitivity Analysis
Case 4 Concentration Over Time at Eastern and Southern Property Lines



Contours in ppb

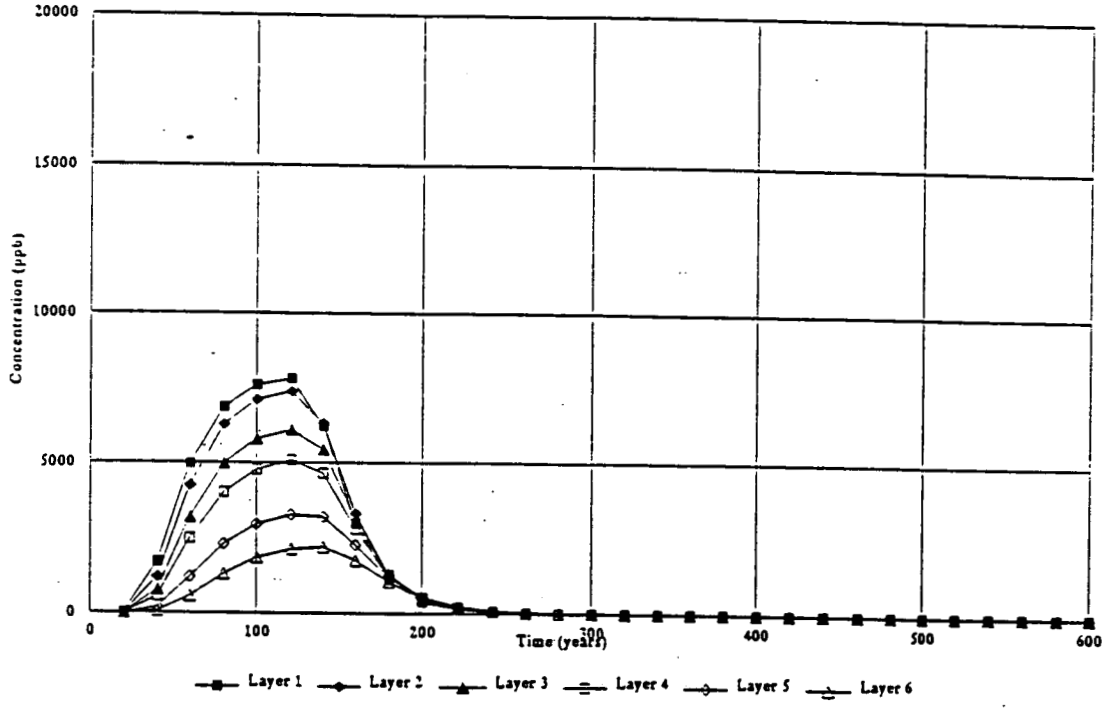
Figure 5.4-15 - SWIFT Sensitivity Analysis - Case 5 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-16 - SWIFT Sensitivity Analysis - Case 5 Layer 3 Plume at 100 Years

Sensitivity Analysis
Case 5



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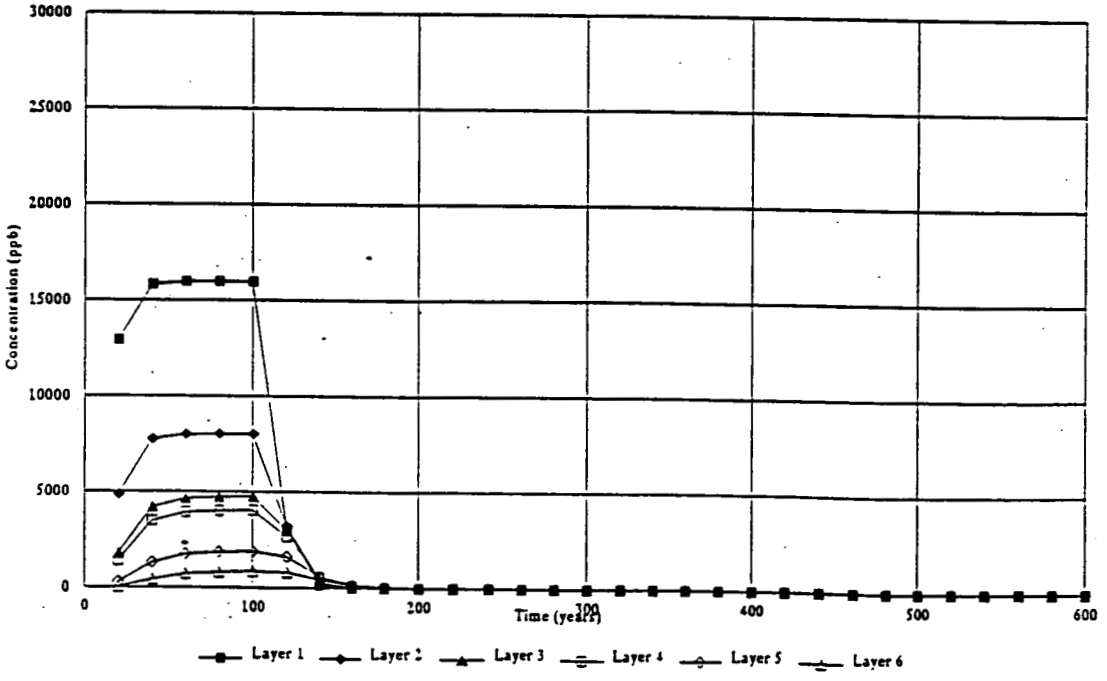

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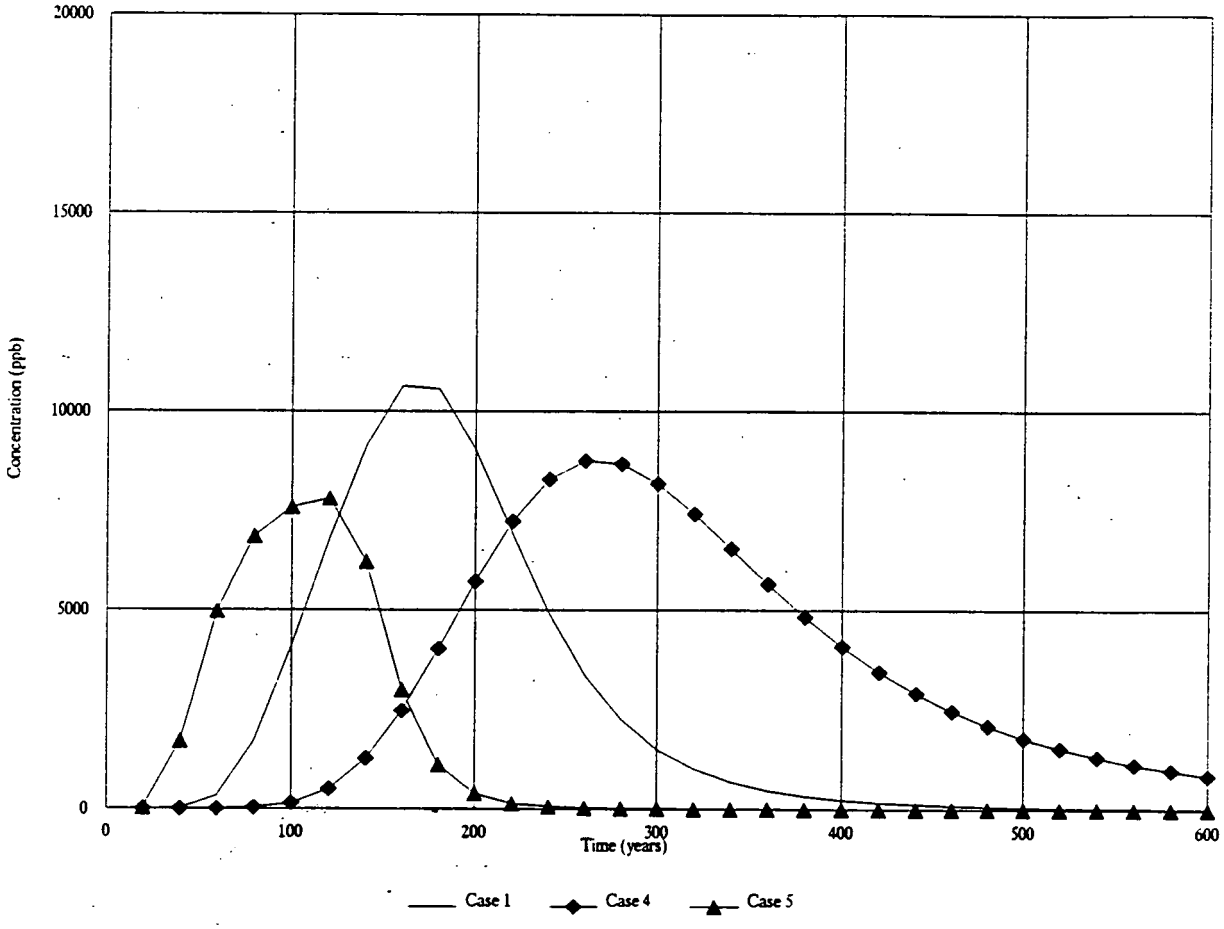
Figure 5.4-17 - SWIFT Sensitivity Analysis
Case 5 Concentration Over Time at Eastern and Southern Property Lines



Hydraulic Conductivity

Figure 5.4-18 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum K_h Cases at Eastern Property Line

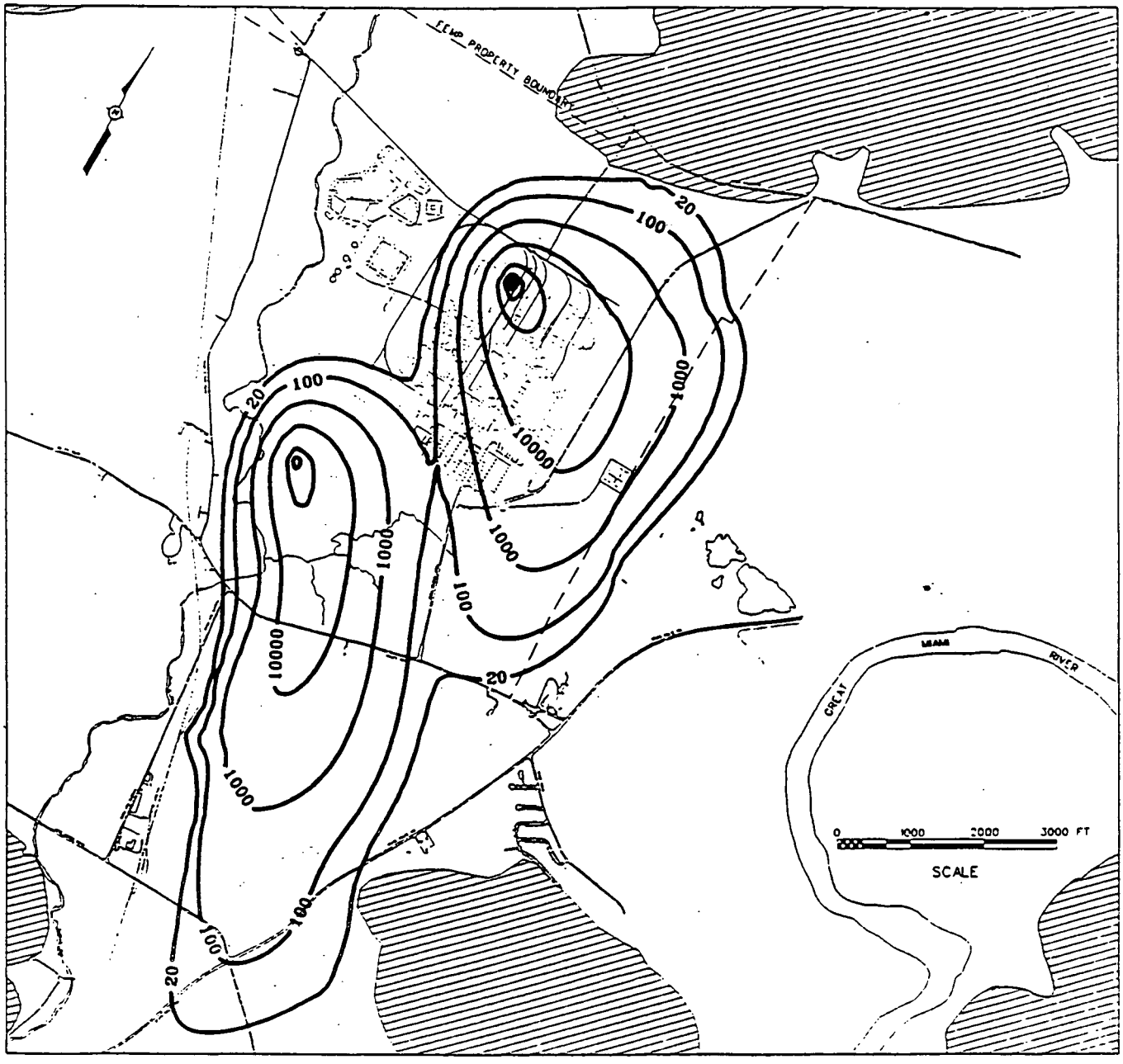


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Figure 5.4-19 - SWIFT Sensitivity Analysis - Case 6 Layer 1 Plume at 100 Years

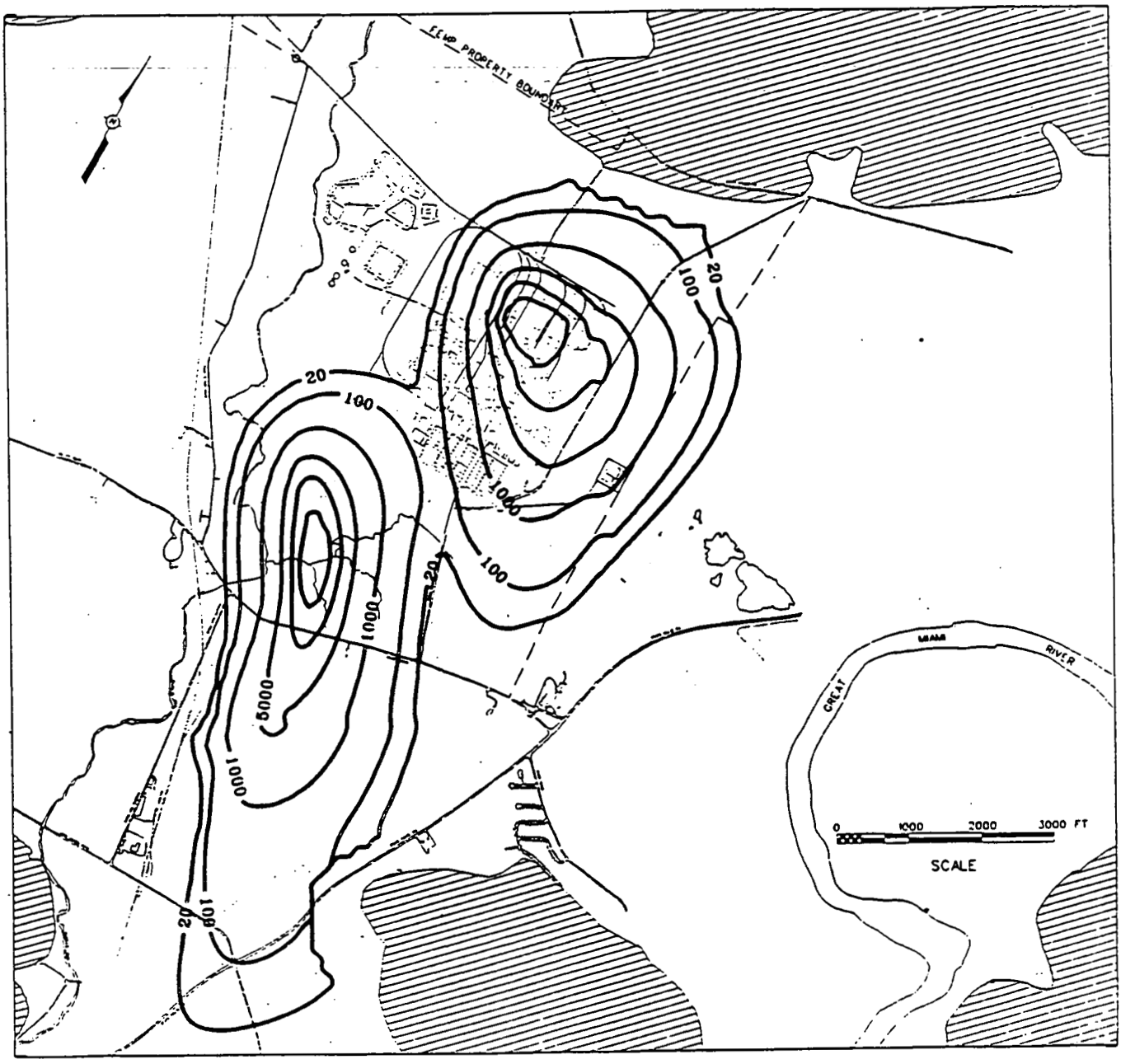

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Figure 5.4-20 - SWIFT Sensitivity Analysis - Case 6 Layer 3 Plume at 100 Years

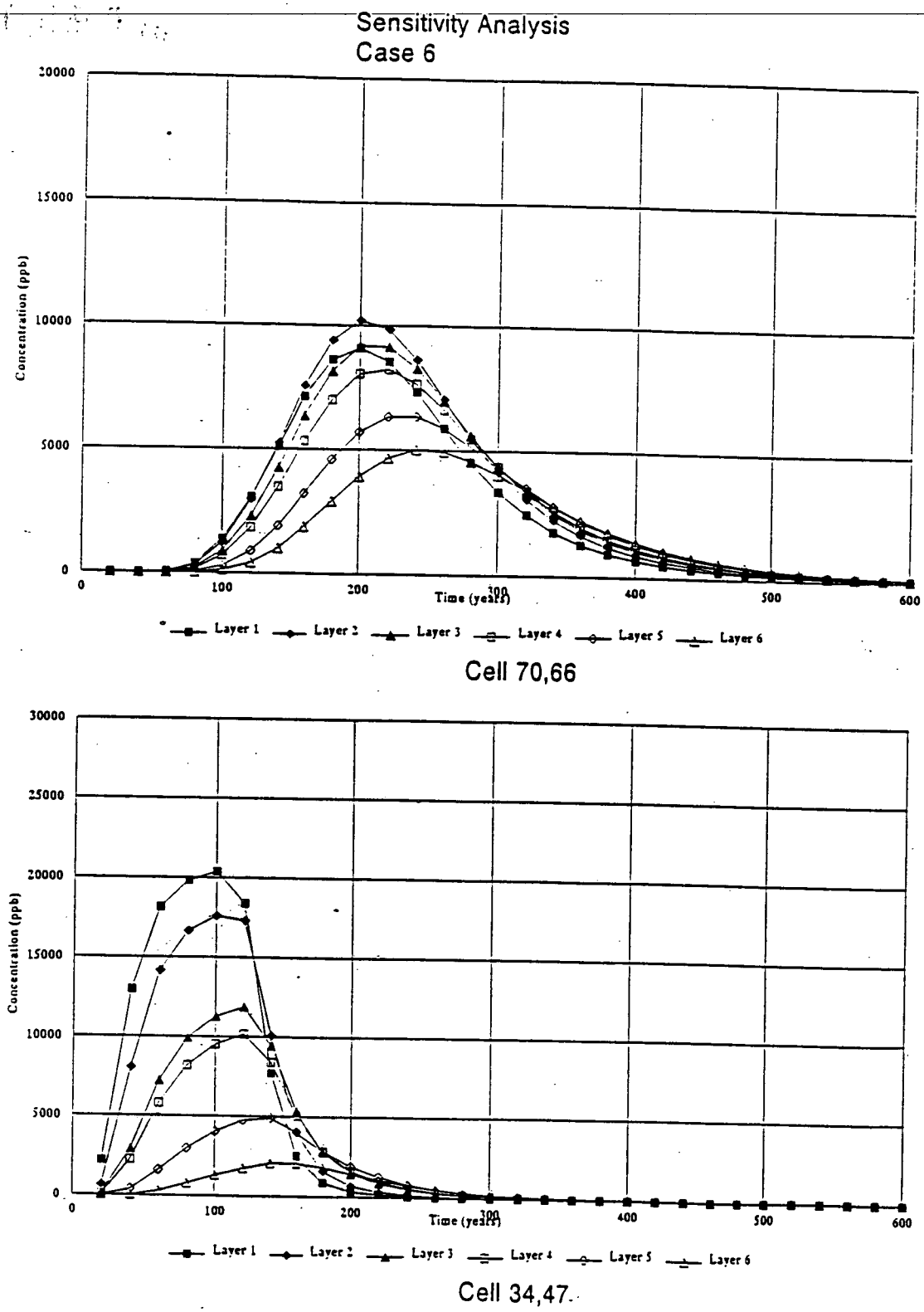
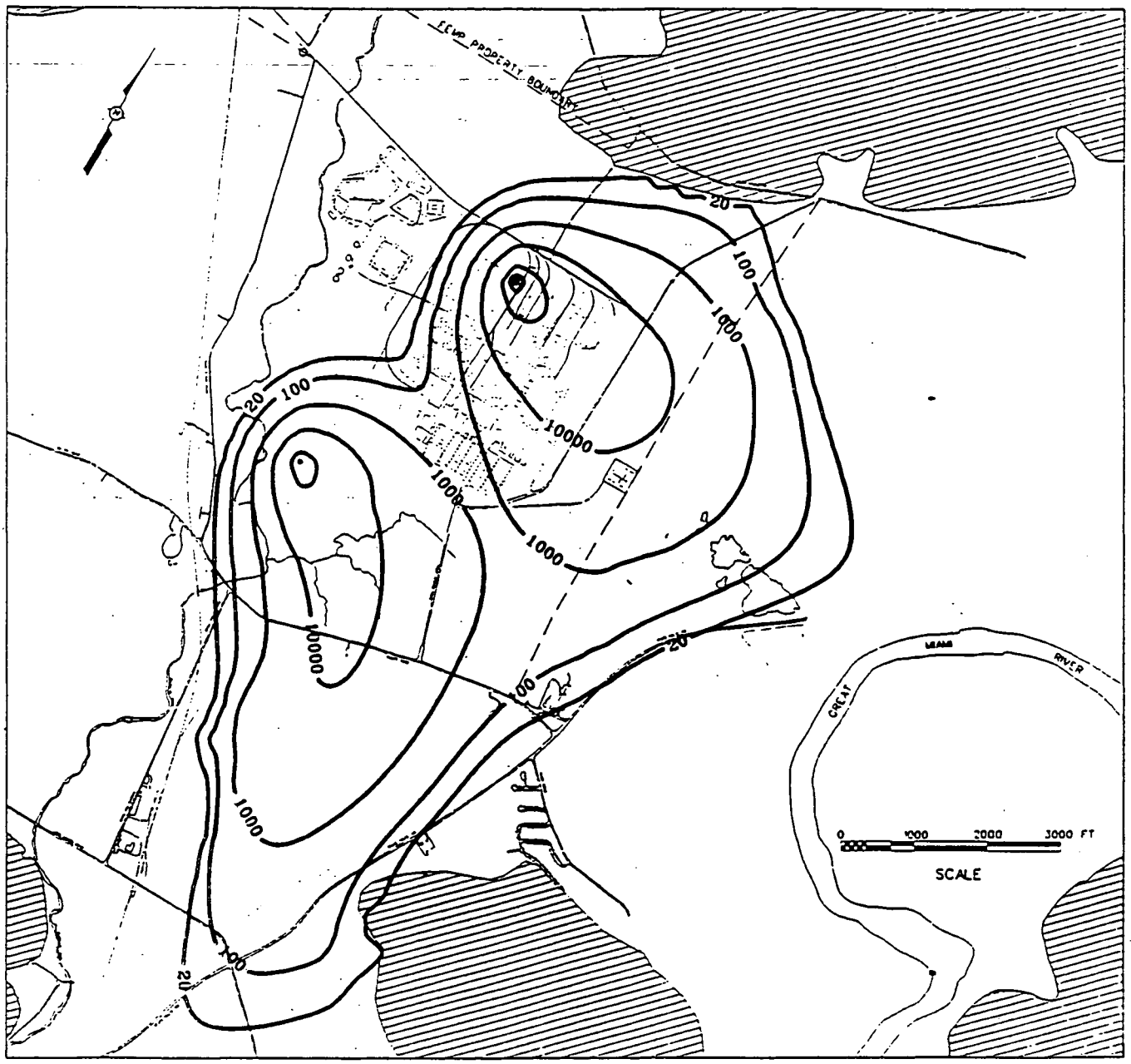
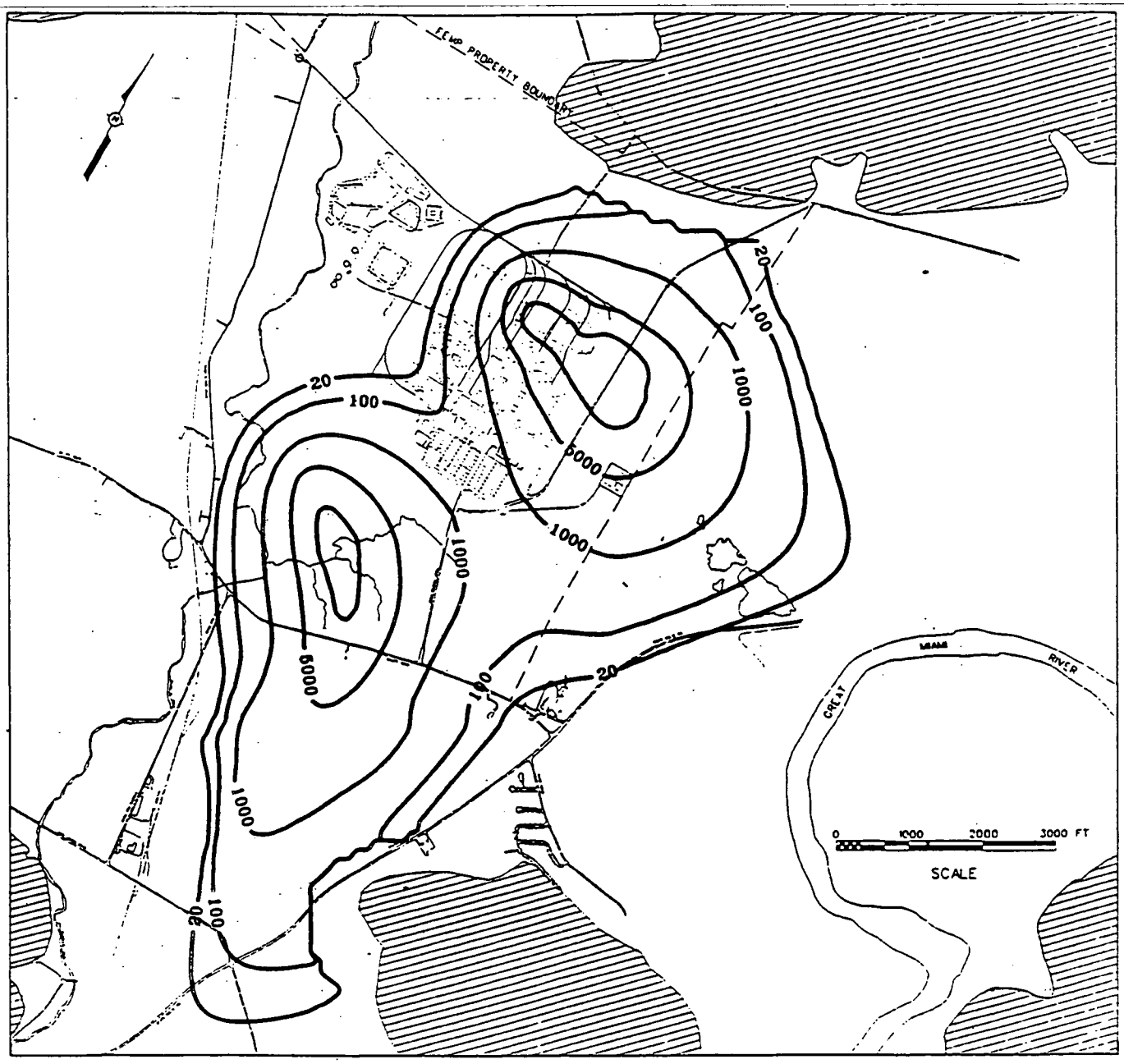


Figure 5.4-21 - SWIFT Sensitivity Analysis
Case 6 Concentration Over Time at Eastern and Southern Property Lines



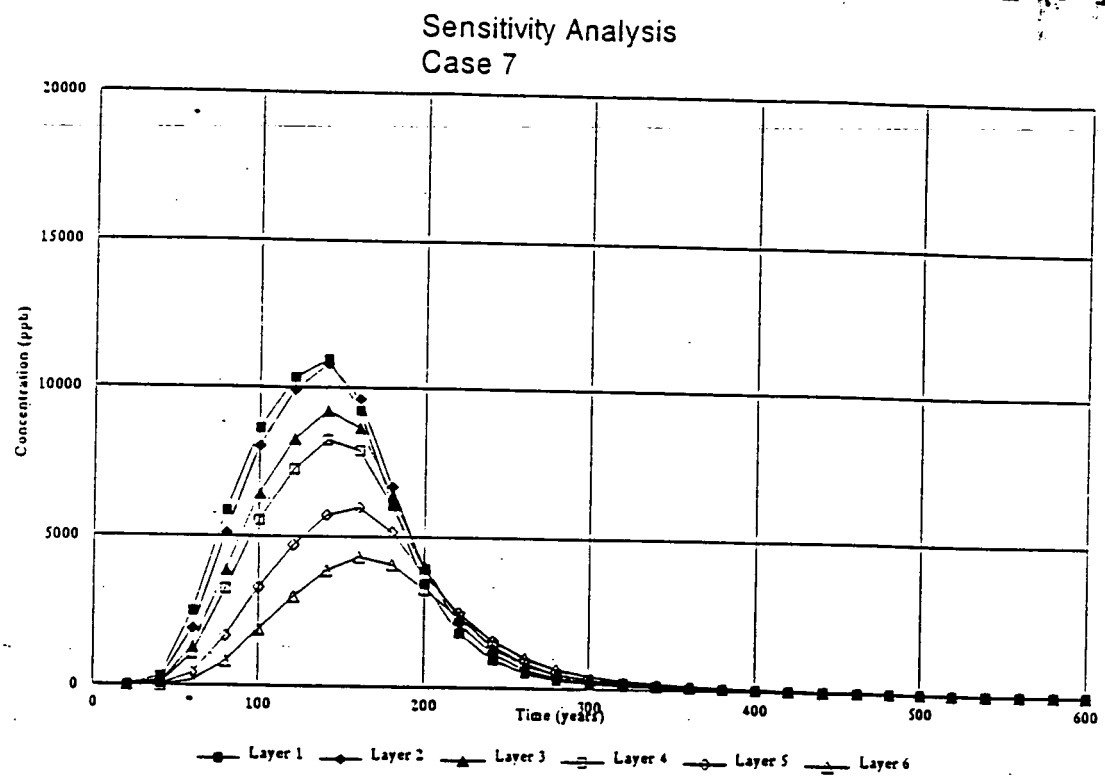
Contours in ppb

Figure 5.4-22 - SWIFT Sensitivity Analysis - Case 7 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-23 - SWIFT Sensitivity Analysis - Case 7 Layer 3 Plume at 100 Years



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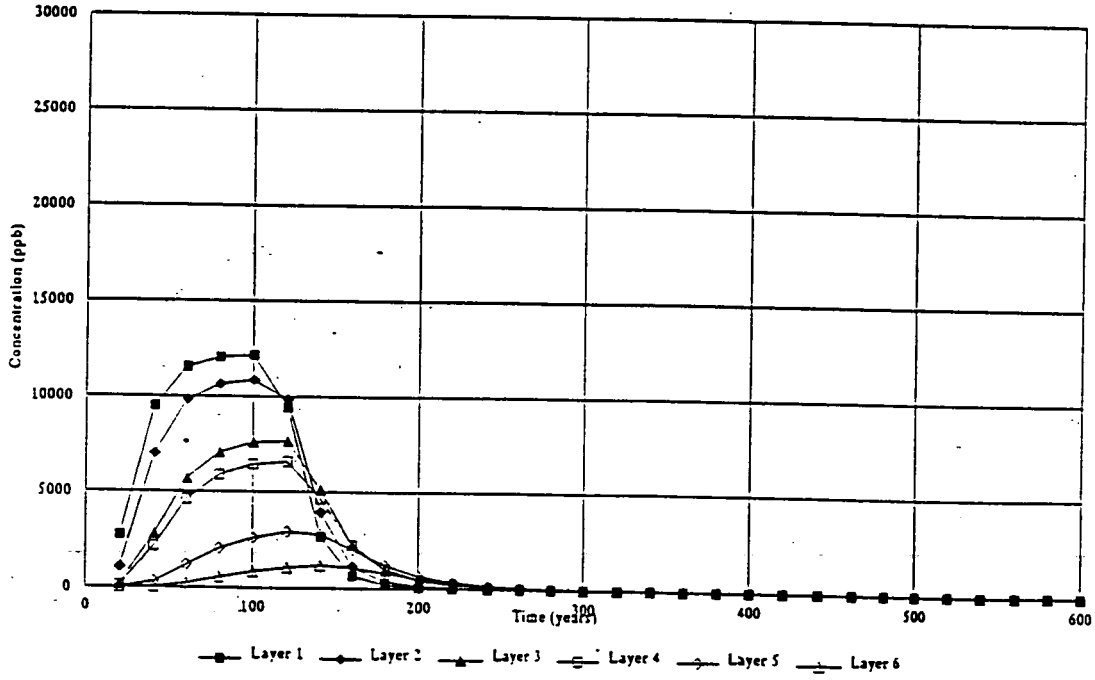

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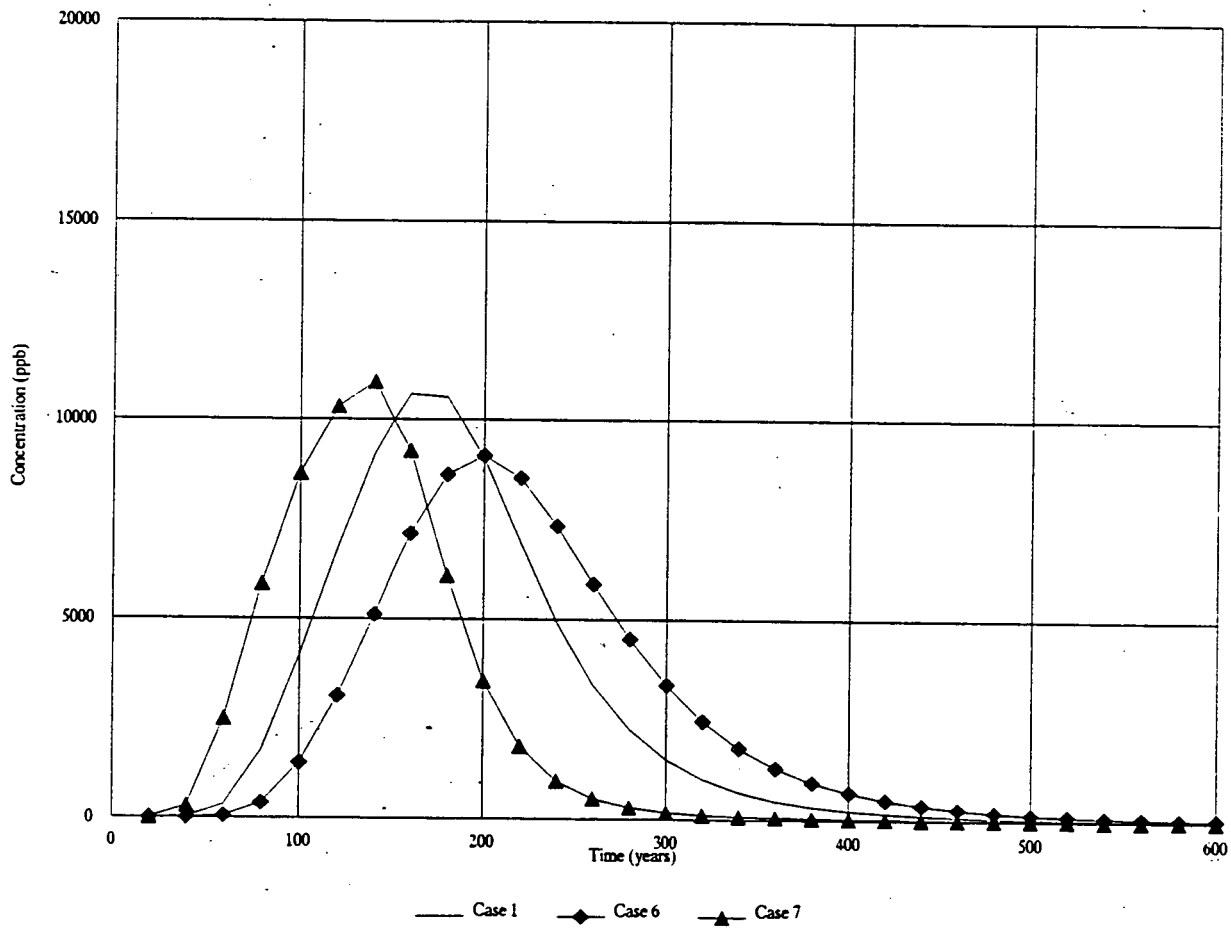
Figure 5.4-24 - SWIFT Sensitivity Analysis
Case 7 Concentration Over Time at Eastern and Southern Property Lines



Kh / Kv

Figure 5.4-25 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum K_h/K_v Cases at Eastern Property Line

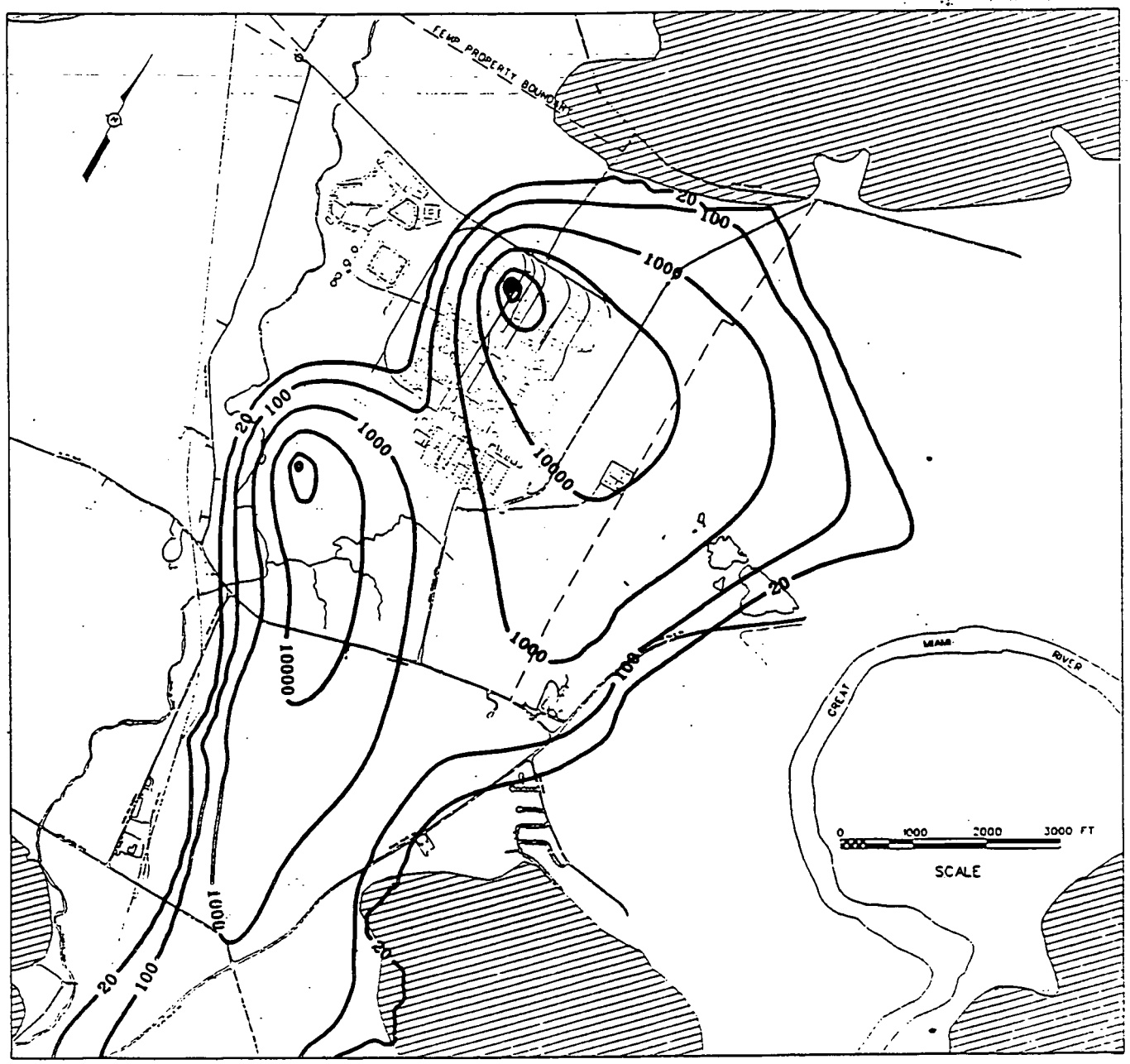


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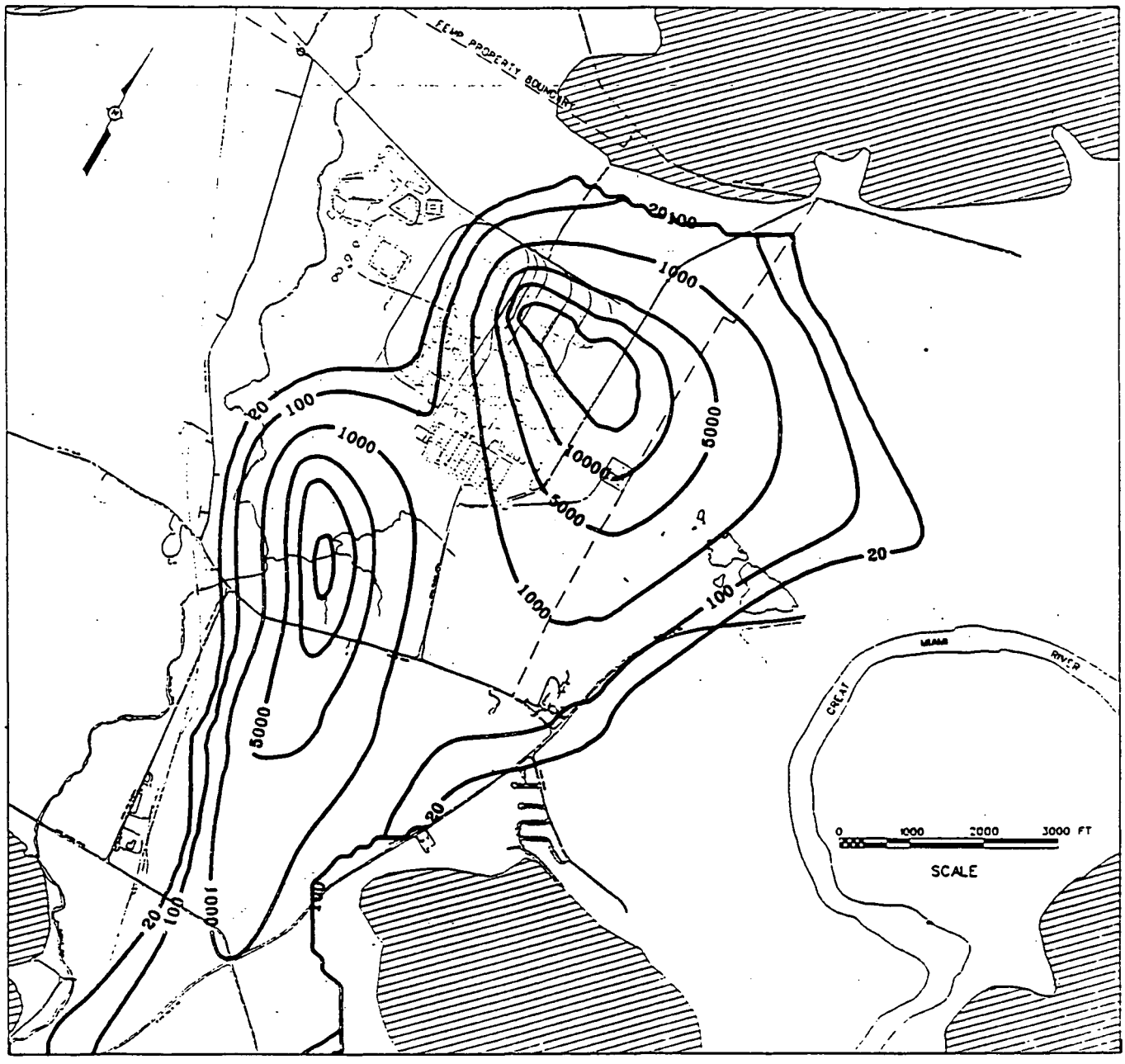
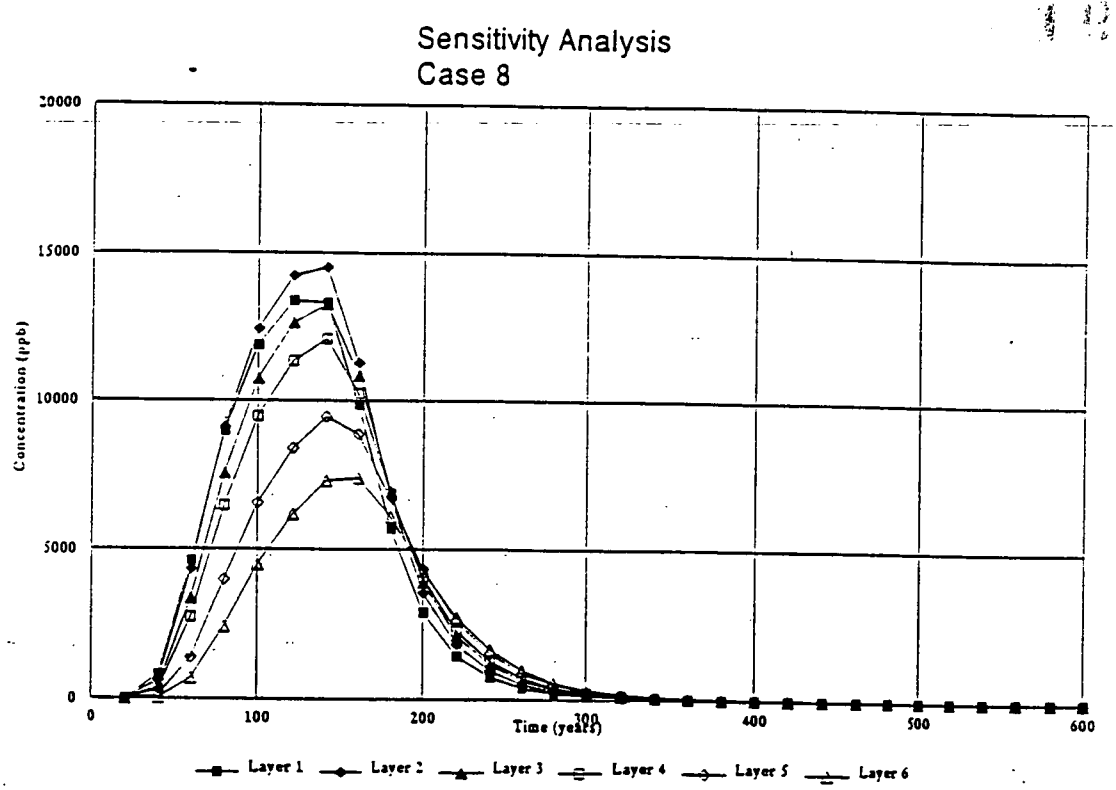
Figure 5.4-26 - SWIFT Sensitivity Analysis - Case 8 Layer 1 Plume at 100 Years



Contours in ppb

Figure 5.4-27 - SWIFT Sensitivity Analysis - Case 8 Layer 3 Plume at 100 Years



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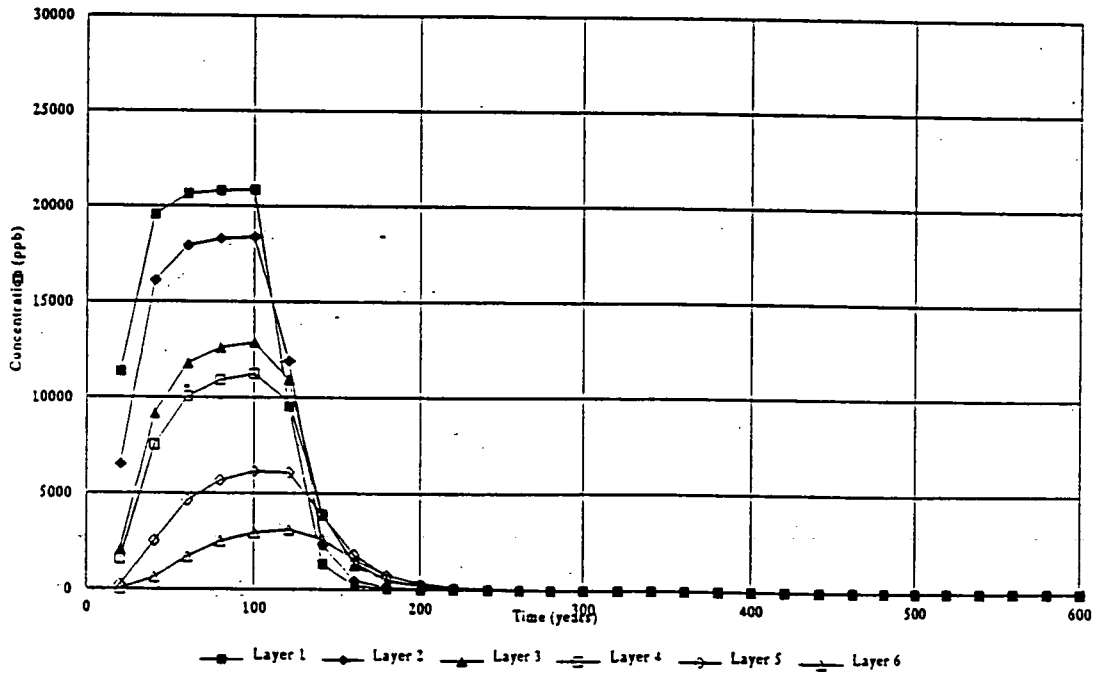

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Figure 5.4-28 - SWIFT Sensitivity Analysis
Case 8 Concentration Over Time at Eastern and Southern Property Lines

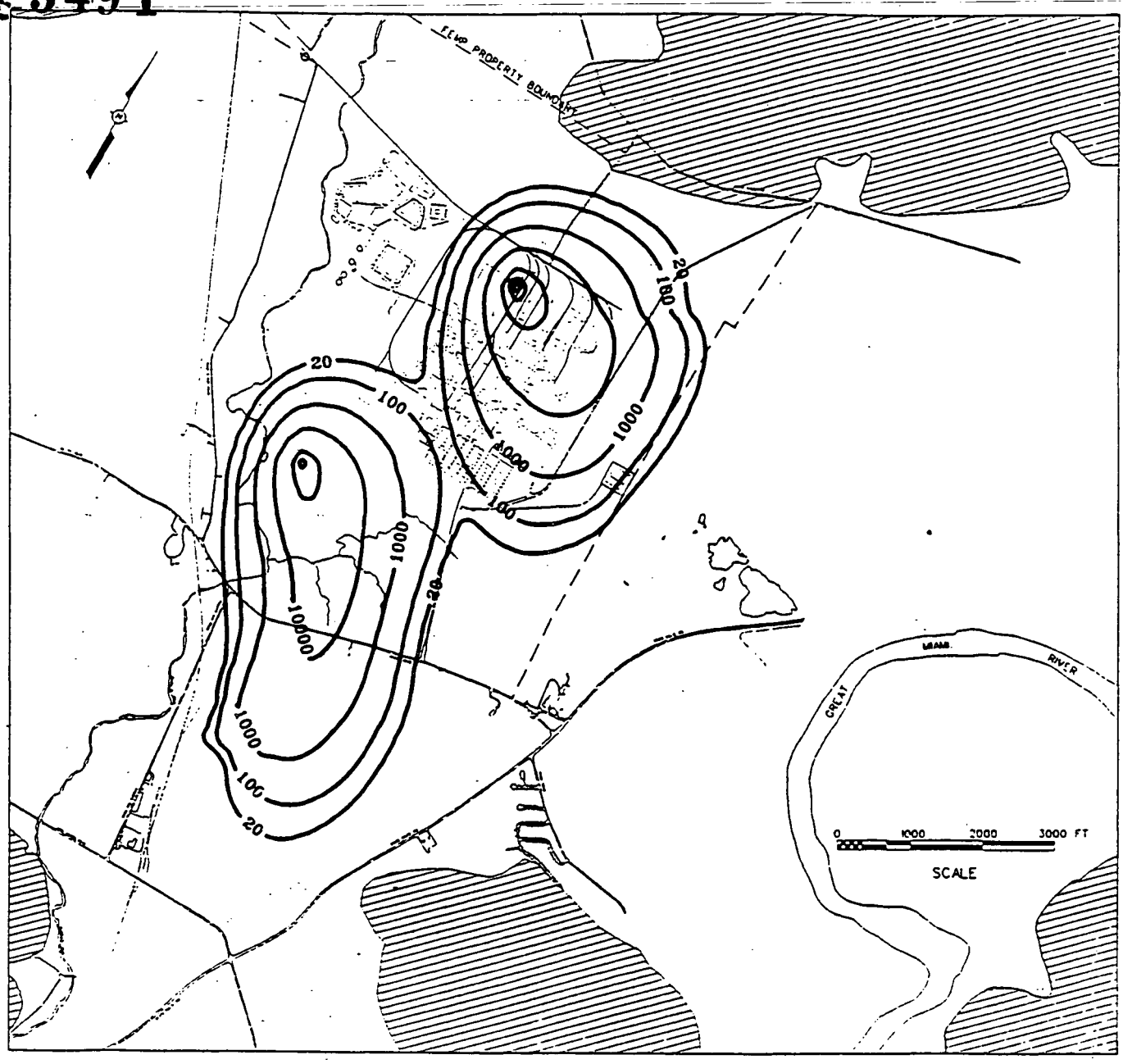

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Figure 5.4-29 - SWIFT Sensitivity Analysis - Case 9 Layer 1 Plume at 100 Years

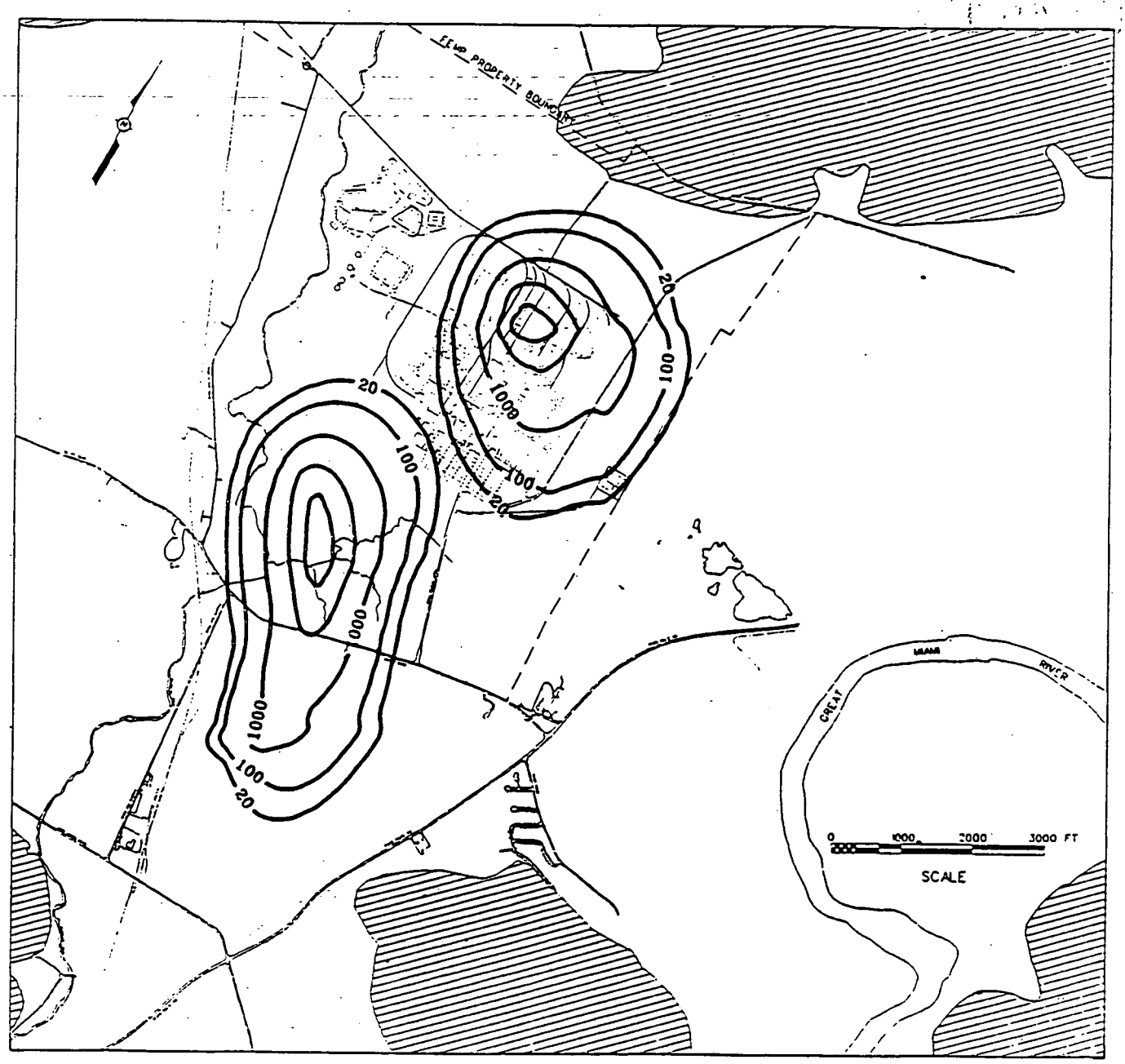

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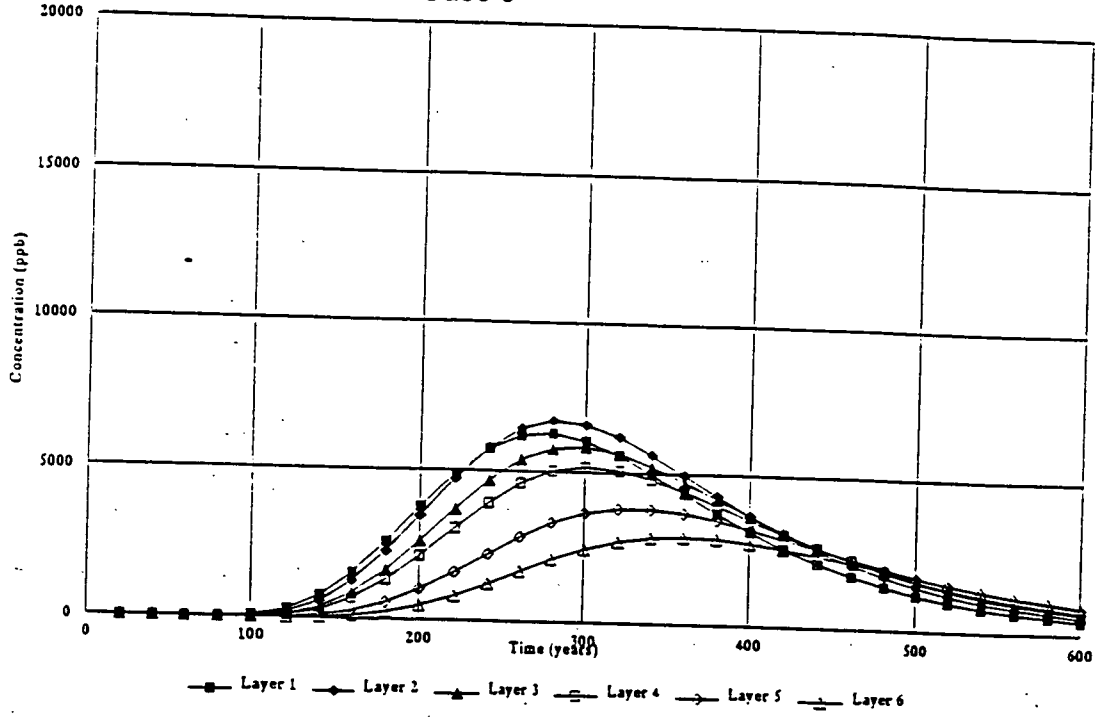
Figure 5.4-30 - SWIFT Sensitivity Analysis - Case 9 Layer 3 Plume at 100 Years

Sensitivity Analysis
Case 9



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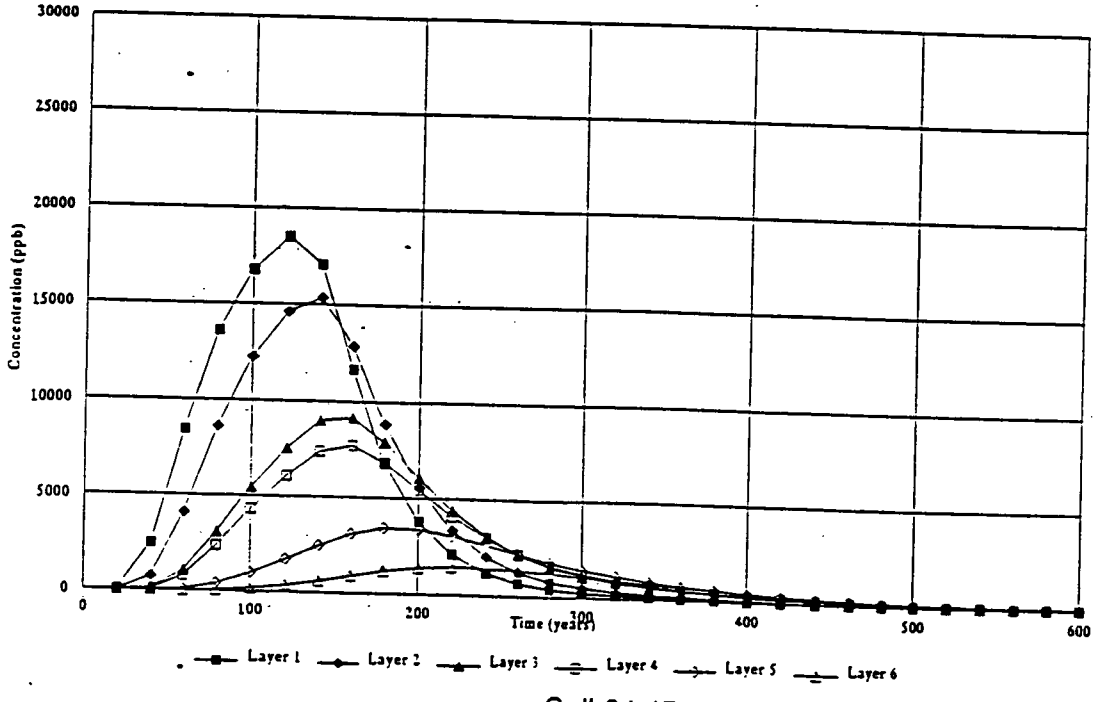

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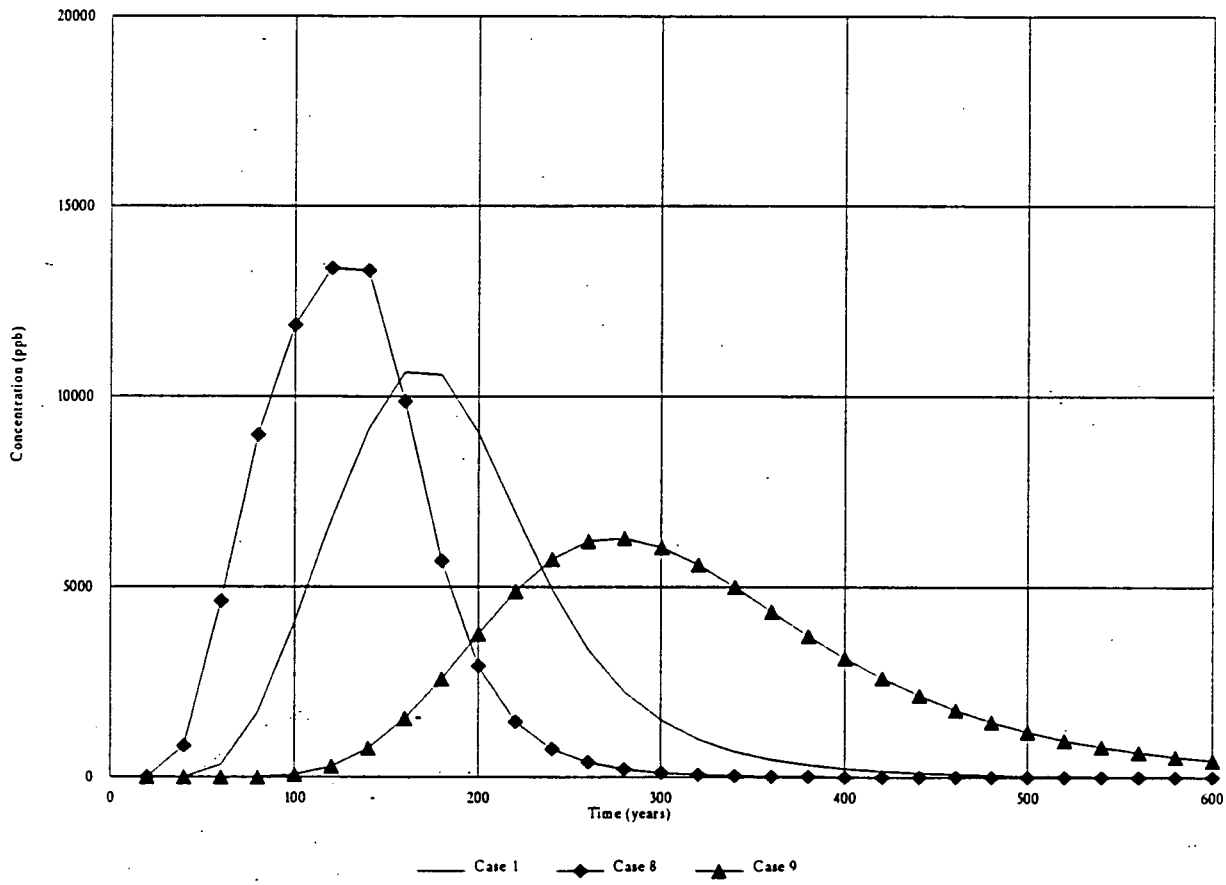
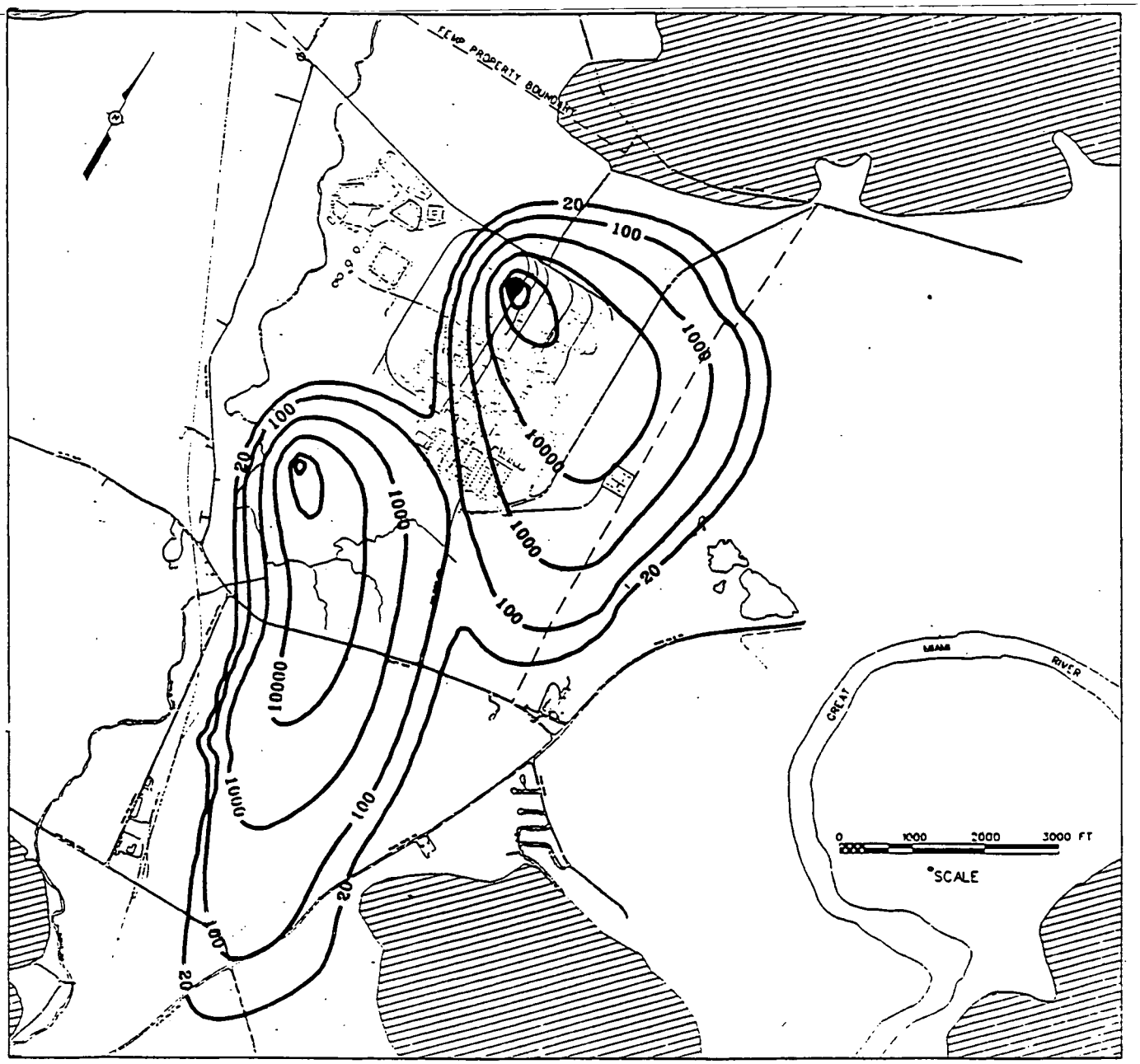
Figure 5.4-31 - SWIFT Sensitivity Analysis
Case 9 Concentration Over Time at Eastern and Southern Property Lines



Kd

Figure 5.4-32 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum K_d Cases at Eastern Property Line



Contours in ppb

Figure 5.4-33 - SWIFT Sensitivity Analysis - Case 10 Layer 1 Plume at 100 Years

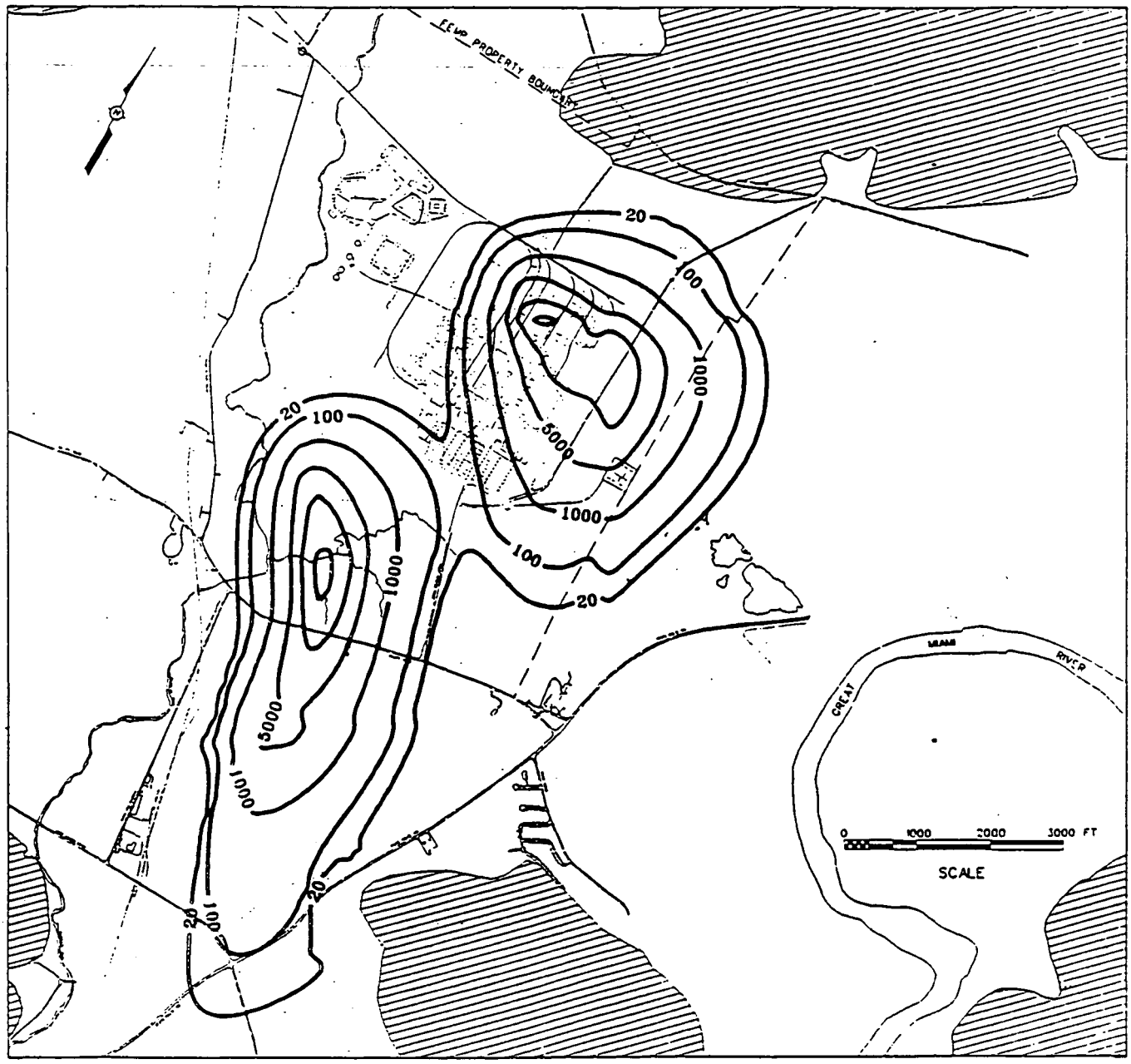


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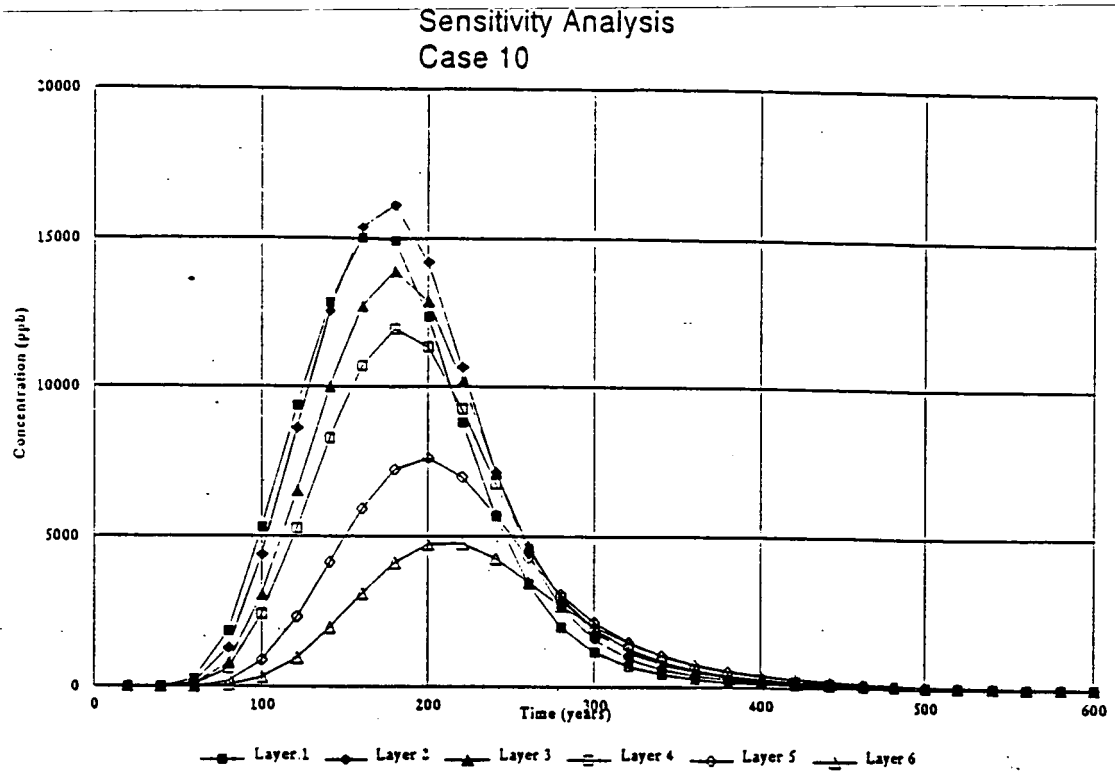
Figure 5.4-34 - SWIFT Sensitivity Analysis - Case 10 Layer 3 Plume at 100 Years



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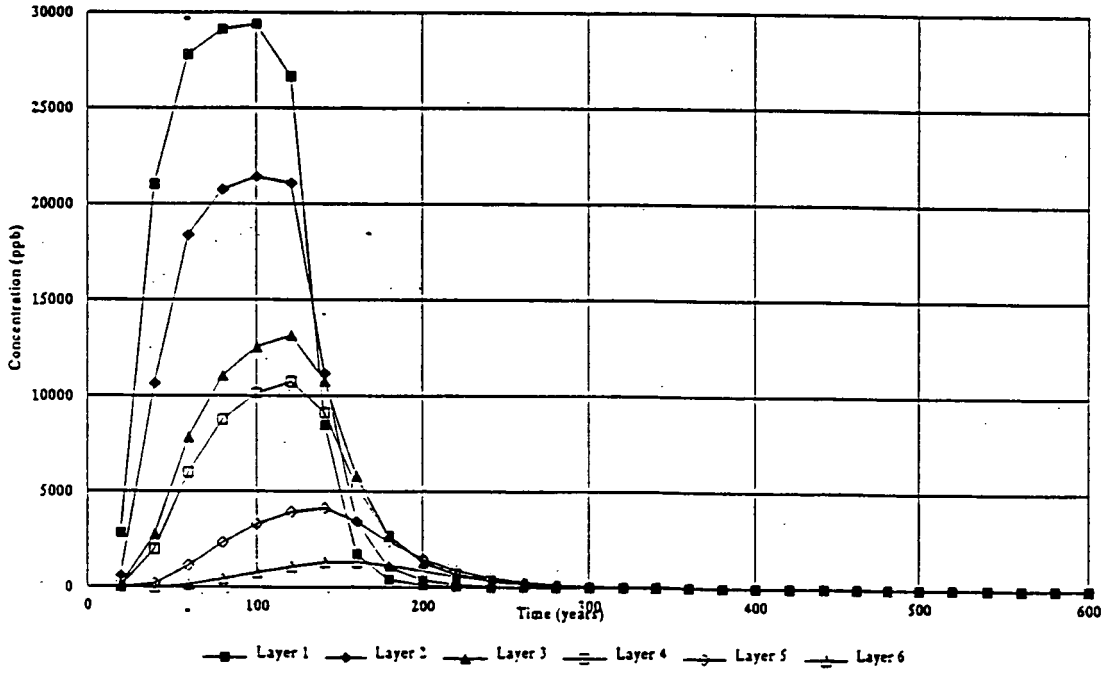

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Figure 5.4-35 - SWIFT Sensitivity Analysis
Case 10 Concentration Over Time at Eastern and Southern Property Lines

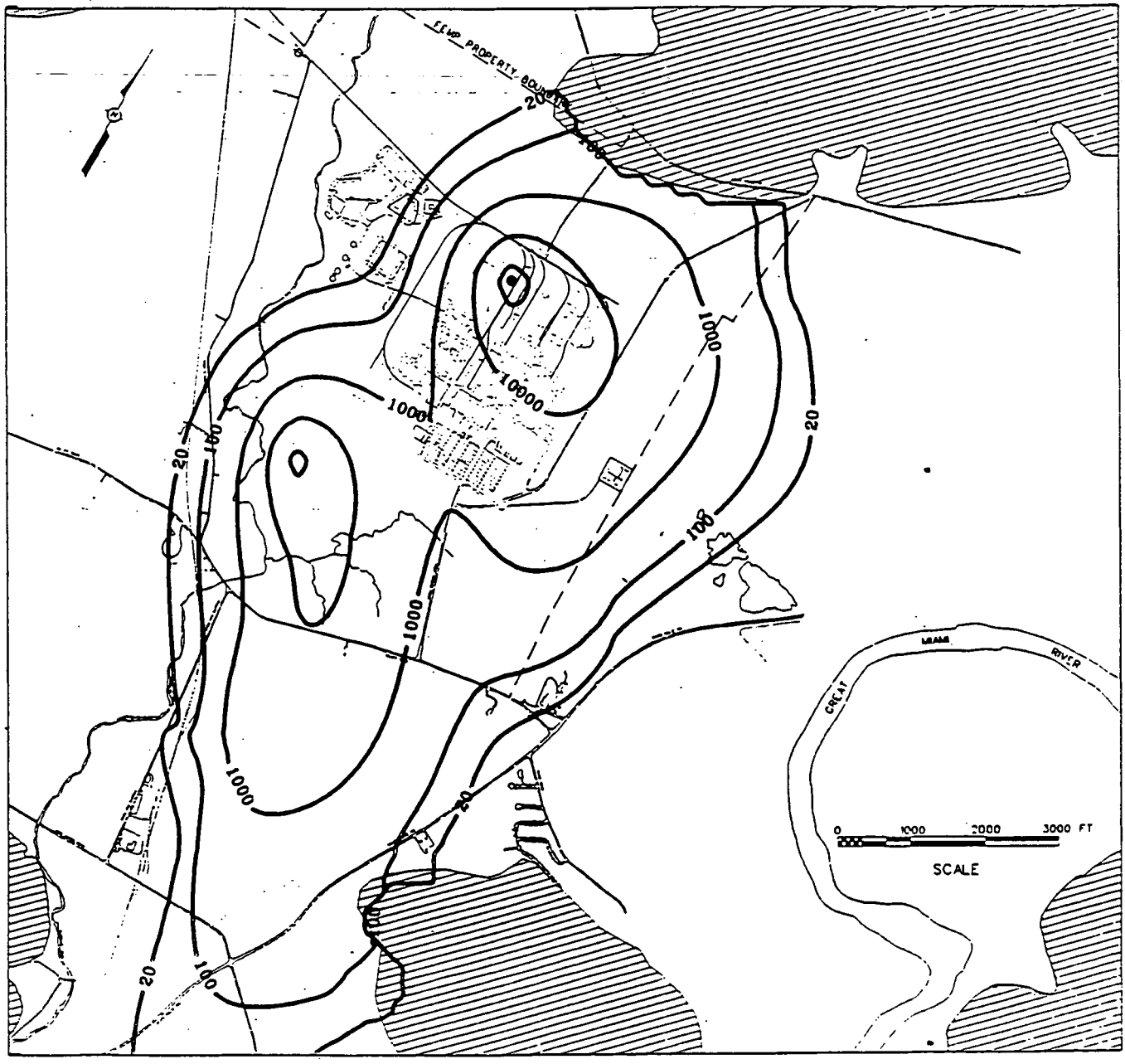

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Figure 5.4-36 - SWIFT Sensitivity Analysis - Case 11 Layer 1 Plume at 100 Years

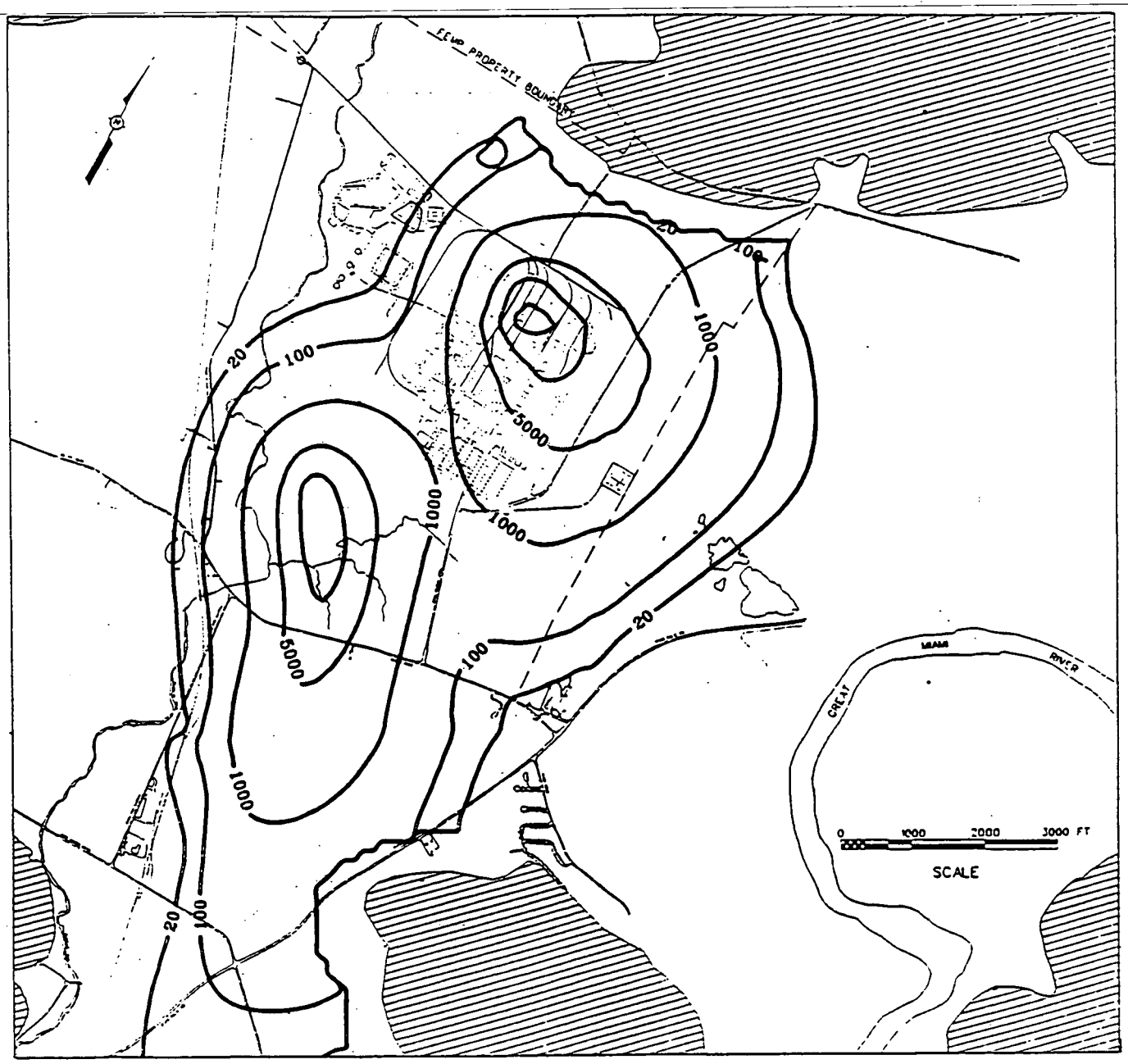

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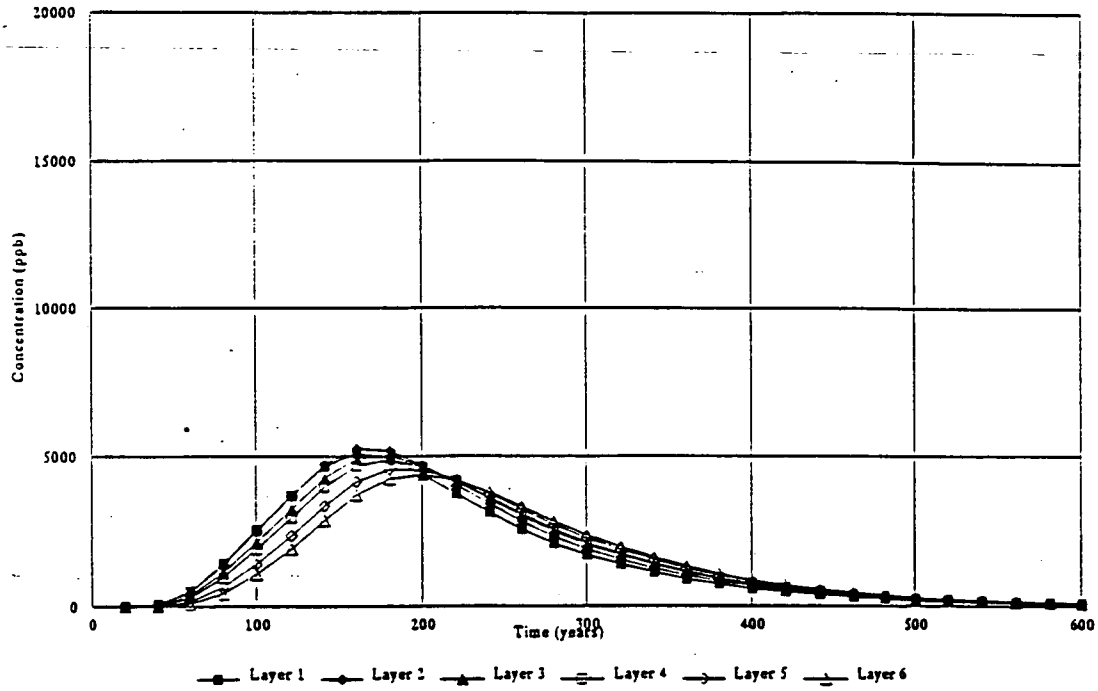
Figure 5.4-37 - SWIFT Sensitivity Analysis - Case 11 Layer 3 Plume at 100 Years

Sensitivity Analysis
Case 11



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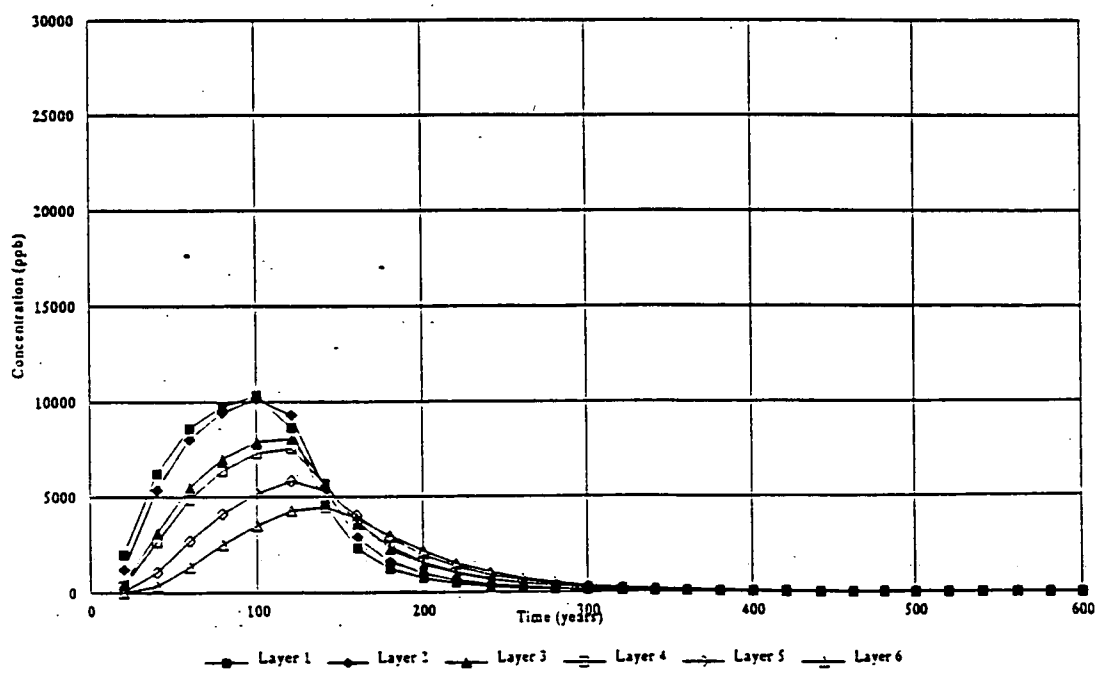

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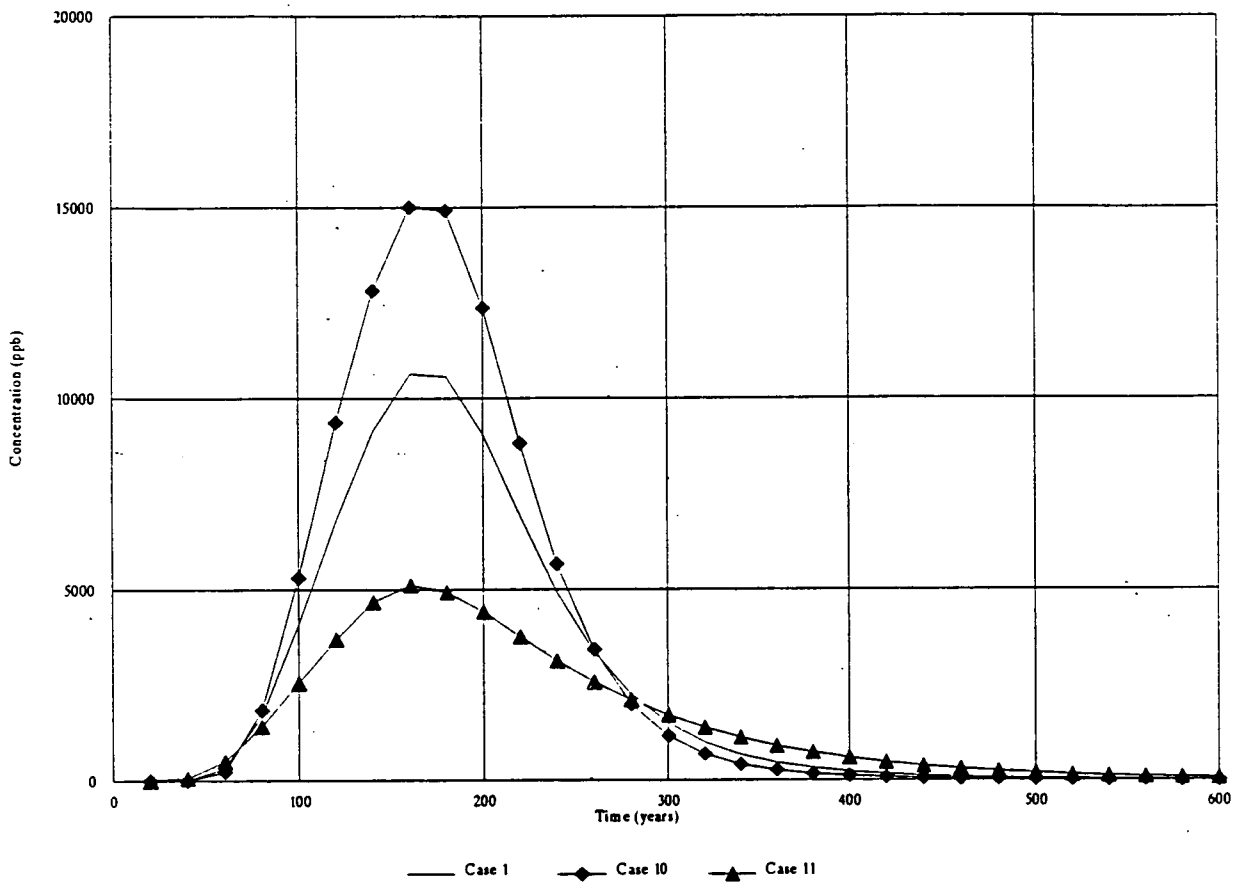
Figure 5.4-38 - SWIFT Sensitivity Analysis
Case 11 Concentration Over Time at Eastern and Southern Property Lines



Dispersivity

Figure 5.4-39 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum Dispersivity Cases at Eastern Property Line

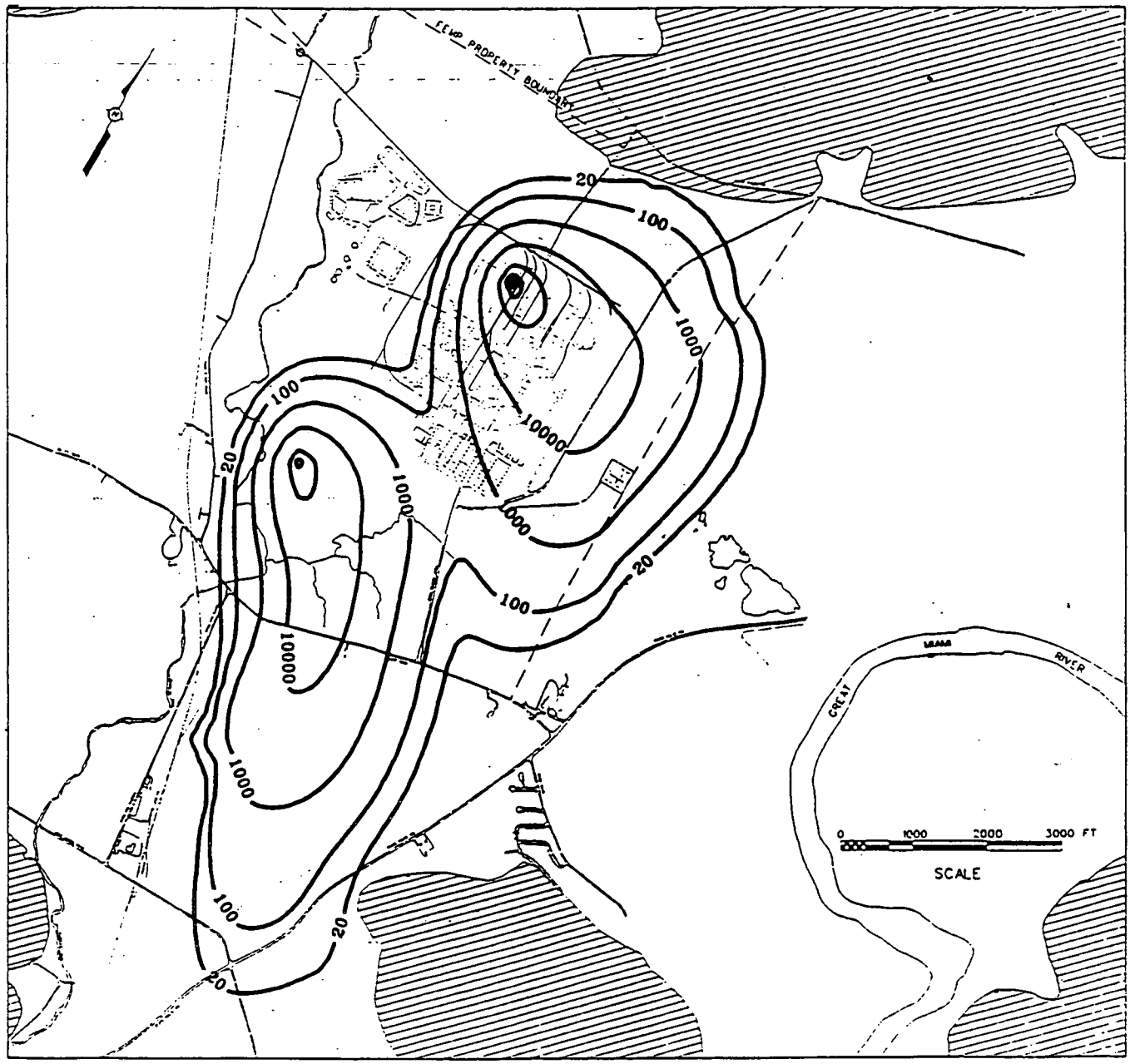


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Figure 5.4-40 - SWIFT Sensitivity Analysis - Case 12 Layer 1 Plume at 100 Years

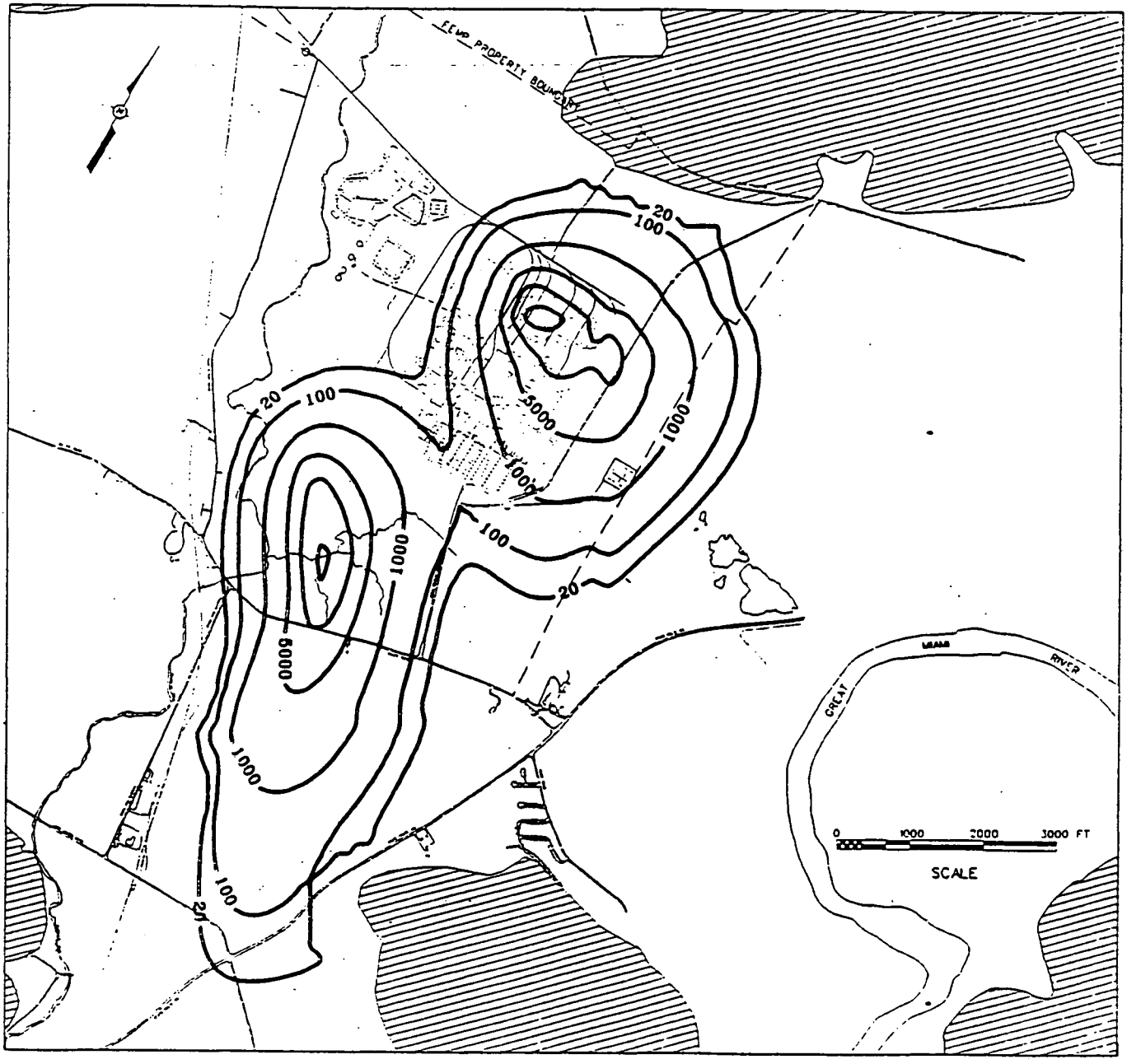

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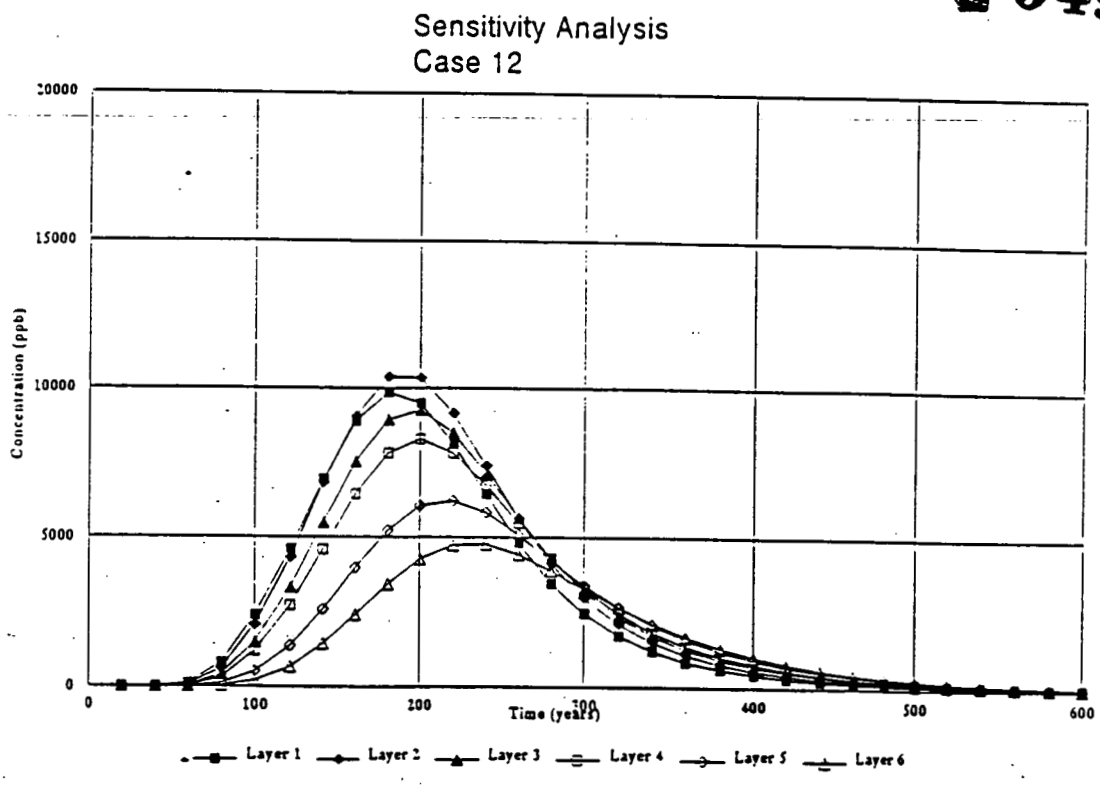
Figure 5.4-41 - SWIFT Sensitivity Analysis - Case 12 Layer 3 Plume at 100 Years



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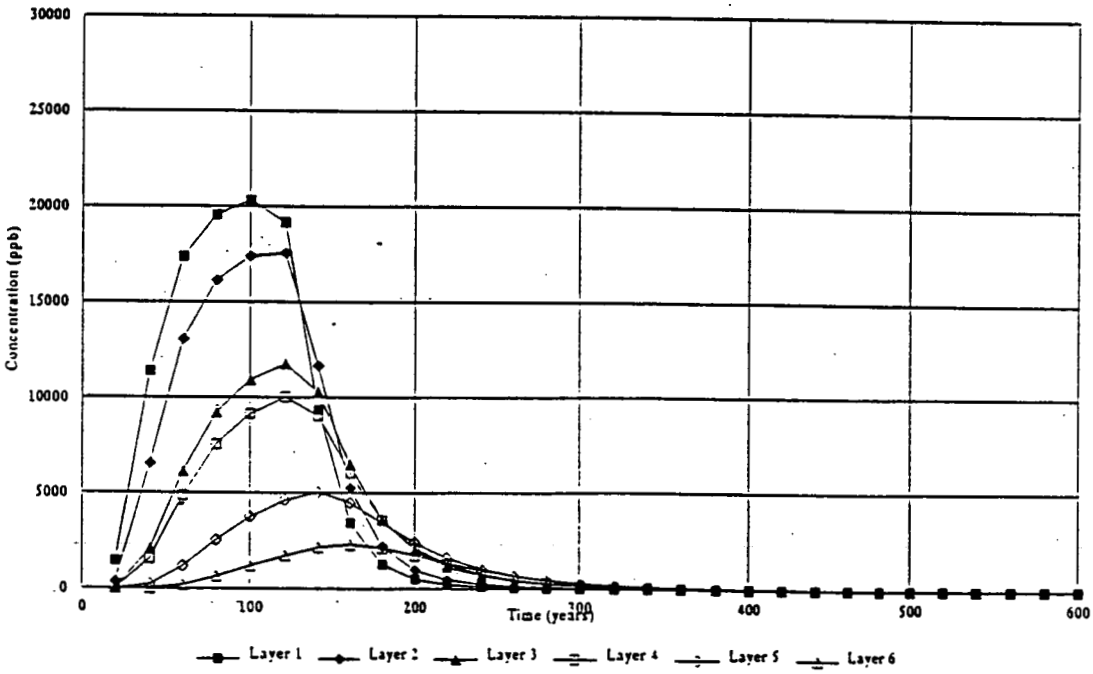

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Figure 5.4-42 - SWIFT Sensitivity Analysis
Case 12 Concentration Over Time at Eastern and Southern Property Lines

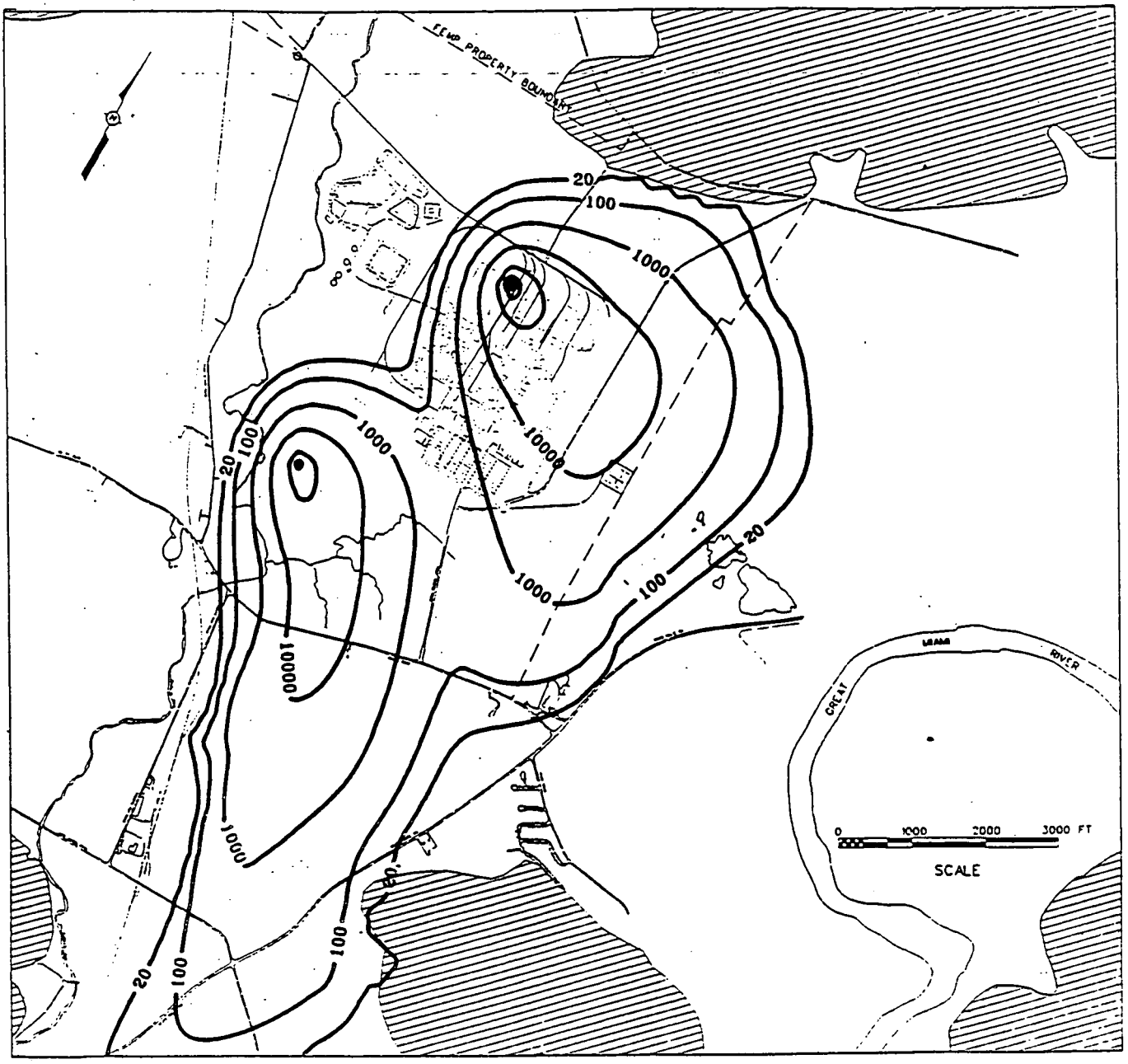

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Figure 5.4-43 - SWIFT Sensitivity Analysis - Case 13 Layer 1 Plume at 100 Years

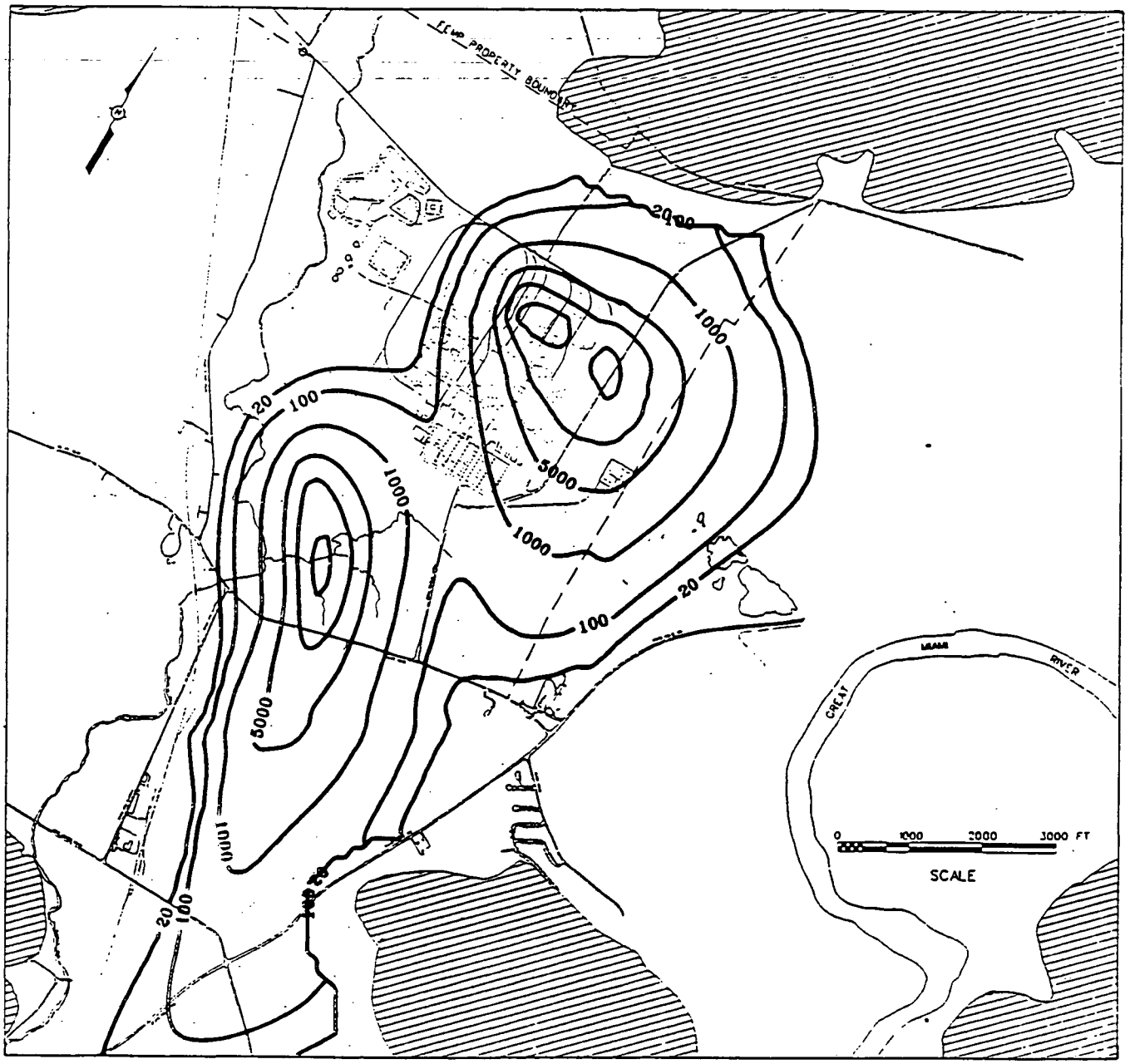

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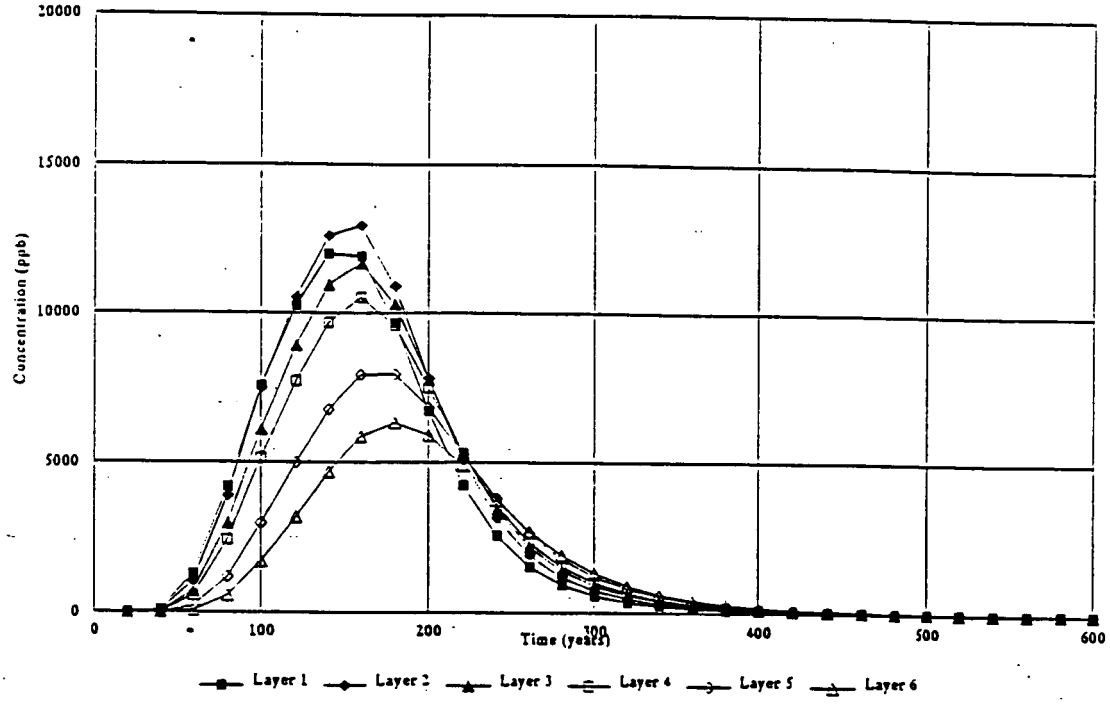
Figure 5.4-44 - SWIFT Sensitivity Analysis - Case 13 Layer 3 Plume at 100 Years

Sensitivity Analysis
Case 13



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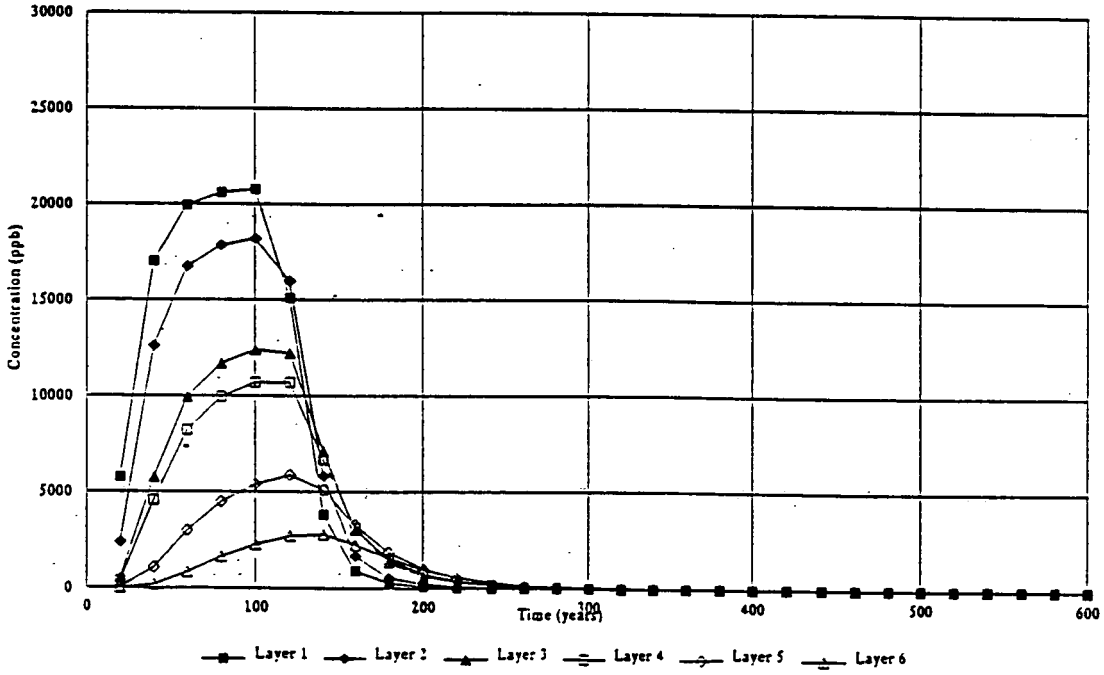

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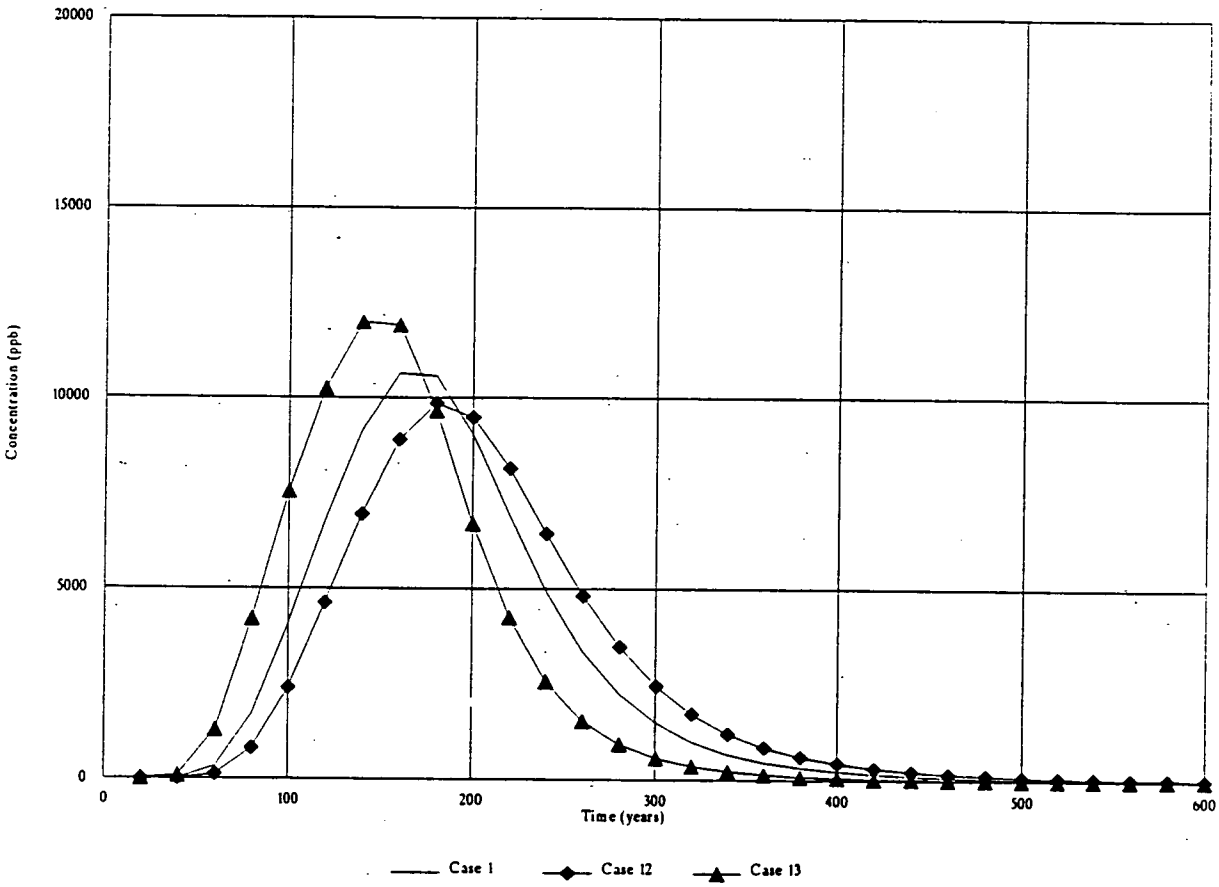
Figure 5.4-45 - SWIFT Sensitivity Analysis
Case 13 Concentration Over Time at Eastern and Southern Property Lines



Porosity

Figure 5.4-46 - SWIFT Sensitivity Analysis - Comparison of Layer 1 Transport for Maximum and Minimum Porosity Cases at Eastern Property Line

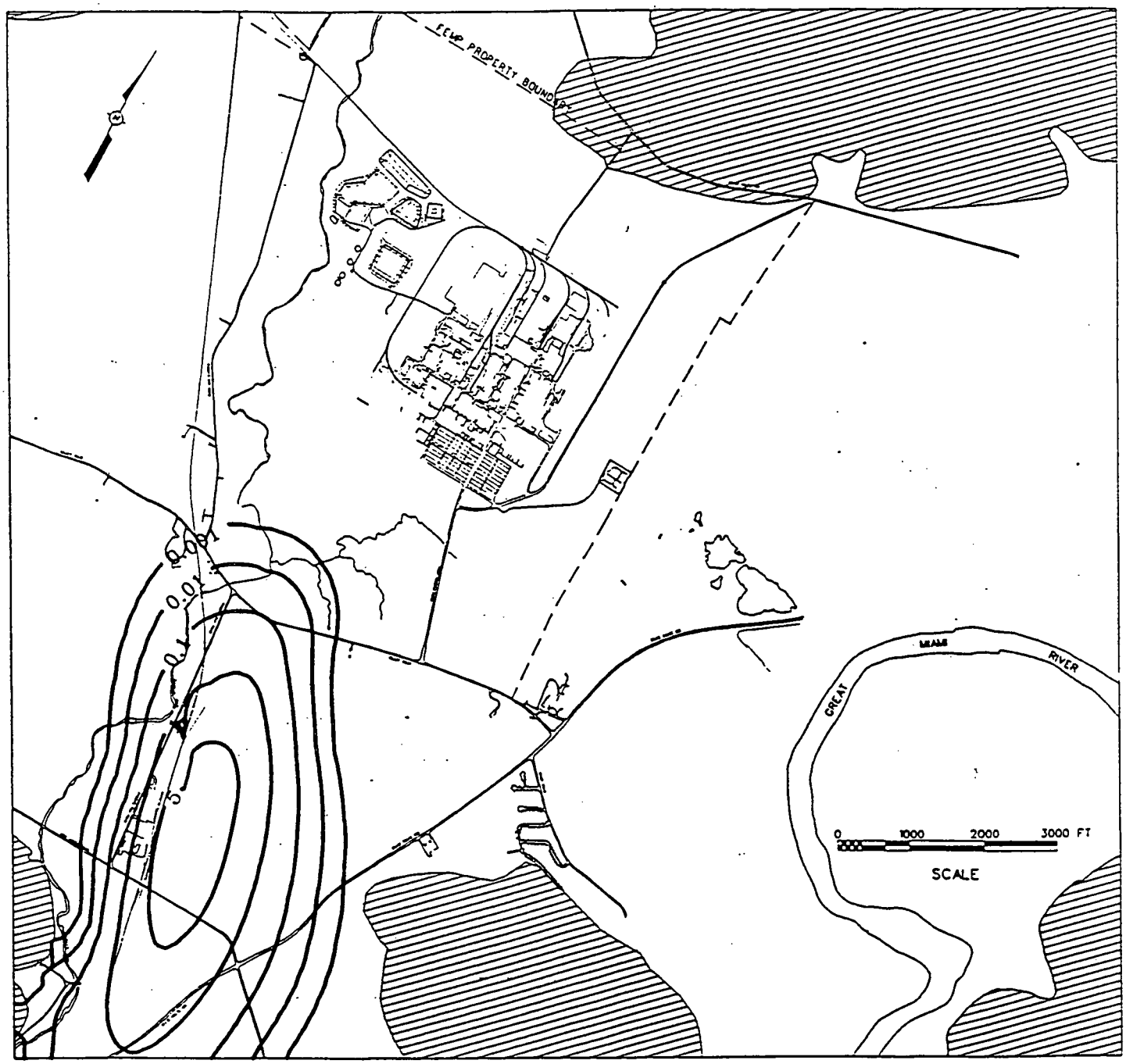


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Figure 5.4-47 - SWIFT Sensitivity Analysis - Case 14 (Baseline South Plume) Layer 1 Plume at 40 Years

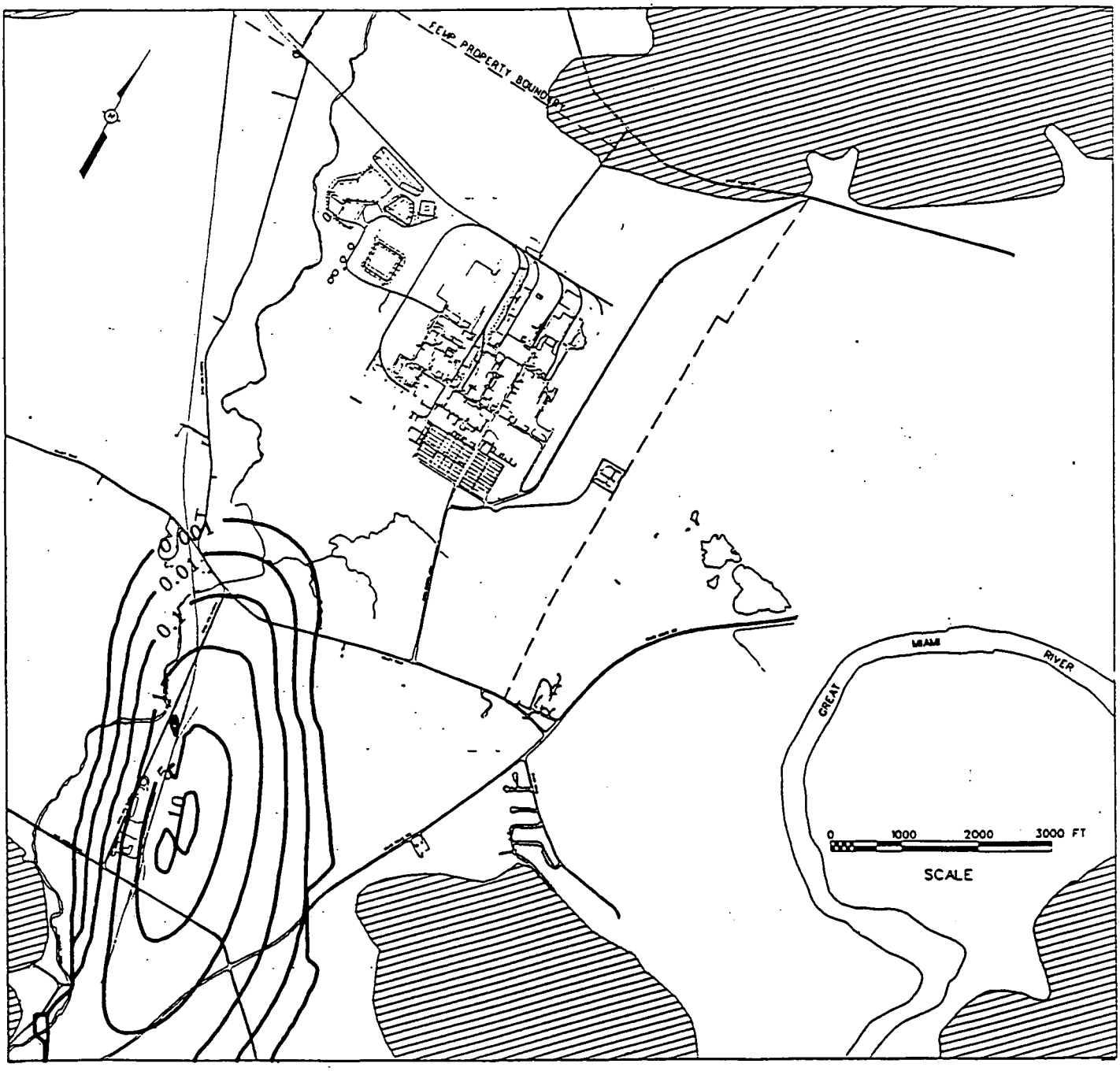

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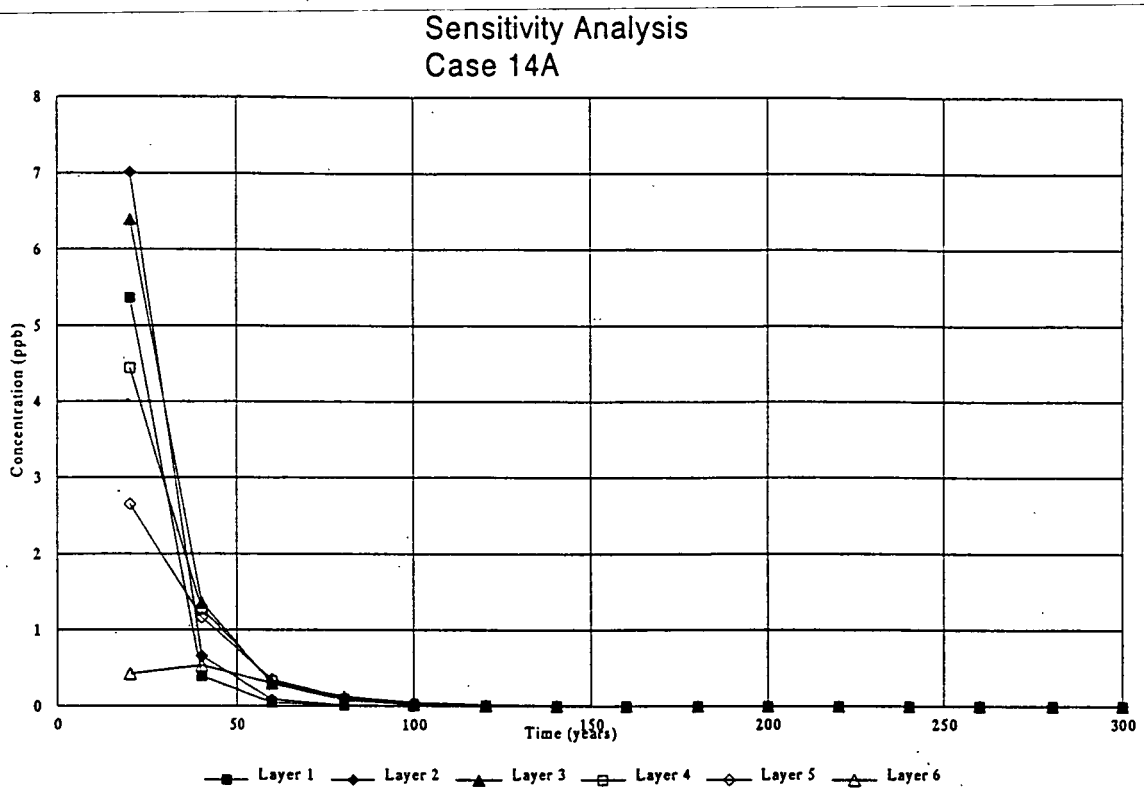
Figure 5.4-48 - SWIFT Sensitivity Analysis - Case 14 (Baseline South Plume) Layer 3 Plume at 40 Years



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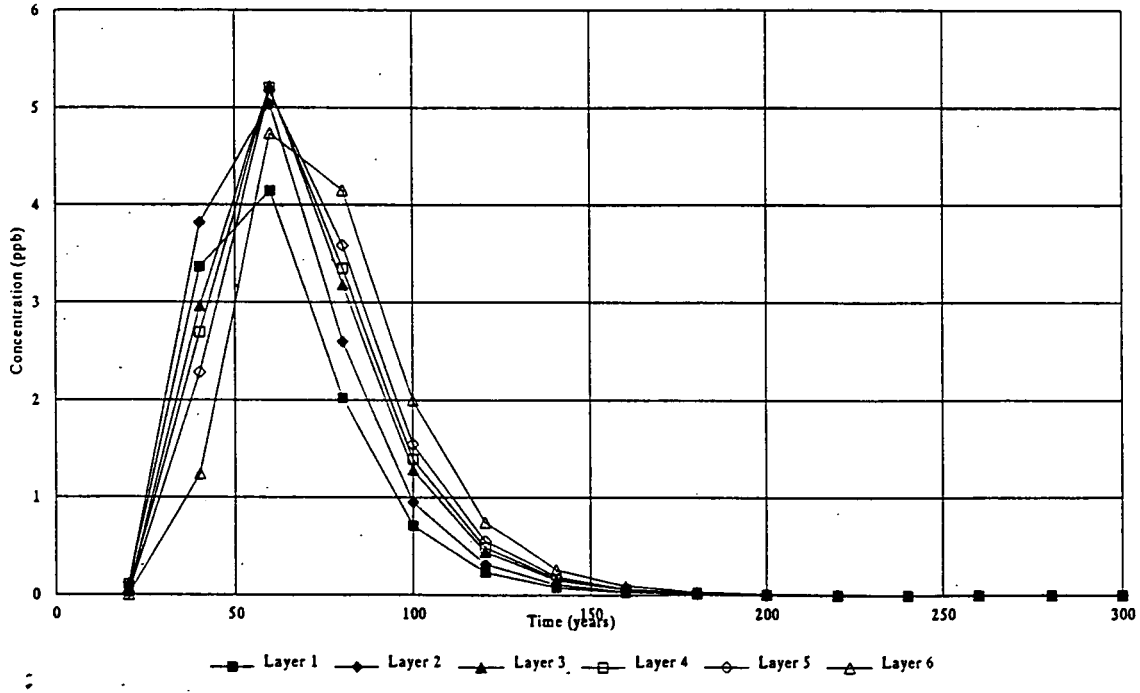

Cell 21,14

Figure 5.4-49 - SWIFT Sensitivity Analysis - Case 14 (Baseline South Plume) Concentration Over Time at Initial Plume Center and at Southern Receptor

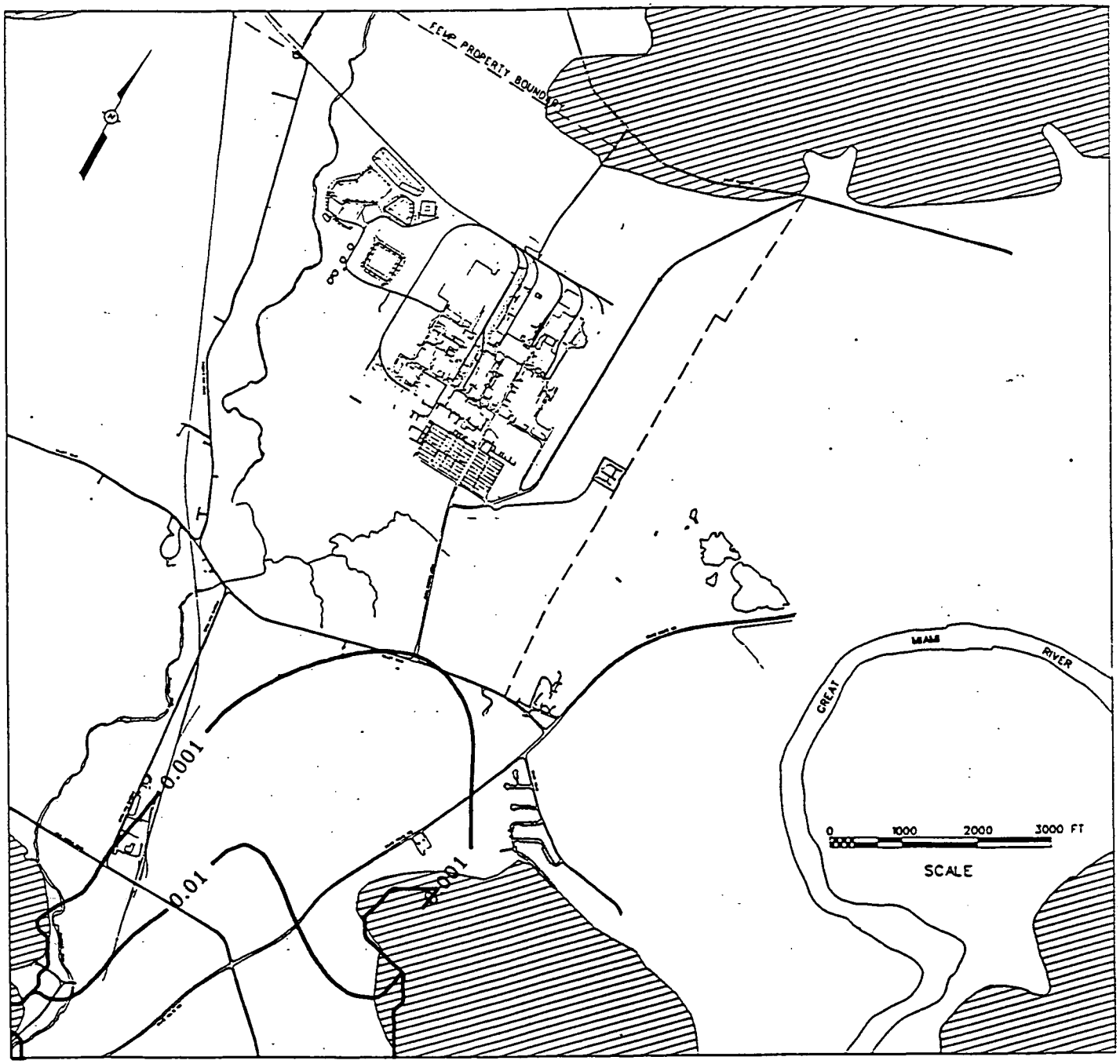

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Figure 5.4-50 - SWIFT Sensitivity Analysis - Case 15 (South Plume) Layer 1 Plume at 40 Years

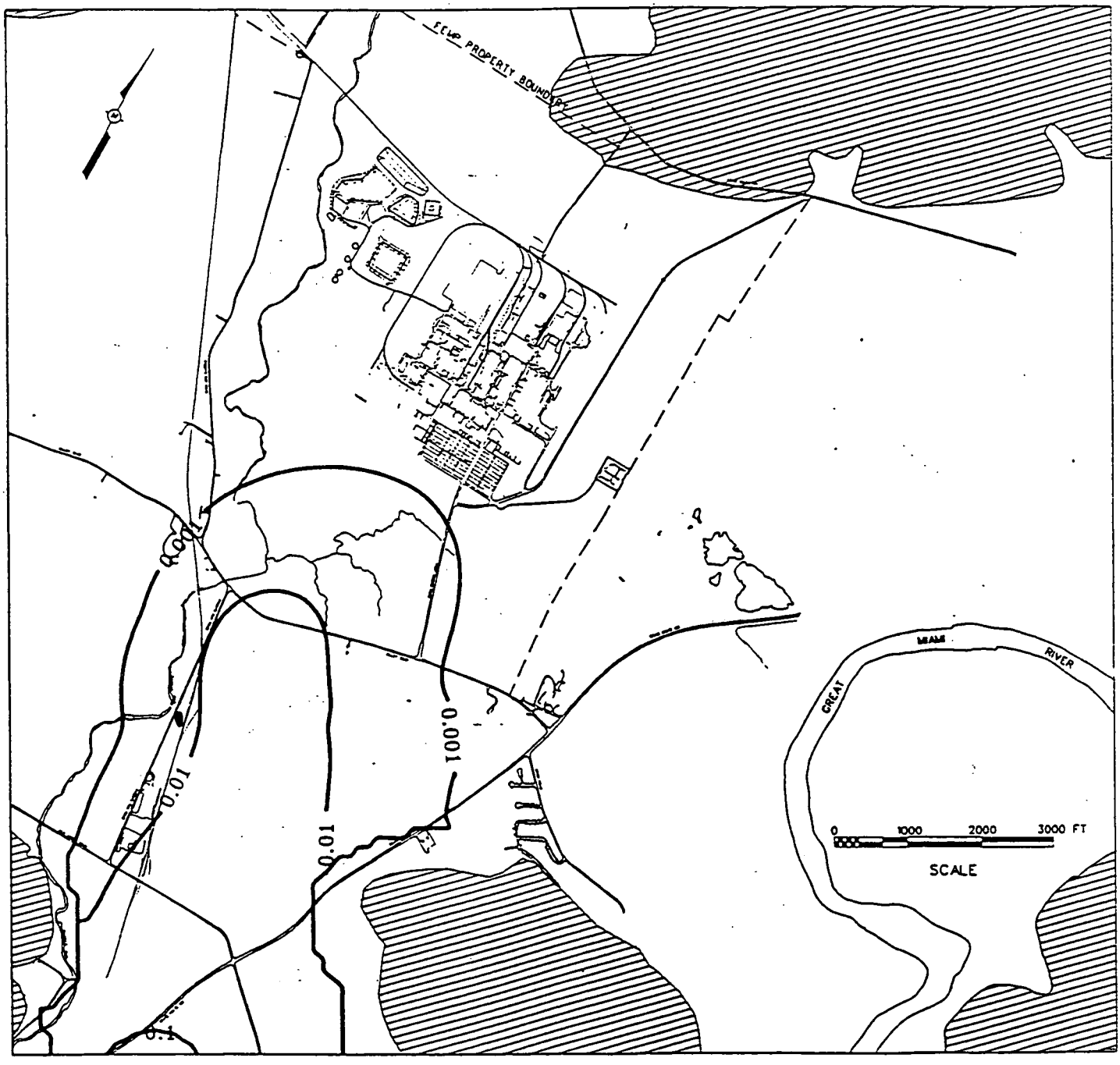

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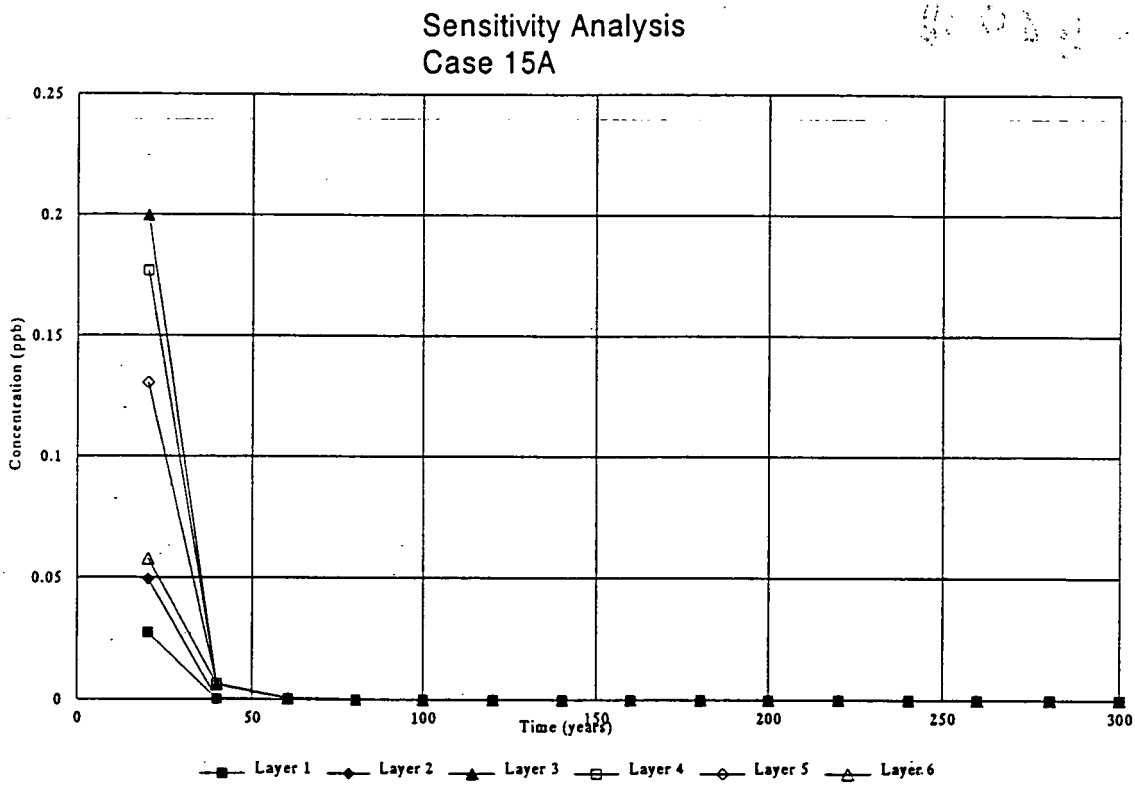
Figure 5.4-51 - SWIFT Sensitivity Analysis - Case 15 (South Plume) Layer 3 Plume at 40 Years



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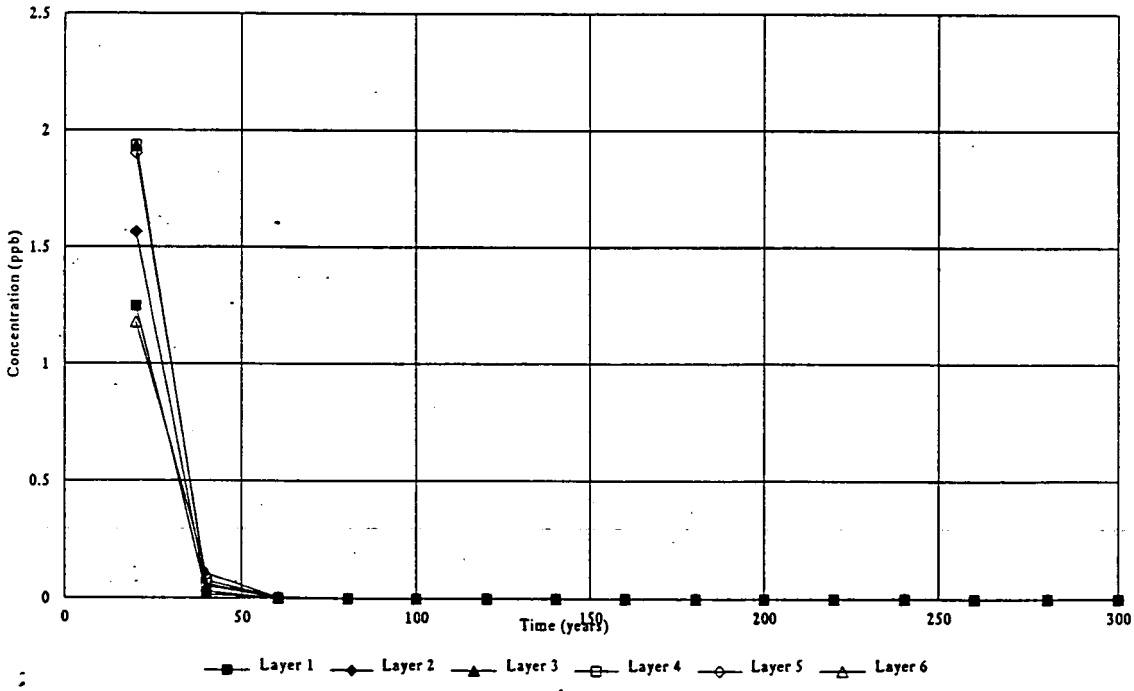

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Figure 5.4-52 - SWIFT Sensitivity Analysis
Case 15 (South Plume) Concentration Over Time at Initial Plume Center and at Southern Receptor

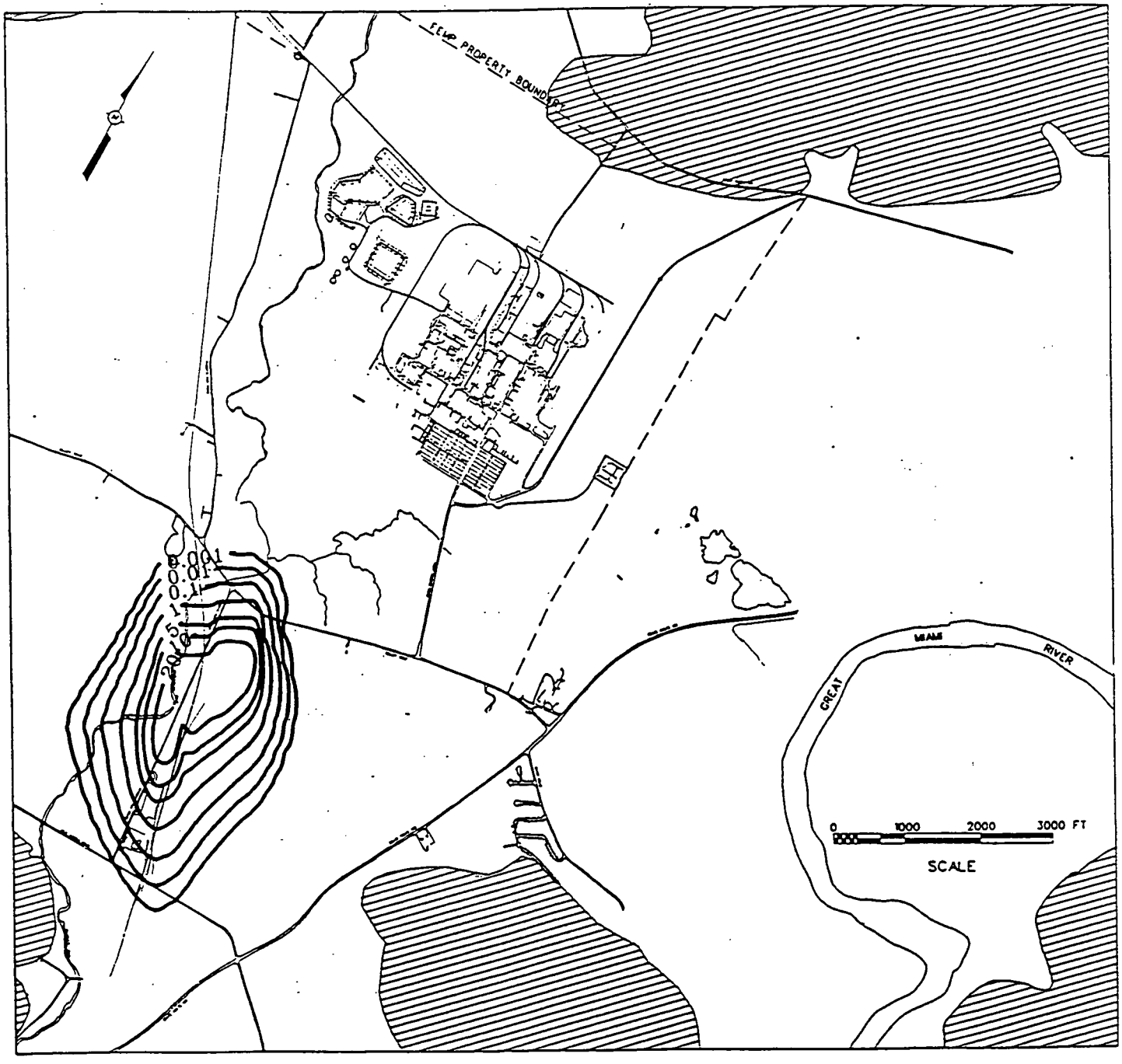

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Figure 5.4-53 - SWIFT Sensitivity Analysis - Case 16 (South Plume) Layer 1 Plume at 40 Years

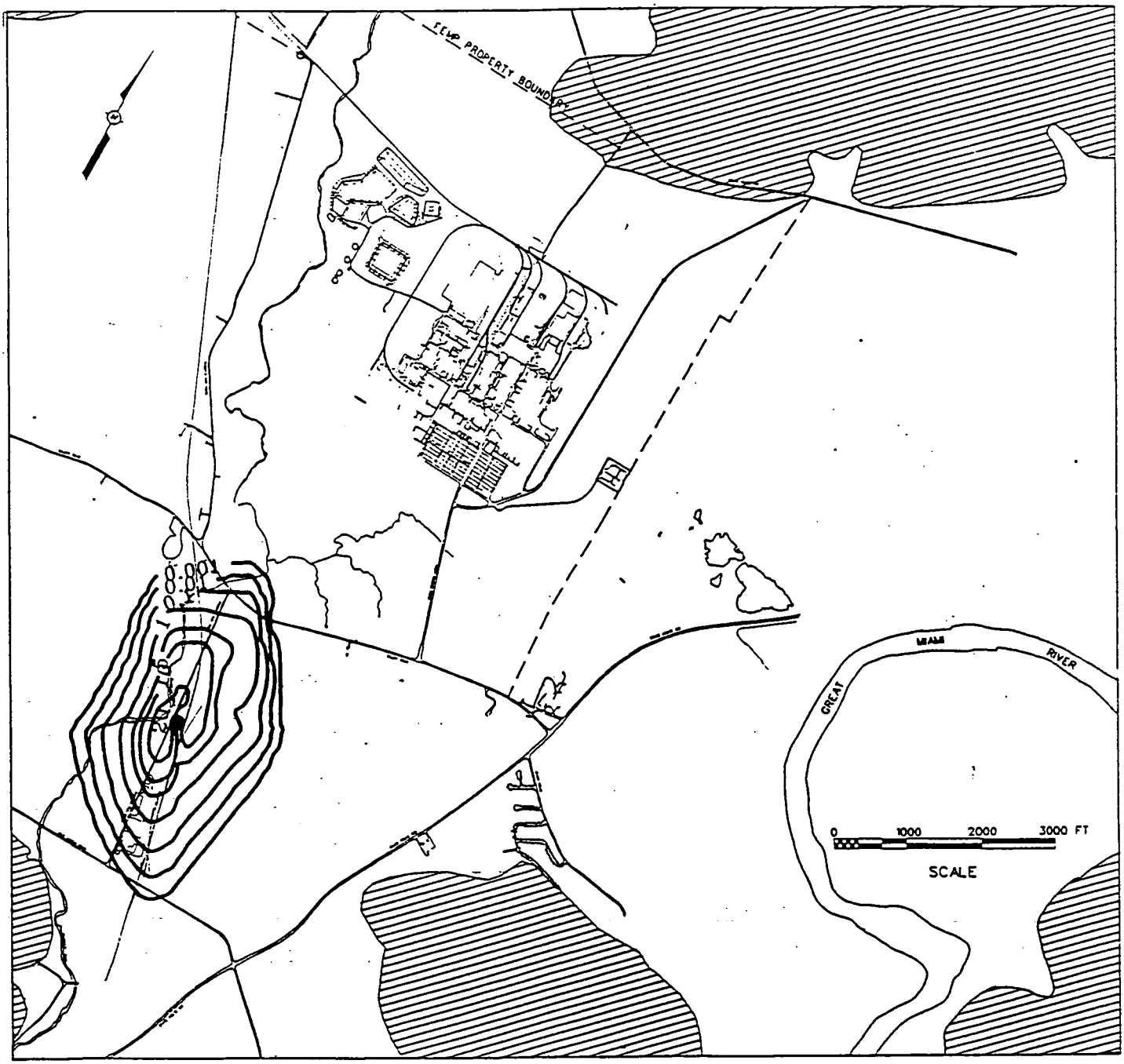

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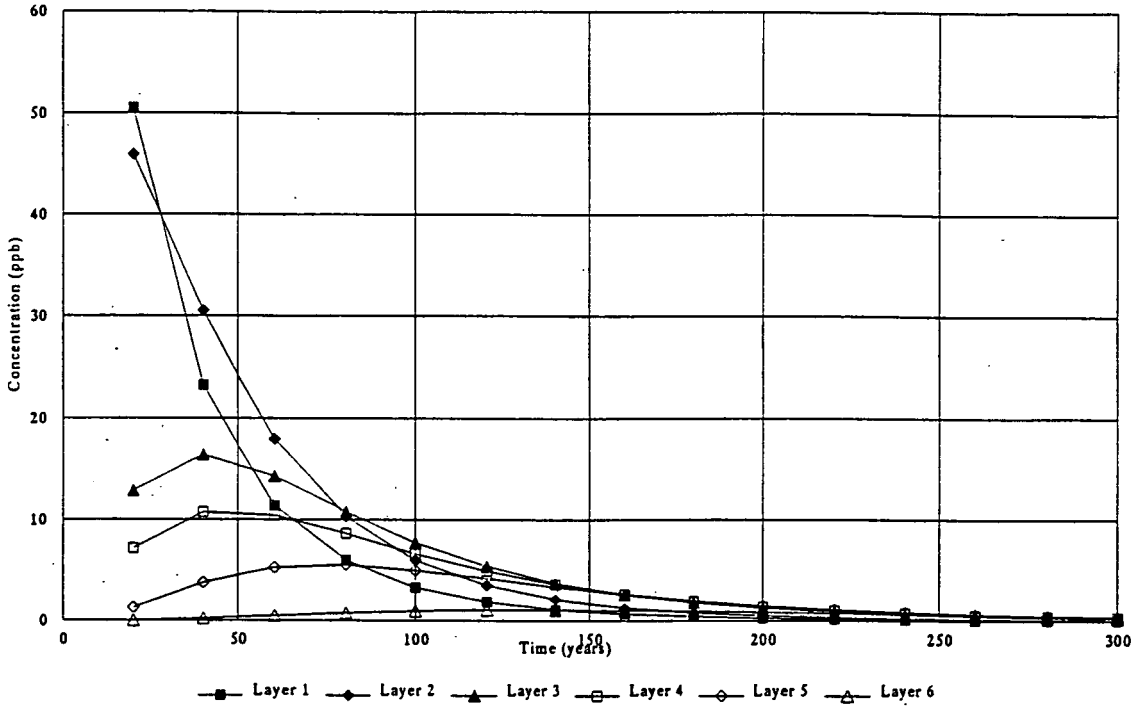
Figure 5.4-54 - SWIFT Sensitivity Analysis - Case 16 (South Plume) Layer 3 Plume at 40 Years

Sensitivity Analysis
Case 16A



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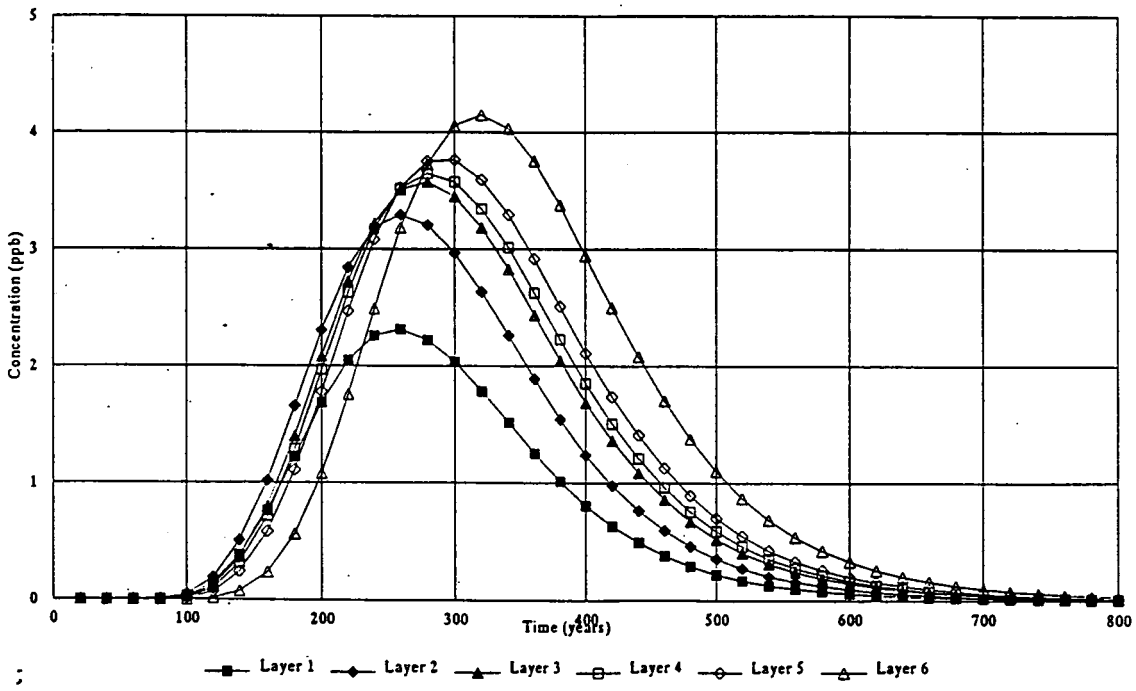

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Figure 5.4-55 - SWIFT Sensitivity Analysis
Case 16 (South Plume) Concentration Over Time at Initial Plume Center and at the Southern Receptor

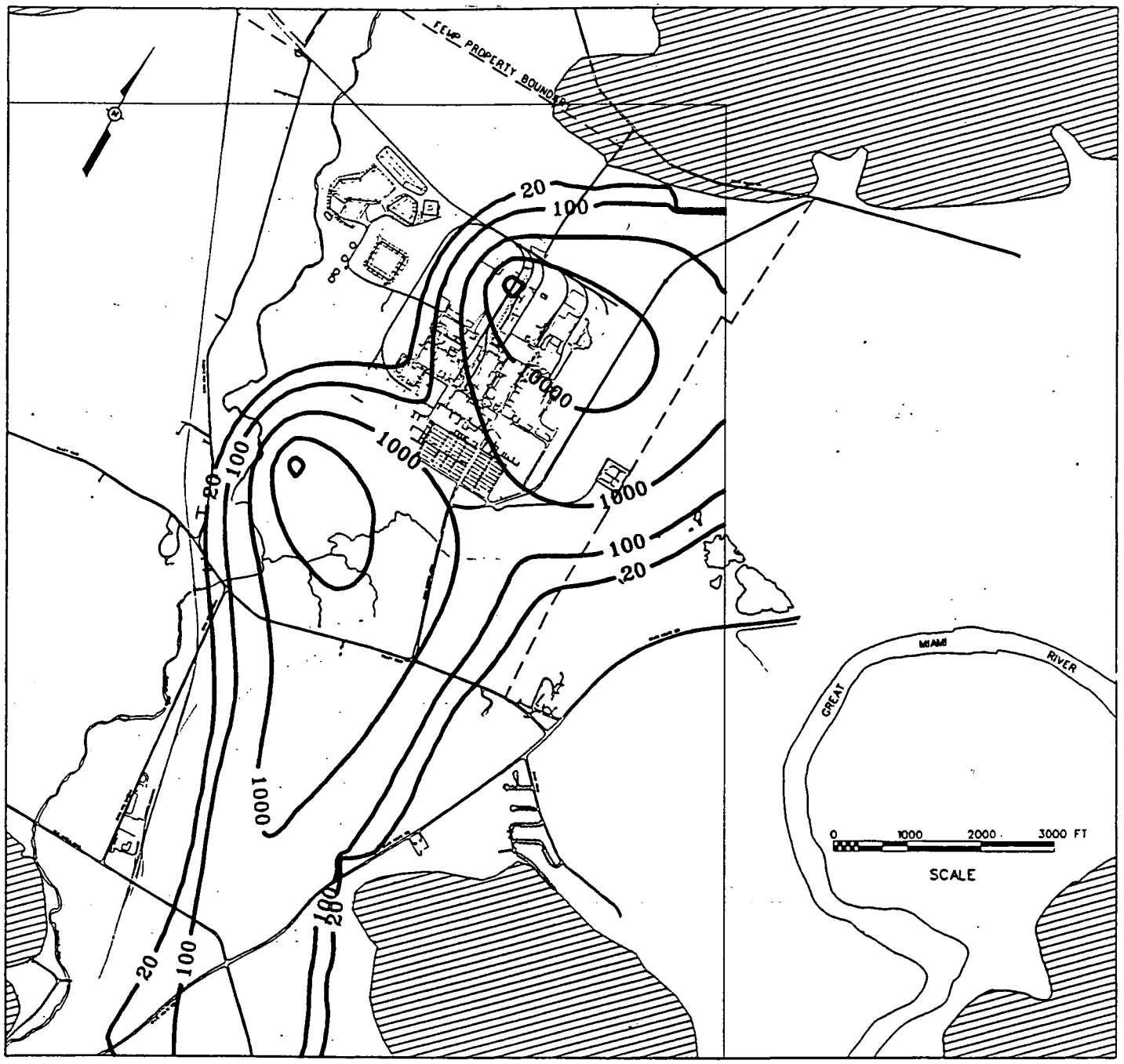

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Figure 5.4-56 - SWIFT Sensitivity Analysis - Case 17 (Original Model) Layer 1 Plume at 100 Years

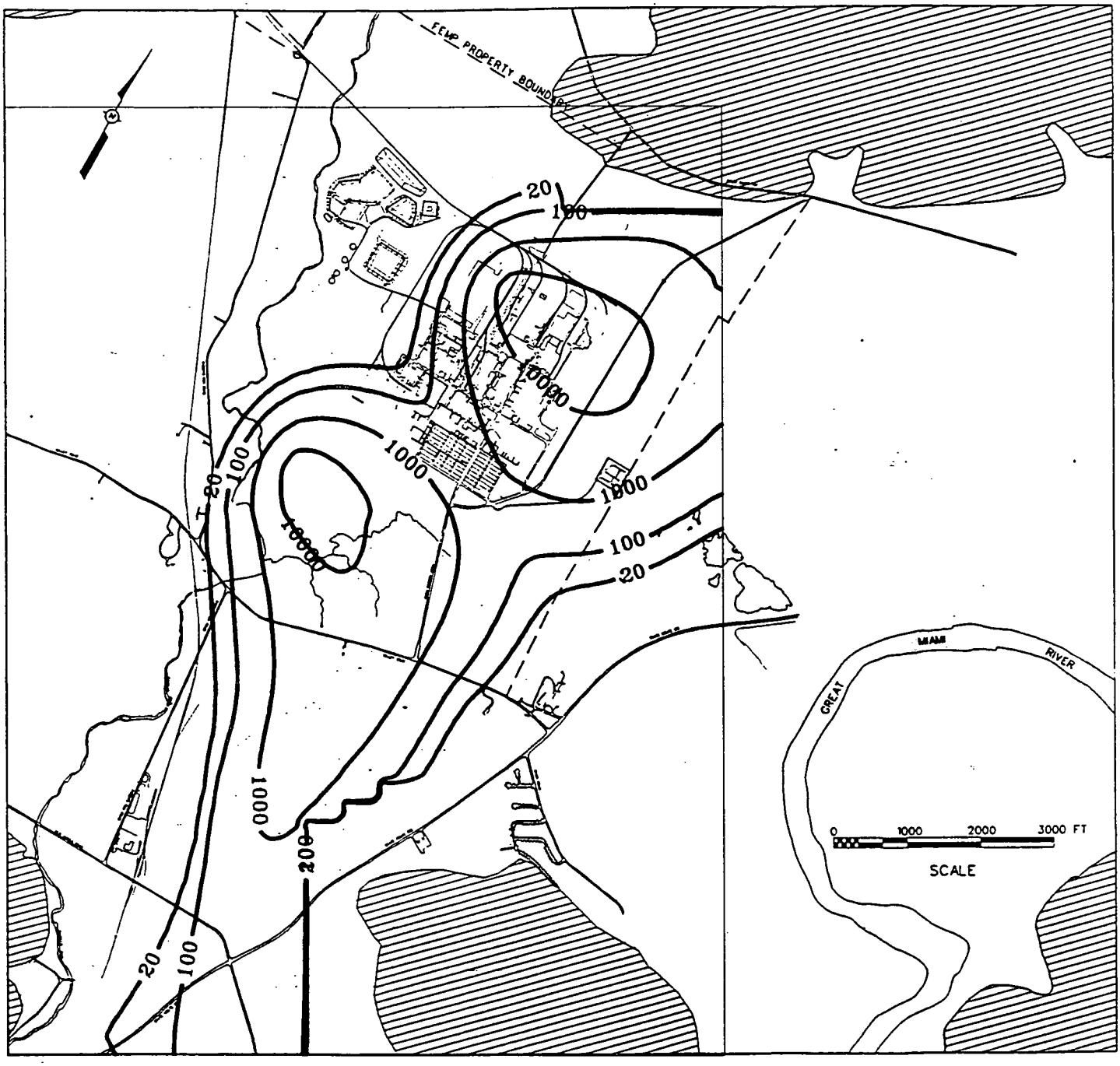

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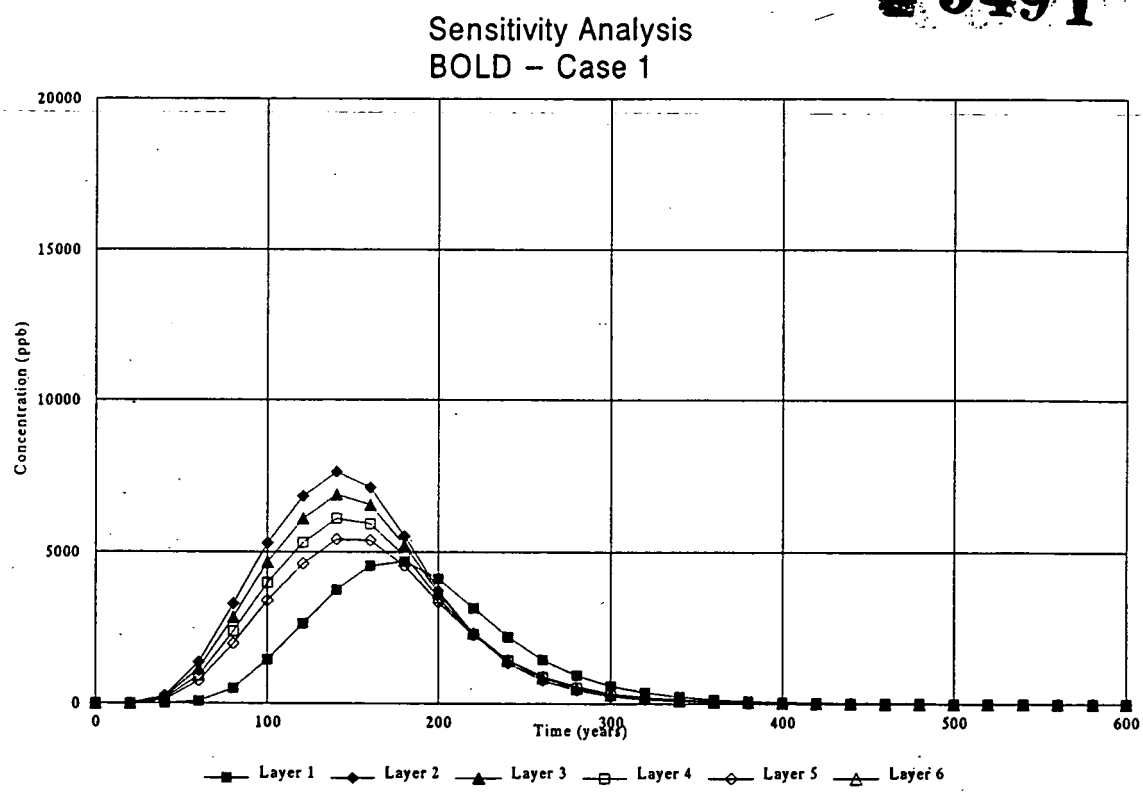
Figure 5.4-57 - SWIFT Sensitivity Analysis - Case 17 (Original Model) Layer 2 Plume at 100 Years



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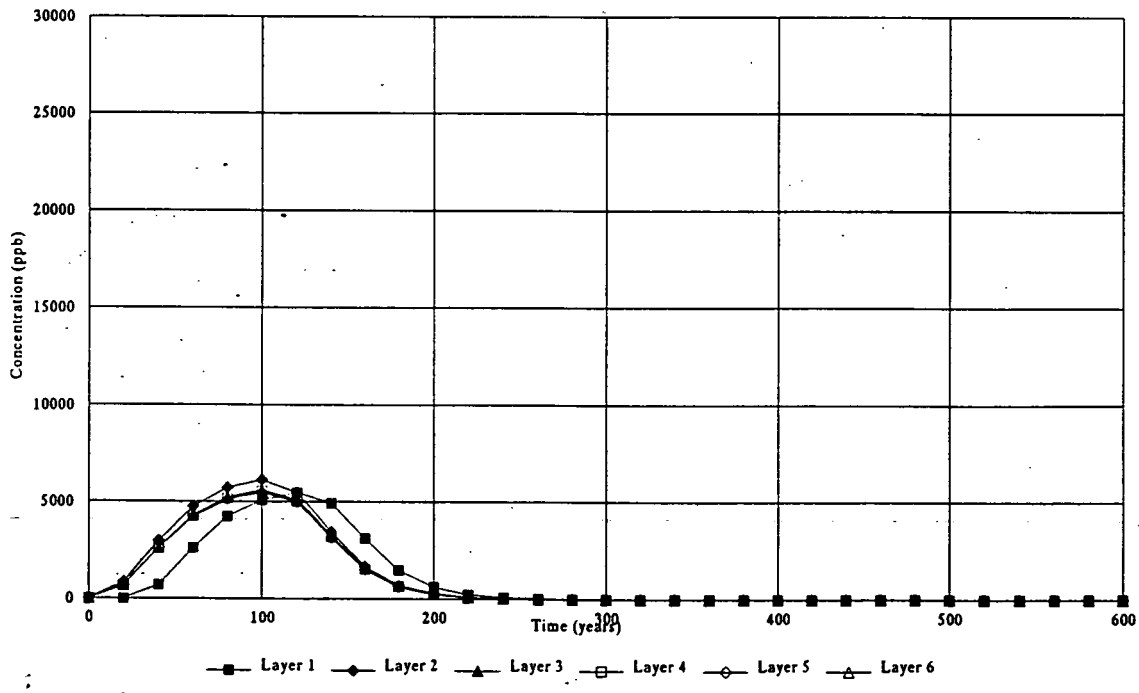

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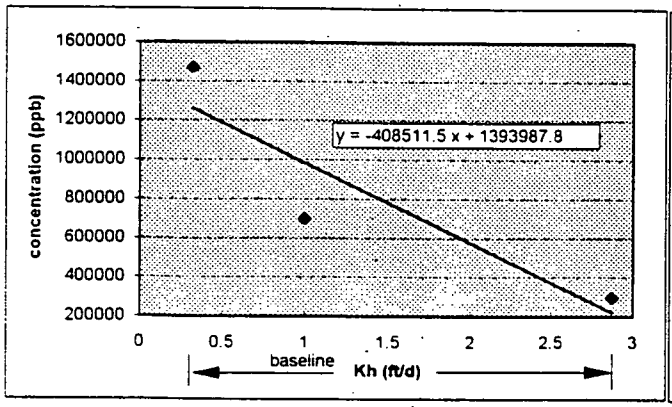
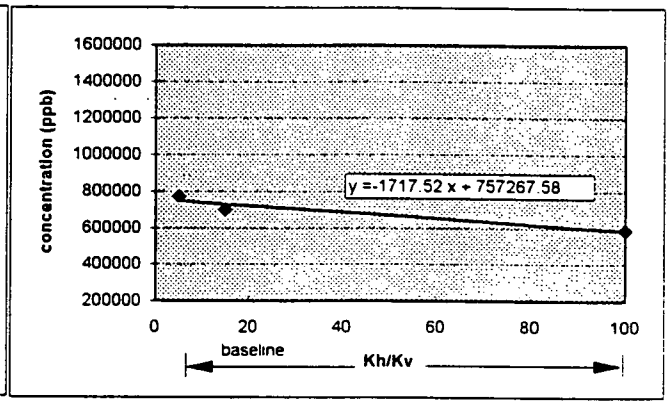
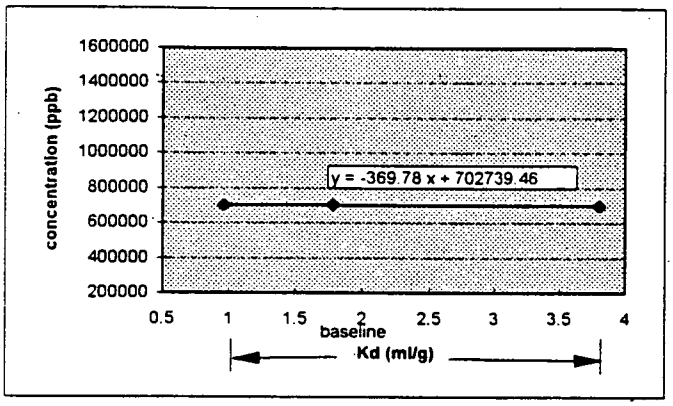
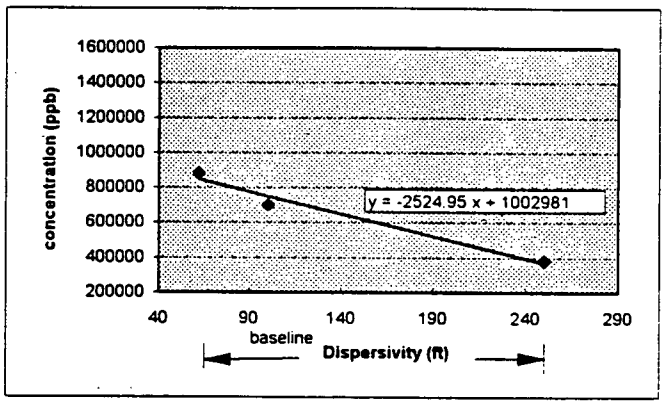
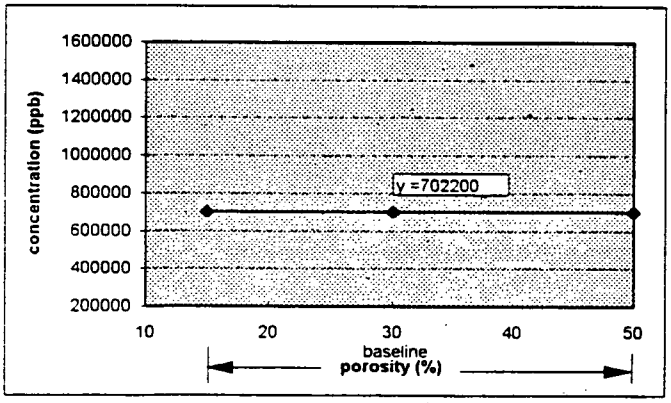
Figure 5.4-58 - SWIFT Sensitivity Analysis - Case 17 (Original Model)
Concentration Over Time at Eastern and Southern Property Lines





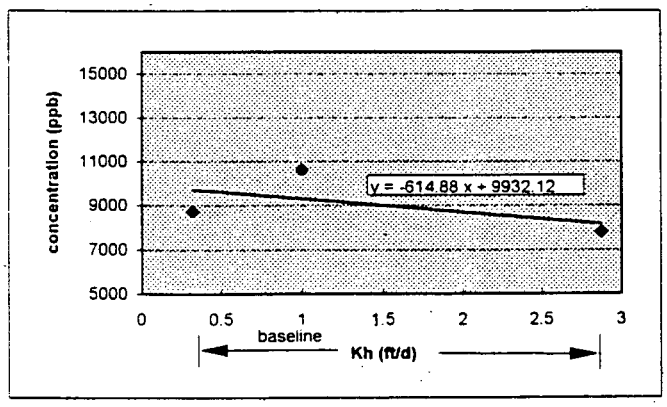


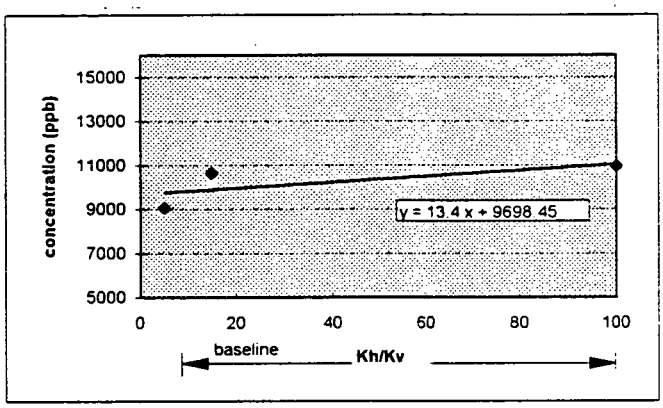


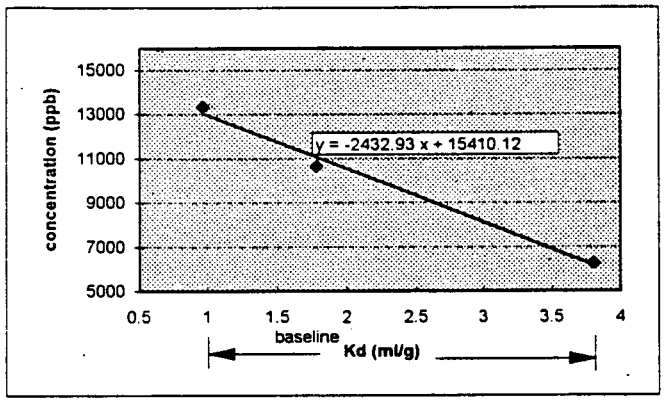


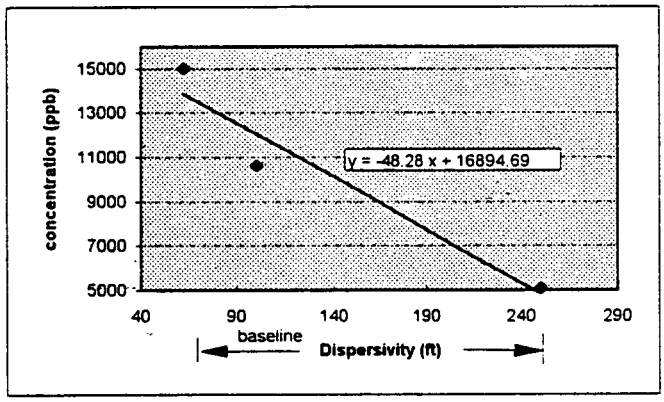
Sensitivity analysis -
Maximum Concentration and Data Regression Line .

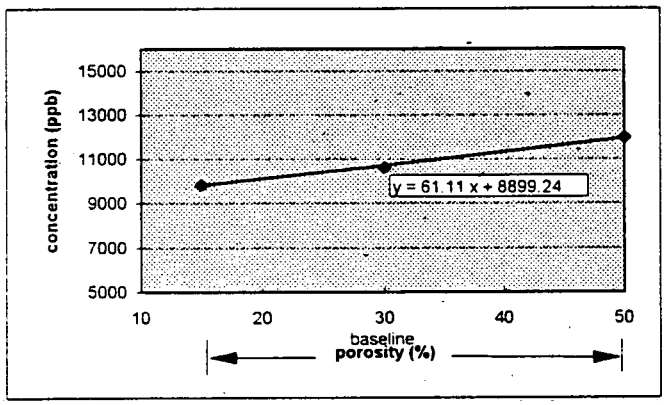
Figure 5.4-59 - Maximum Concentration Sensitivity Derivatives





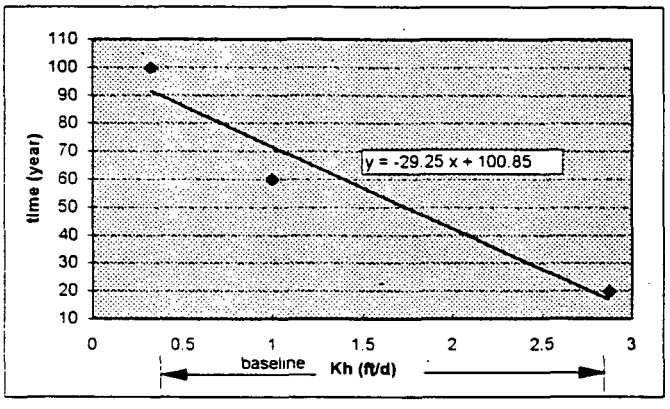


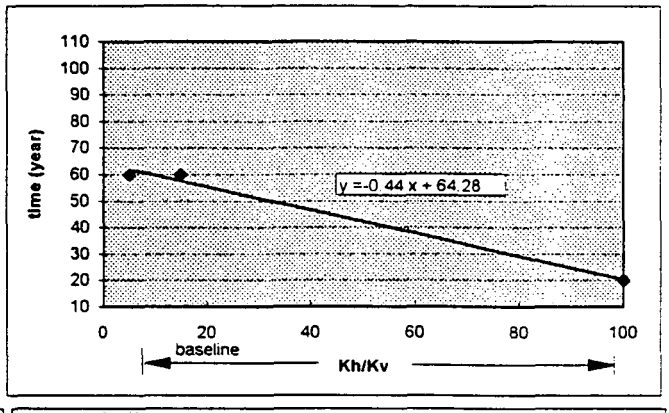


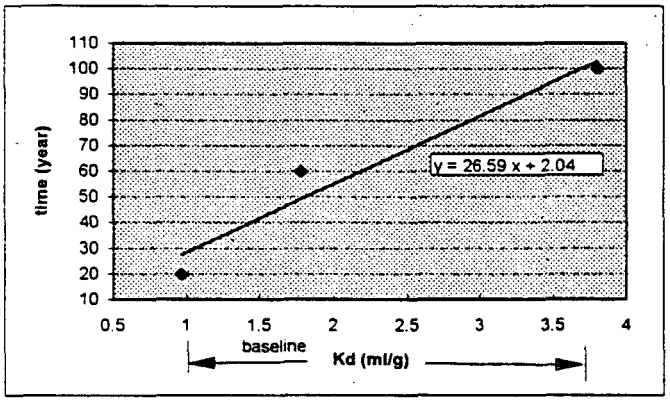


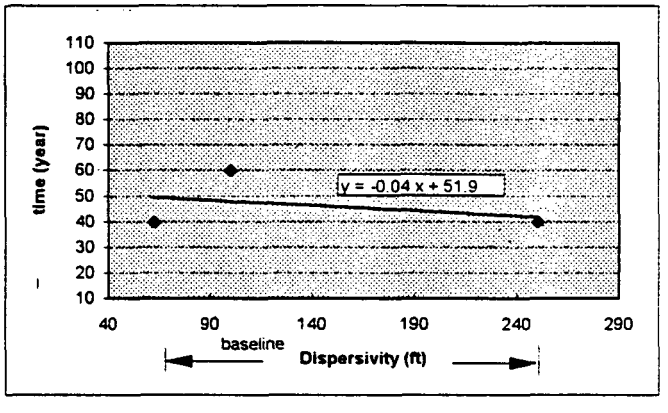
Sensitivity analysis -
Maximum Concentration and Data Regression Line at Eastern Property Line.

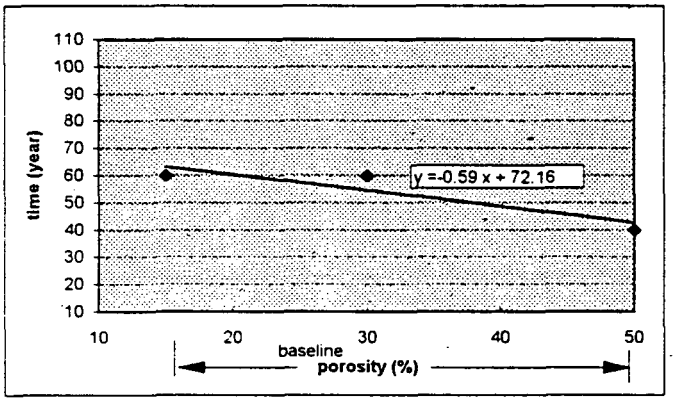
Figure 5.4-60 - Maximum Concentration at Fenceline Sensitivity Derivatives





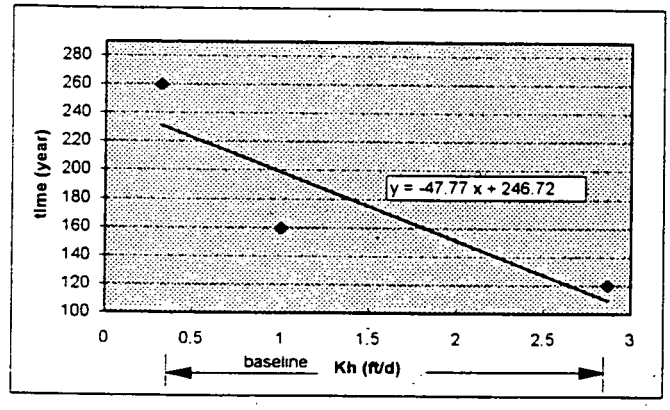


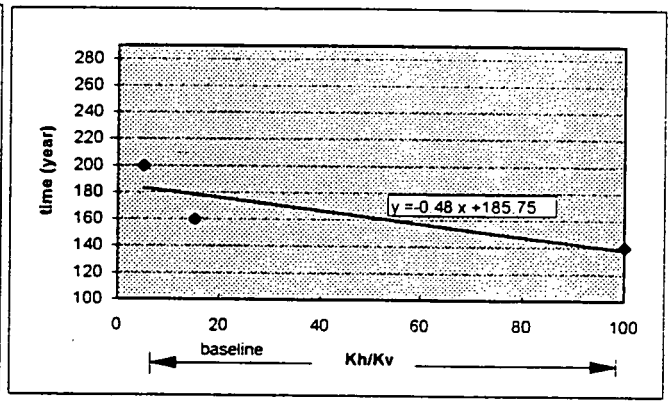


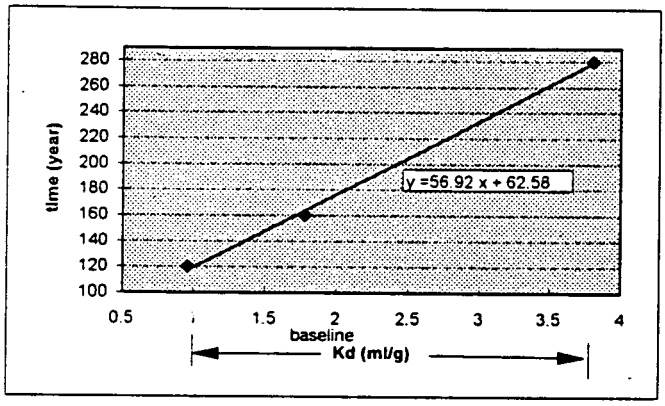


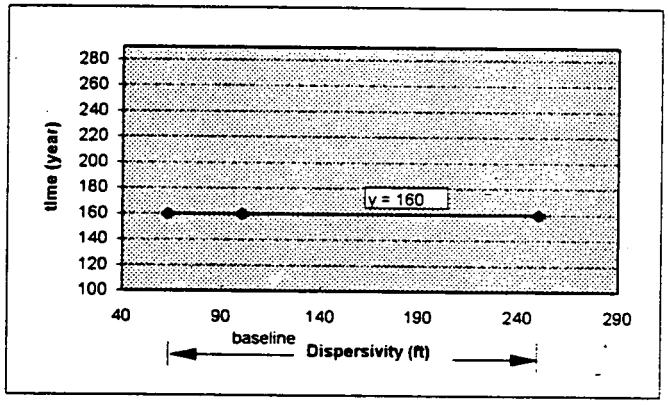
Sensitivity analysis -
Arrival Time and Data Regression Line at
Eastern Property Line .

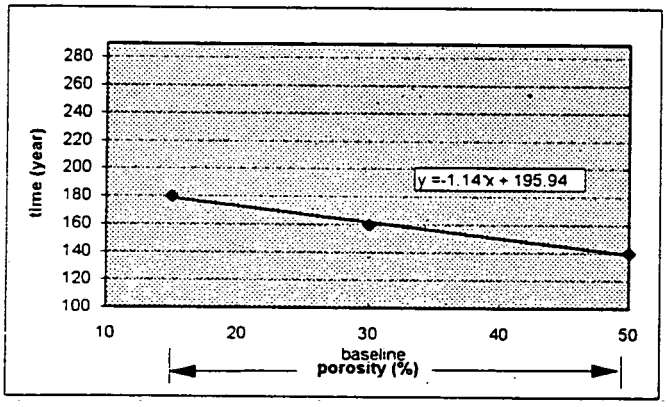
Figure 5.4-61 - Time of Arrival at Fenceline Sensitivity Derivatives











Sensitivity analysis -
Time of Maximum Concentrations and Data
Regression Line at Eastern Property Line .

Figure 5.4-62 - Time of Maximum at Fenceline Sensitivity Derivatives

Table 5.2-1 - Values of Hydraulic Conductivity Determined with Pumping Tests

Reference	Location/Identifier to Figure 1	Hydraulic Conductivity (ft/day)
Dove 1961	SOWC Wells / A	375 to 400
Smith 1962	Bolton Wellfield / B	328
Klaer 1948	Bolton Wellfield / B	120
Kazmann 1950	SOWC Wells / A	318 to 369
Klaer and Kazmann 1943	Hamilton South Wellfield / C	313 to 324
Speiker and Norris 1962	FEMP Production Well / D	267
Lewis 1968	SOWC Wells / A	334 to 404
Smith 1960	Chemdyne Hamilton / E	214 to 412
DOE 1993d	Fernald - South Plume FEMP / F	413
Smith 1962	Ross - West Bank of Great Miami River / G	534
Smith 1960	New Miami - Mouth of Four Mile Creek / H	774

Summary Statistics

Minimum K_h = 120 ft/day
Maximum K_h = 774 ft/day
Average K_h = 386 ft/day
Standard Deviation = 164 ft/day

Table 5.2-2 - Ranges of Site-Specific K_d Values

Waste Materials	K_d (L/KG)
Plant 2/3, Plant 6, and Plant 9 Contaminated Soils	15[a] - 31[b]
Remaining Production Area	222[a]
OU4 Contaminated Soils	12 - 15.4[c]
OU2 Waste	37 - 177[d]
Glacial Overburden	
Contaminated Till (Desorption)	200 - 280[d]
Uncontaminated Till (Adsorption)	12 - 81[d]
Unsaturated Sand and Gravel	
Southfield Area	12 - 14[d]
Saturated Sand and Gravel	
Waste Pit Area	12 - 68[e]
Southfield Area	8 - 10[d]
South Plume Area	0.76 - 4.39[e]

Notes:

a Geometric mean of calculated K_d values in 1000-series wells.
b ORNL study (Lee, et al. 1993).
c OU4 batch tests (Appendix A)
d OU2 batch tests (DOE 1993h)
e Issue 3 and 5 study (DOE 1993a)
f Table reprinted from DOE 1993e

Table 5.2-3 - Gradient and Travel Distance Summary

Well Location	Season	Gradient (ft/ft)	Direction (degree)	Distance to Property Line (ft)
2055/	Spring	0.00057	105	
(55,83)	Summer	0.00067	90	
	Fall	0.00067	100	
	Winter	0.00033	75	
	Maximum	0.00067	105	3000
	Minimum	0.00033	75	2875
2046	Spring	0.001	100	
(32,64)	Summer	0.0008	105	
	Fall	0.0008	75	
	Winter	0.0008	90	
	Maximum	0.001	105	4250
	Minimum	0.0008	75	4150
(27,47)	Spring	0.001	130	
	Summer	0.00072	160	
	Fall	0.0008	95	
	Winter	0.001	170	
	Maximum	0.001	170	
	Minimum	0.00072	95	

Table 5.2-4 - Summary of Estimated Range and Distribution of Model Parameters

Parameter	Minimum Value	Calibrated Value	Maximum Value	Assumed Distribution[1]
K_h	36 ft/day in K_h Zone VI	120 to 638 ft/day in 6 zones	1,831 ft/day in K_h Zone IV	Log Normal mean = 305 SD^2 = 1.593
K_h/K_v	5	5 to 20	100	Log Normal mean = 22.36 SD^2 = 2.115
Porosity (n)	15%	30%	50%	Log Normal mean = 27.40 SD^2 = 1.351
Gradient (I)	0.00033 - PA[3] 0.0008 - SF[3]	Varies	0.0067 - PA 0.001 - SF	Uniform
Transport Distance (L)	2,875 ft. - PA 4,150 ft. - SF	Varies	3,000 ft. - PA 4,250 ft. - SF	Uniform
Partition Coefficient (K_d)	0.96 L/Kg	1.78 L/Kg	3.80 L/Kg	Log Normal mean = 1.910 SD^2 = 1.411
Dispersivity (α)	62.5 ft	100 ft	250 ft	Uniform
Mixing Depth (d_m)	5 ft	Layer 1 saturated thickness approx 10 ft	15 ft	Uniform
Infiltration Rate	4 in/yr	6 in/yr	8 in/yr	Uniform

1 In establishing distributions, the range is assumed to represent a 95 percent confidence interval, with approximately 2 standard deviations above and below the mean. Standard deviations were calculated based on this assumption.

2 Standard deviation for log normal distributions are reported as a multiplicative factor.

3 PA = Production Area hypothetical source
SF = South Field hypothetical source

Table 5.3-1 - Summary of ECTran Model Monte Carlo Results

Parameters (Units)	Case 1	Case 2	Case 3
Range of Predicted Maximum Conc. for Source Area (μg/L)	1.46×10^5 to 1.21×10^7	2.03×10^5 to 1.54×10^7	N/A
Range of Predicted Maximum Conc. for Fenceline (μg/L)	1.28×10^1 to 2.73×10^5	5.83×10^{-2} to 3.83×10^5	5.96×10^{-3} to 5.38×10^1
Baseline Maximum GMA Conc. in Source Area (μg/L)	2.25×10^8	2.25×10^5	9.05×10^1
Baseline Maximum GMA Conc. in Source Area (μg/L)	7.74×10^4	7.74×10^4	1.48×10^1
Mean Source Area GMA Conc. (μg/L)	2.58×10^6	2.50×10^8	N/A
Mean Fenceline Area GMA Conc. (μg/L)	4.09×10^4	4.55×10^4	1.20×10^1
% < Baseline Source Area GMA Conc.	54%	58%	N/A
% < Baseline Fenceline GMA Conc.	86%	81%	58%

Table 5.4-1 - Simulations for SWIFT Model Sensitivity Analysis - On-Site Loading Analysis

Simulation Objective	K_h (ft/day)	K_d (L/kg)	α (ft)	K_h/K_v	n (%)
1. Baseline	As calibrated	As calibrated	As calibrated	As calibrated	As calibrated
2. Minimize Travel Time to Exposure Point	- 774 for till zone - (774/till zone K_h) * zone K_h for other zones	0.96	250	100	15
3. Maximize GMA Concentration	- 120 for river zone K_h - (120/river zone K_h) * zone K_h for other zones	0.96	62.5	100	15
4. Effect of K_h Variation on Maximum Concentration and Minimum Travel Time - Minimum K_h	- 120 for river zone K_h - (120/river zone K_h) * zone K_h for other zones	As calibrated	As calibrated	As calibrated	As calibrated
5. Effect of K_h Variation on Maximum Concentration and Minimum Travel Time - Maximum K_h	- 774 for till zone- (774/till zone K_h) * zone K_h for other zones	As calibrated	As calibrated	As calibrated	As calibrated
6. Effect of K_h/K_v Variation on Maximum Concentration and Minimum Travel Time - Minimum K_h/K_v	As calibrated	As calibrated	As calibrated	5	As calibrated
7. Effect of K_h/K_v Variation on Maximum Concentration and Minimum Travel Time - Maximum K_h/K_v	As calibrated	As calibrated	As calibrated	100	As calibrated
8. Effect of K_d Variation on Maximum Concentration and Travel Time - Minimum K_d	As calibrated	0.96	As calibrated	As calibrated	As calibrated

Table 5.4-1 - Simulations for SWIFT Model Sensitivity Analysis - On-Site Loading Analysis (Continued)

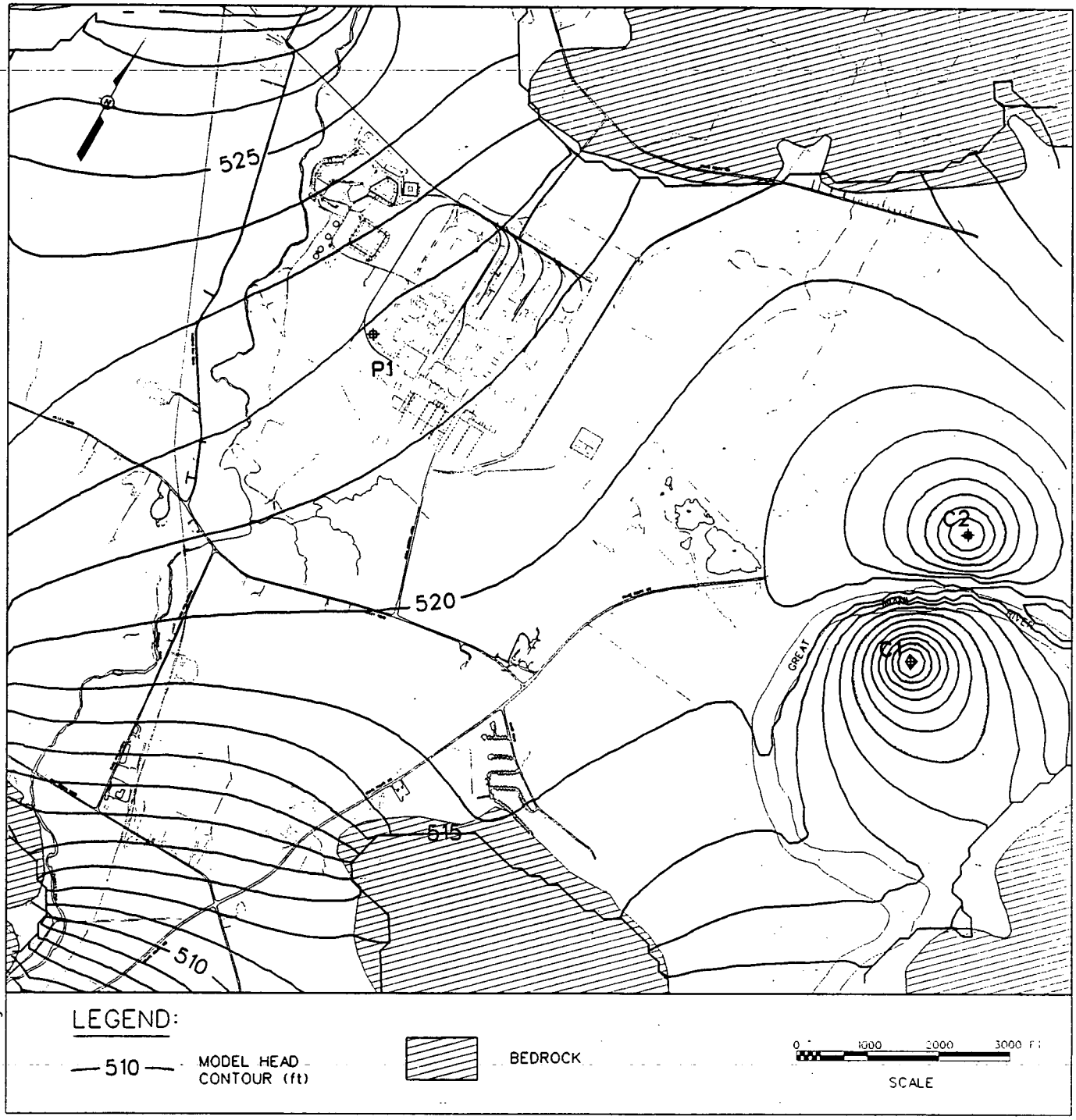
Simulation Objective	K_h (ft/day)	K_d (L/kg)	α (ft)	K_h/K_v	n (%)
9. Effect of K_d Variation on Maximum Concentration and Travel Time - Maximum K_d	As calibrated	3.80	As calibrated	As calibrated	As calibrated
10. Effect of α Variation on Maximum Concentration and Travel Time - Minimum α	As calibrated	As calibrated	62.5	As calibrated	As calibrated
11. Effect of α Variation on Maximum Concentration and Travel Time - Maximum α	As calibrated	As calibrated	250	As calibrated	As calibrated
12. Effect of n Variation on Maximum Concentration and Travel Time - Minimum n	As calibrated	As calibrated	As calibrated	As calibrated	15
13. Effect of n Variation on Maximum Concentration and Travel Time - Maximum n	As calibrated	As calibrated	As calibrated	As calibrated	50
14. Baseline	As calibrated	As calibrated	As calibrated	As calibrated	As calibrated
15. Minimize Travel Time to Exposure Point	- 774 for till zone - (774/till zone K_h) * zone K_h for other zones	0.96	250	100	15
16. Maximize Travel Time to Exposure Point	- 120 for river zone K_h - (120/river zone K_h) * zone K_h for other zones	3.80	62.5	5	50
17. Compare Original and Revised Model	450 layers 1 and 2 600 layers 4 and 5	1.75	100	10	0.25

Table 5.4-2 - Maximum Grid and Fenceline Concentrations

Case Number	Case Description	Cell Location (Grid)	Time of Max (years)	Concentration (ppb)	% of Base Case
Grid Maximum					
Case 1	Baseline	(55,83,1)	100	7.022e+05	
Case 2	Min. Travel Time	(55,83,1)	100	1.516e+05	22%
Case 3	Max. GMA Conc	(55,83,1)	100	1.545e+06	220%
Case 4	Min. K_h	(55,83,1)	100	1.471e+06	209%
Case 5	Max. K_h	(55,83,1)	100	2.971e+05	42%
Case 6	Min. K_h/K_v	(55,83,1)	100	7.749e+05	110%
Case 7	Max. K_h/K_v	(55,83,1)	100	5.886e+05	84%
Case 8	Min. K_d	(55,83,1)	100	7.023e+05	100%
Case 9	Max. K_d	(55,83,1)	100	7.013e+05	100%
Case 10	Min. Disp.	(55,83,1)	100	8.838e+05	126%
Case 11	Max. Disp.	(55,83,1)	100	3.814e+05	54%
Case 12	Min. Porosity	(55,83,1)	100	7.022e+05	100%
Case 13	Max. Porosity	(55,83,1)	100	7.022e+05	100%
Case 17	Original Model	(55, 83, 1)	100	2.336E+5	33%
Fenceline Maximum					
Case 1	Baseline	(34,47,1)	100	2.058e+04	
Case 2	Min. Travel Time	(34,47,1)	100	5.695e+03	28%
Case 3	Max. GMA Conc	(72,70,2)	140	2.186e+04	106%
Case 4	Min. K_h	(33,47,2)	120	2.232e+04	108%
Case 5	Max. K_h	(33,47,1)	100	1.514e+04	74%
Case 6	Min. K_h/K_v	(33,47,1)	100	2.279e+04	111%
Case 7	Max. K_h/K_v	(36,46,1)	100	1.419e+04	69%
Case 8	Min. K_d	(34,47,1)	100	2.085e+04	101%
Case 9	Max. K_d	(34,47,1)	120	1.850e+04	90%
Case 10	Min. Disp.	(34,47,1)	100	2.940e+04	143%
Case 11	Max. Disp.	(34,47,1)	100	1.032e+04	50%
Case 12	Min. Porosity	(34,47,1)	100	2.033e+04	99%
Case 13	Max. Porosity	(34,47,1)	100	2.077e+04	101%
Case 17	Original Model	(73, 72, 2)	160	9.559e+03	46%

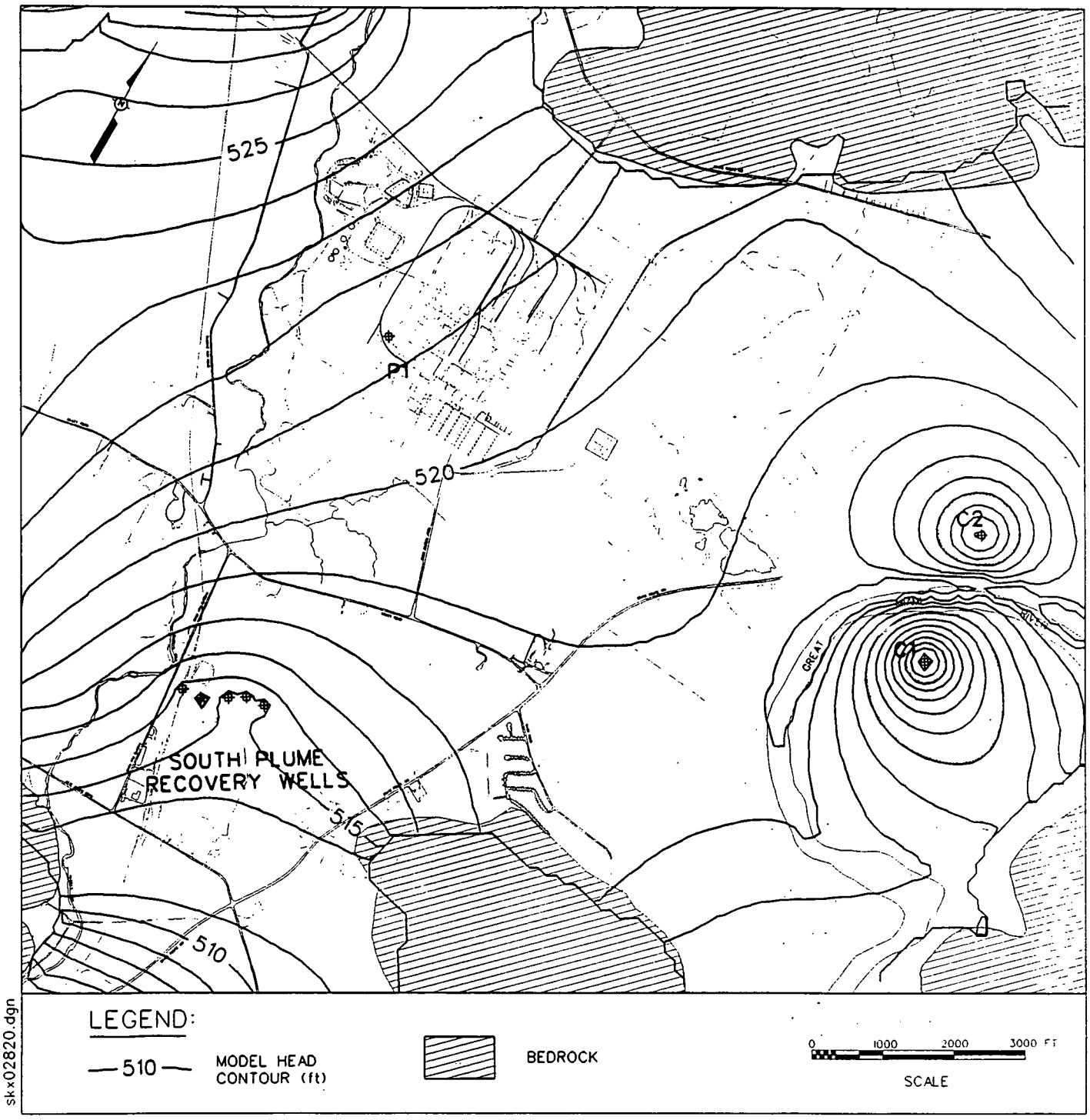
Table 5.4-3 - Time of Arrival and Concentrations at the East and South Boundaries

Case #	Case Description	Approx. 1st Arrival Time (years)	Time of Max(years)	Concentration (ppb) at Time of Maximum	%of Base Case
East-Maximum at (70;66)					
Case 1	Baseline	60	160	1.065e+04	
Case 2	Min. Travel Time	<20	100	4.500e+03	42%
Case 3	Max. GMA Conc	40	140	1.355e+04	127%
Case 4	Min. K_h	100	260	8.758e+03	82%
Case 5	Max. K_h	20	120	7.812e+03	73%
Case 6	Min. K_h/K_v	60	200	9.094e+03	85%
Case 7	Max. K_h/K_v	20	140	1.096e+04	103%
Case 8	Min. K_d	20	120	1.338e+04	126%
Case 9	Max. K_d	100	280	6.289e+03	59%
Case 10	Min. Disp.	40	160	1.501e+04	141%
Case 11	Max. Disp.	40	160	5.107e+03	48%
Case 12	Min. Porosity	60	180	9.863e+03	93%
Case 13	Max. Porosity	40	140	1.199e+04	113%
South-Maximum at (34;47)					
Case 1	Baseline	<20	100	2.058e+04	
Case 2	Min. Travel Time	<20	80	5.150e+03	25%
Case 3	Max. GMA Conc	<20	100	8.953e+03	44%
Case 4	Min. K_h	20	120	1.948e+04	95%
Case 5	Max. K_h	<20	80	1.597e+04	78%
Case 6	Min. K_h/K_v	<20	100	2.039e+04	99%
Case 7	Max. K_h/K_v	<20	100	1.215e+04	59%
Case 8	Min. K_d	<20	100	2.085e+04	101%
Case 9	Max. K_d	20	120	1.850e+04	90%
Case 10	Min. Disp.	<20	100	2.940e+04	143%
Case 11	Max. Disp.	<20	100	1.032e+04	50%
Case 12	Min. Porosity	<20	100	2.033e+04	99%
Case 13	Max. Porosity	<20	100	2.077e+04	101%



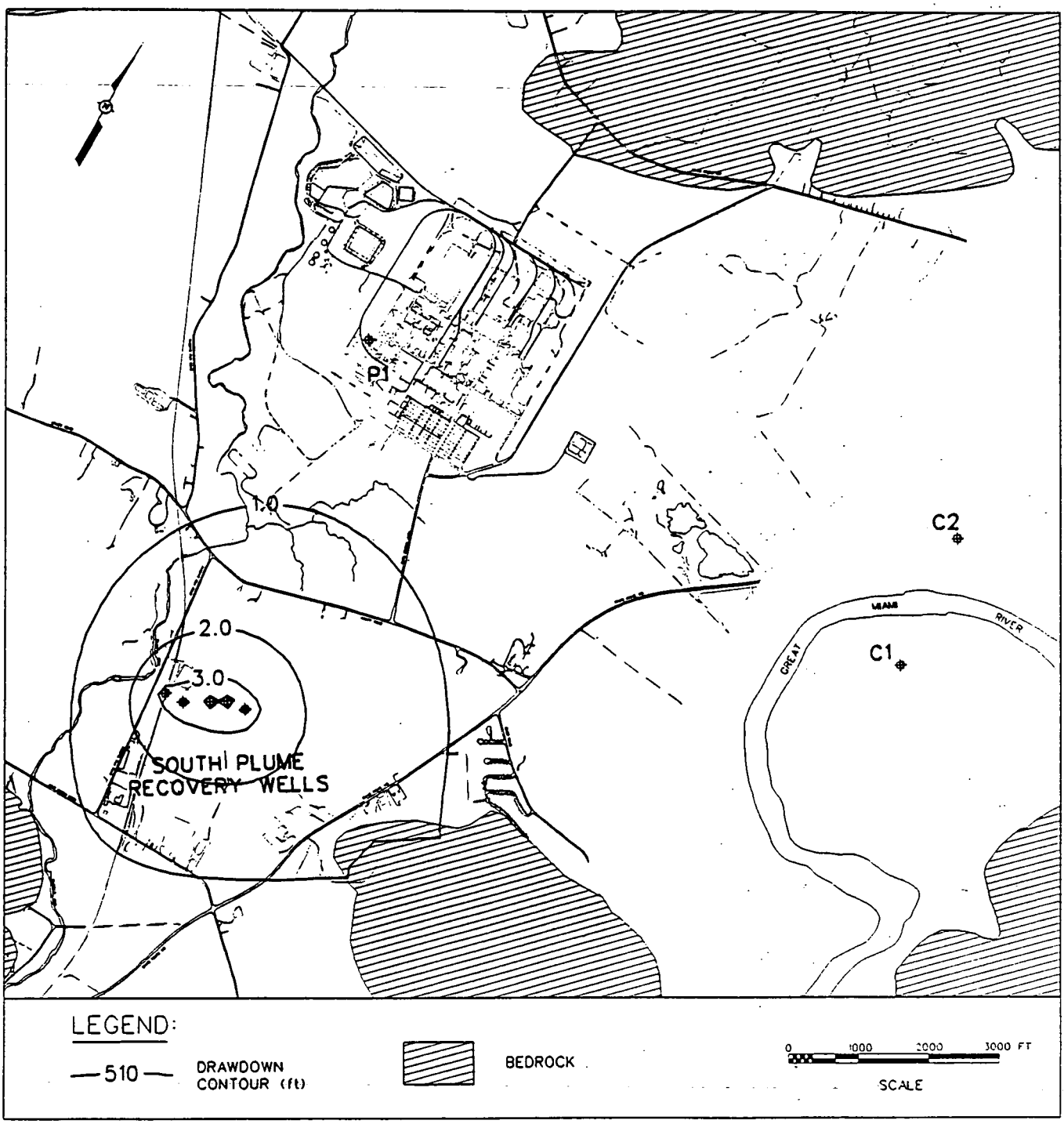
Note: Flow patterns and particle tracks represent water and not contamination.

6.3-1 - Model Head Contours in Layer 1 (Baseline Case)



Note: Flow patterns and particle tracks represent water and not contamination.

6.3-2 - Model Head Contours in Layer 1 (South Plume Pumping Case)

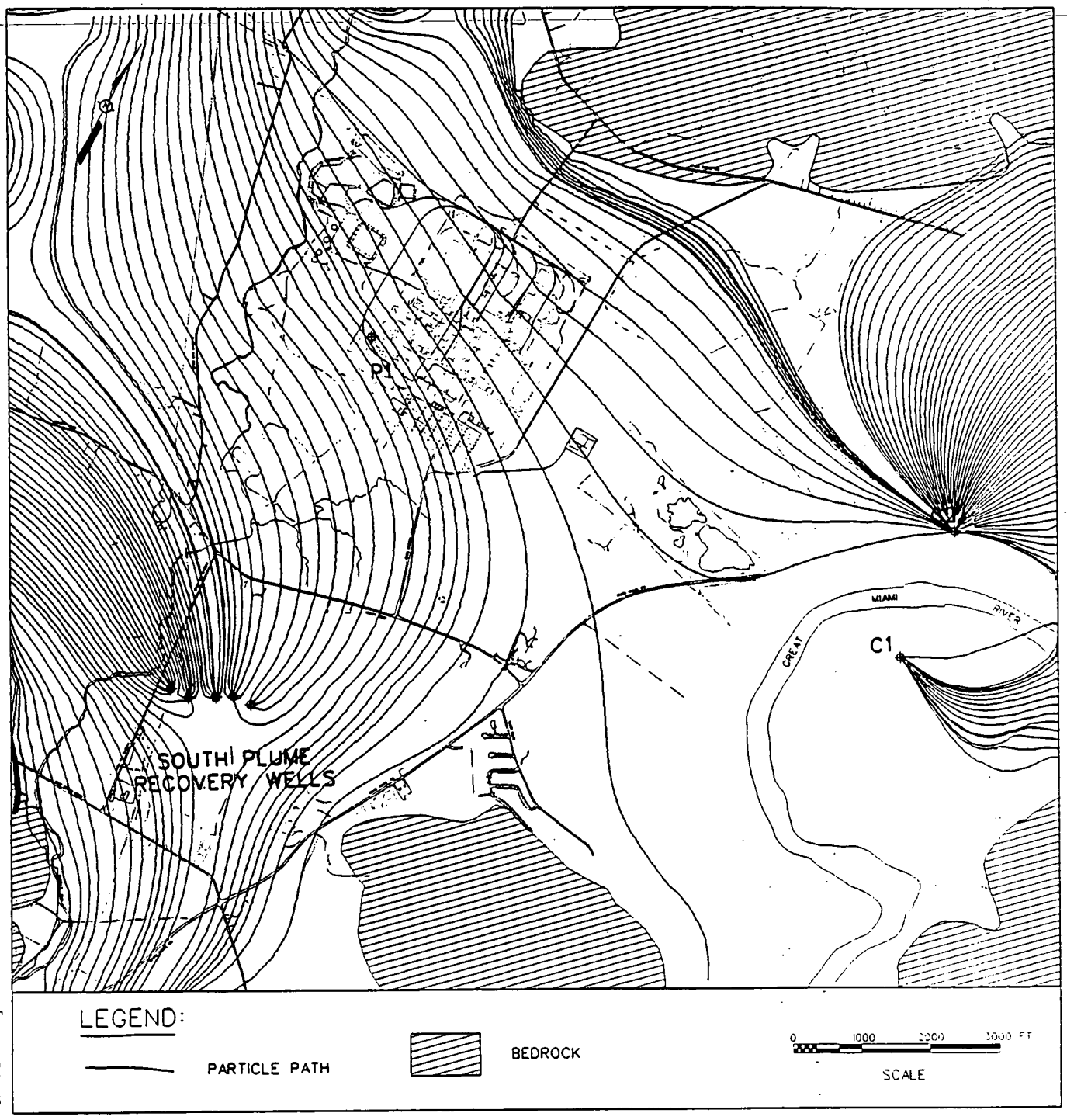


sk-x027xx.dgn

MAXIMUM DRAWDOWN- 4.67 FT

Note: Flow patterns and particle tracks represent water and not contamination.

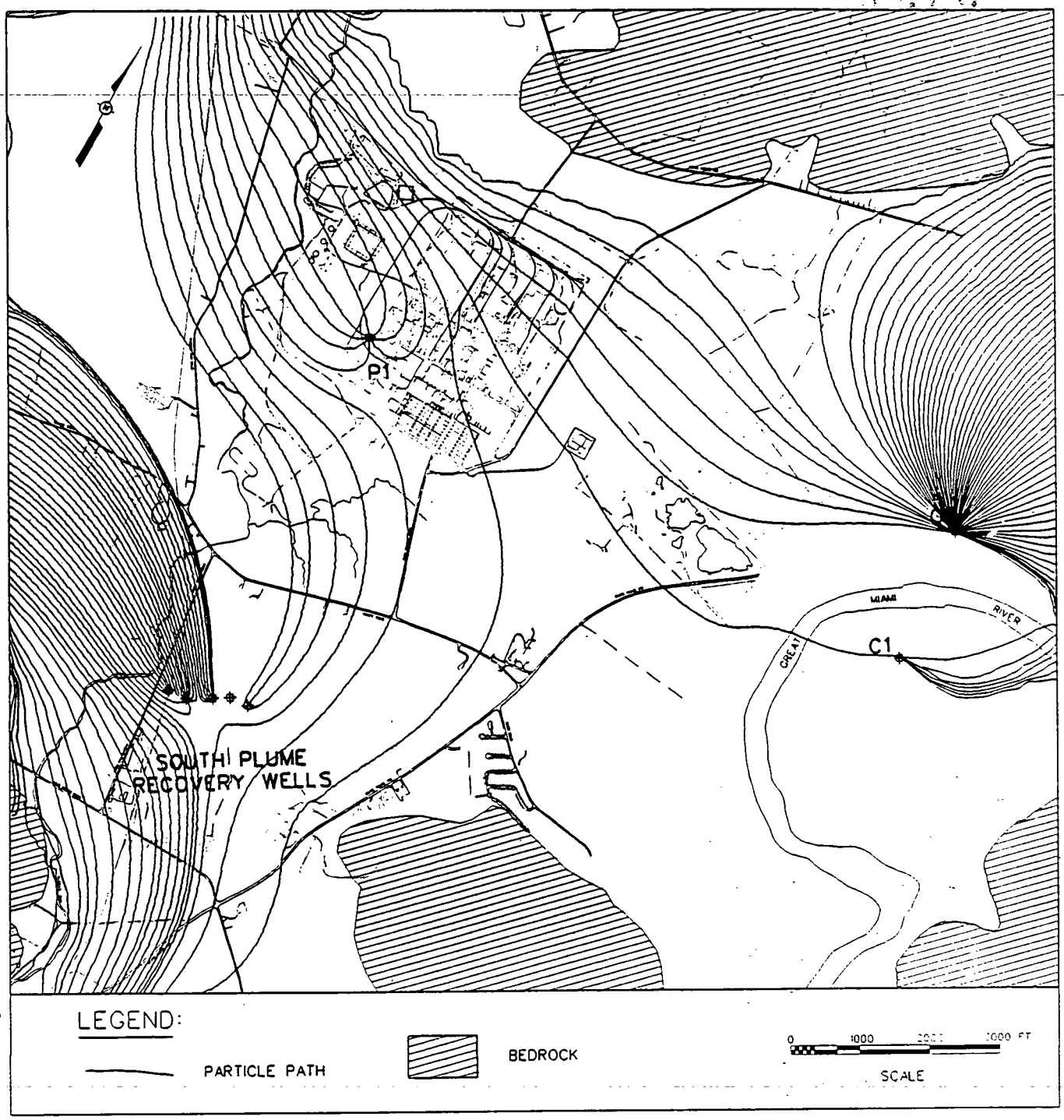
6.3-3 - Drawdown from South Plume Pumping



sh.x027xx.dgn

Notes: Flow patterns and particle tracks represent water and not contamination.
Additional pumping systems to further reduce flow from beneath the FEMP site to Wells C1 and C2 are being evaluated.

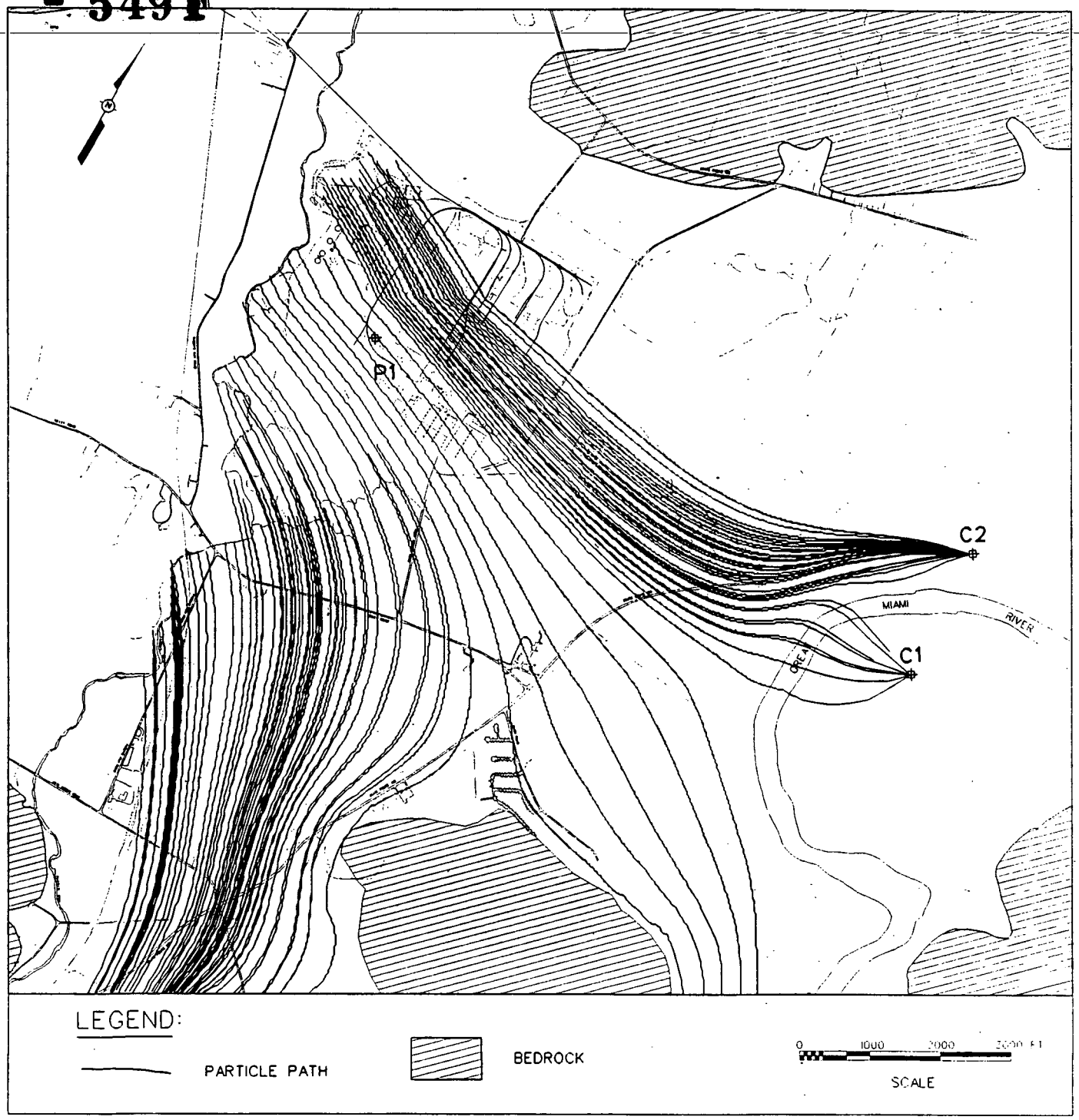
6.4-1 - Forward Tracking from Model Boundaries - Layer 1



sk x027xx.dgn

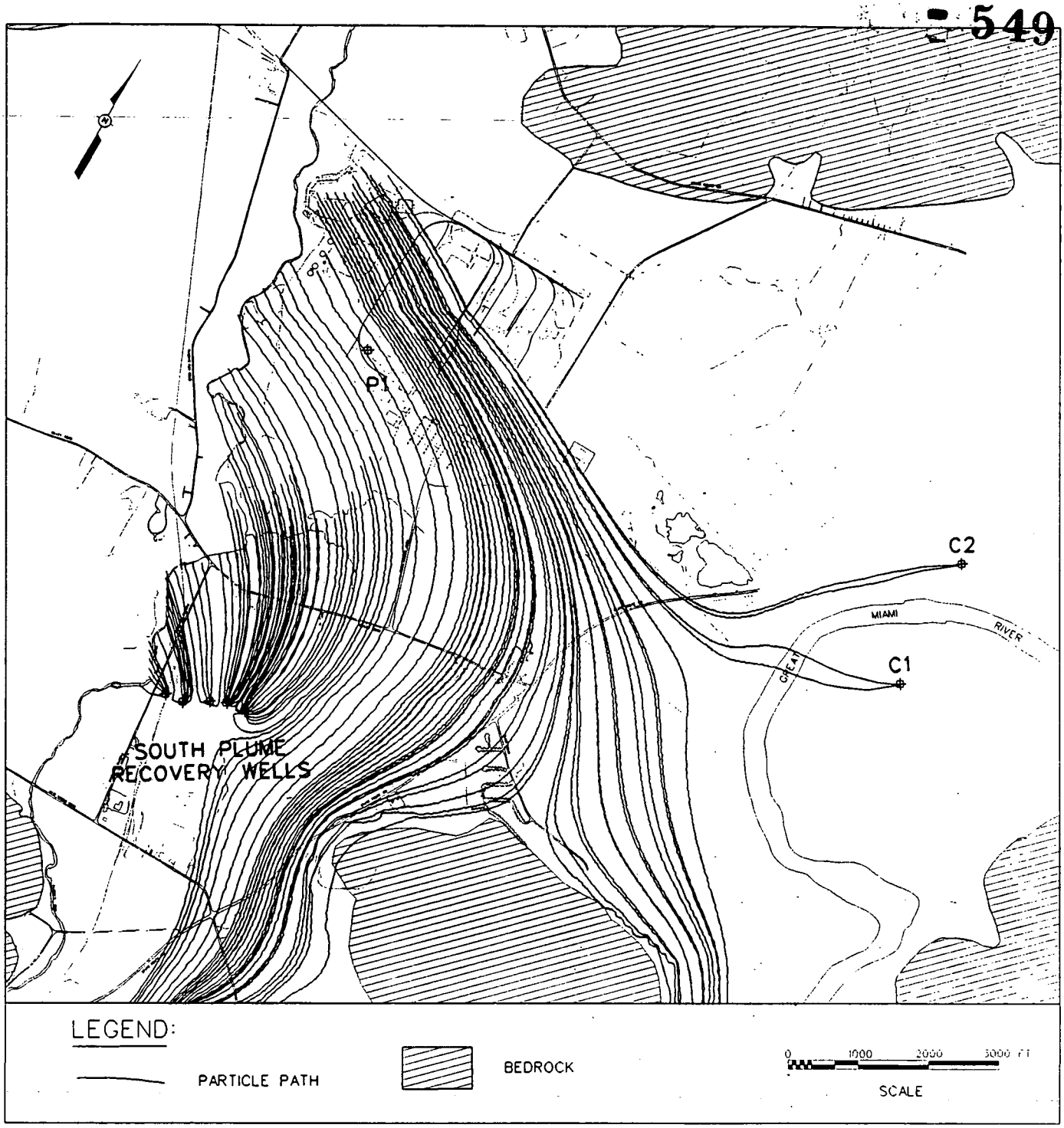
Notes: Flow patterns and particle tracks represent water and not contamination.
Additional pumping systems to further reduce flow from beneath the FEMP site to Wells C1 and C2 are being evaluated.

6.4-2 - Forward Tracking from Model Boundaries - Layer 5



Notes: Flow patterns and particle tracks represent water and not contamination.
This flow situation no longer exists. The South Plume Recovery Wells have been pumping since Fall 1993 (see Figure 6.5-2)

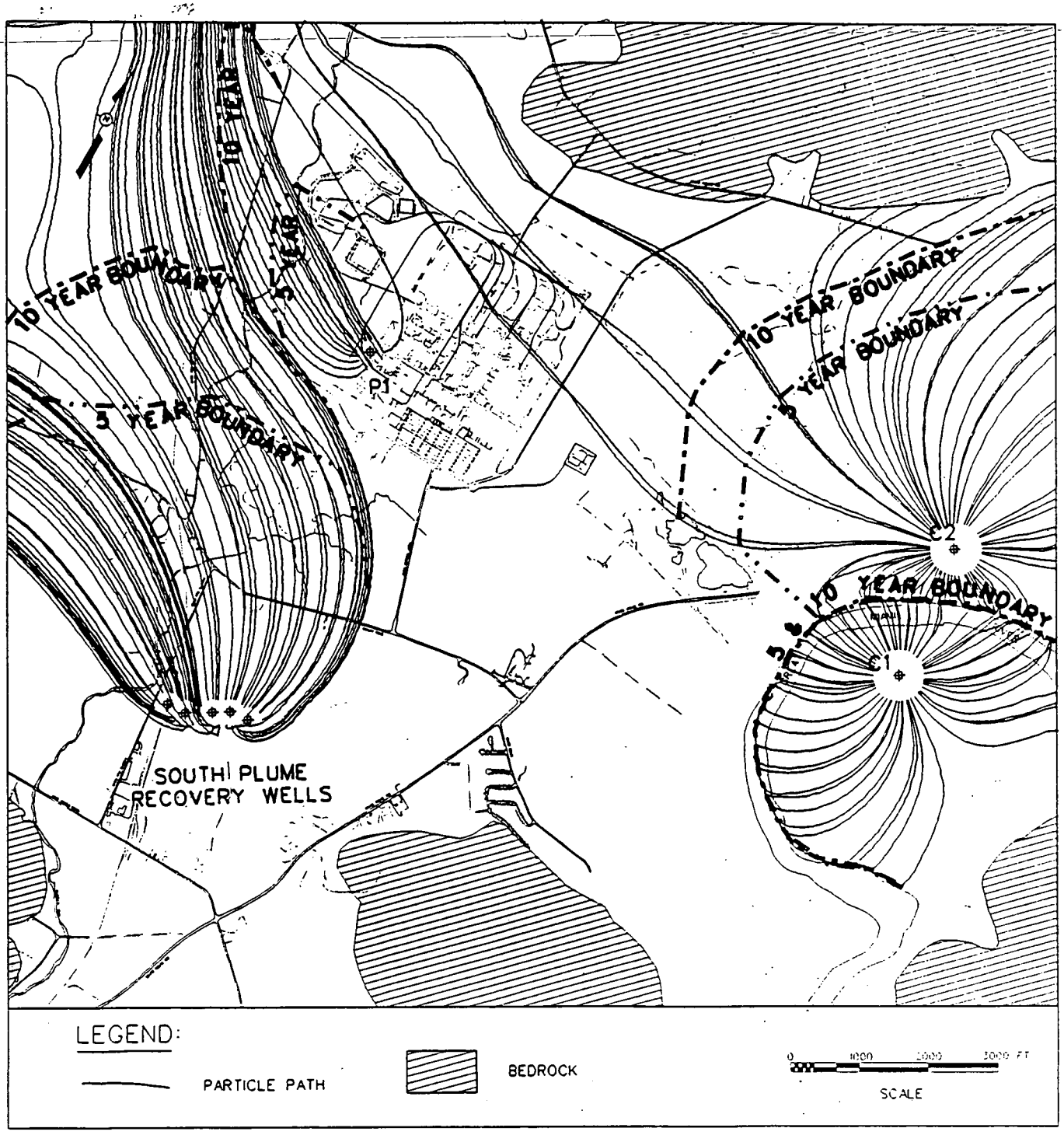
6.5-1 - Forward Tracking from Potential Sources (Baseline Case)



sk x02825.dgn

Notes: Flow patterns and particle tracks represent water and not contamination.
Additional pumping systems to further reduce flow from beneath the FEMP site to Wells C1 and C2 are being evaluated.

6.5-2 - Forward Tracking from Potential Sources (South Plume Pumping Case)



sk.x027xx.dgn

Notes: Flow patterns and particle tracks represent water and not contamination.
Additional pumping systems to further reduce flow from beneath the FEMP site to Wells C1 and C2 are being evaluated.

6.6-1 - Reverse Tracking 5- and 10-Year Capture Zones

Table 6.2-1 - Pumping Rates of Capture Zone Wells

Well System	Well No.	Date of Install	Est. Pumping Rate	Source of Data
South Plume Recovery Well	3924	1993	300 gpm	Operating records
South Plume Recovery Well	3925	1993	300 gpm	Operating records
South Plume Recovery Well	3926	1993	300 gpm	Operating records
South Plume Recovery Well	3927	1993	300 gpm	Operating records
South Plume Recovery Well	3928	1993	300 gpm	Operating records
SOWC Collector Well	Coll. 1	1950s	7621 gpm	Miami Conservancy - see Tables 4.3-4 and 4.3-5
SOWC Collector Well	Coll. 2	1950s	6959 gpm	Miami Conservancy - see Tables 4.3-4 and 4.3-5
SOWC Collector Well	Coll. 3	1950s	0	Miami Conservancy - see Tables 4.3-4 and 4.3-5
FEMP Production Well		1950s	240 gpm	FEMP Records

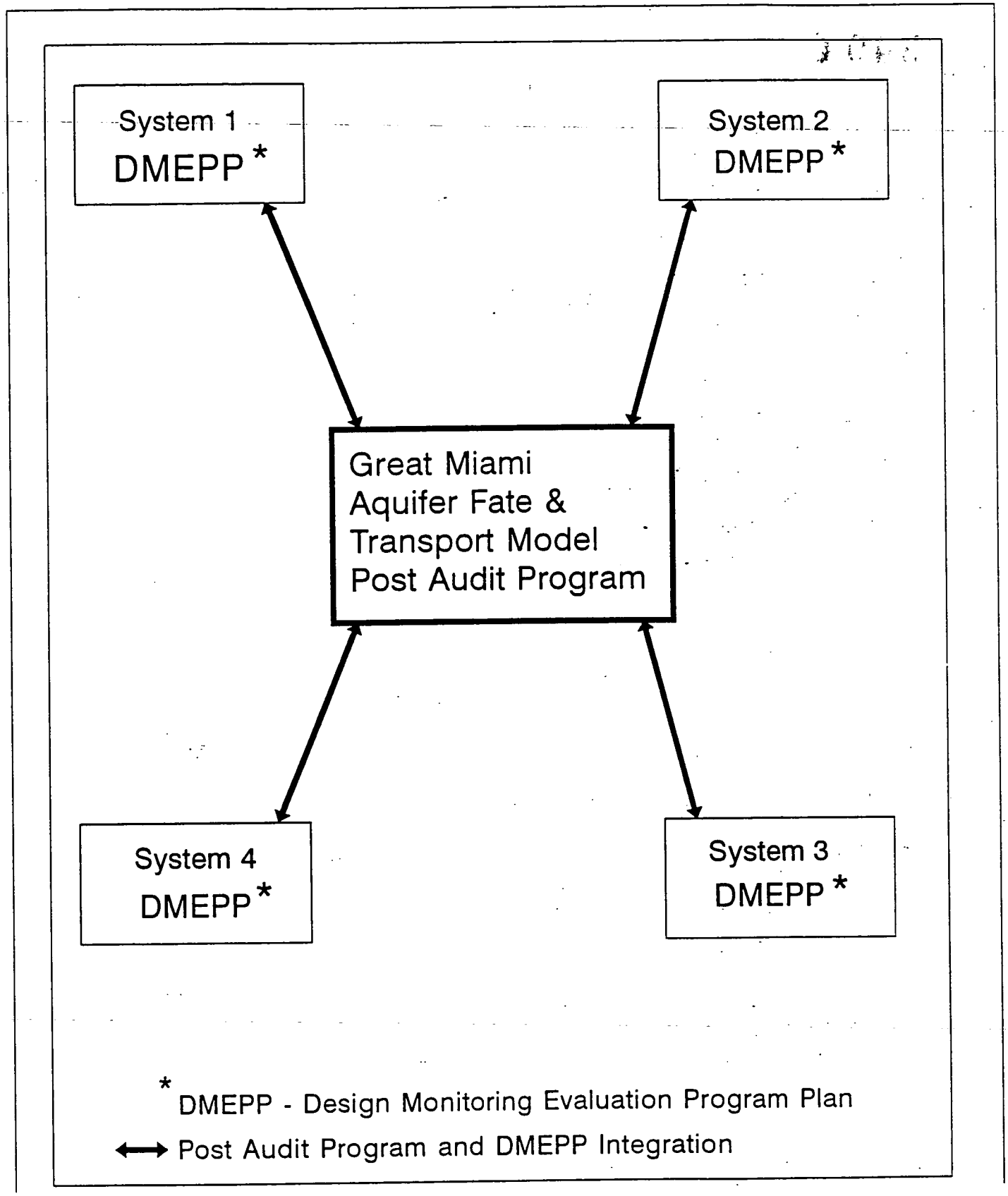


Figure 8.1-1 - GMA Fate and Transport Model Post-Audit Program and Remediation Systems with Associated DMEPPs

5491

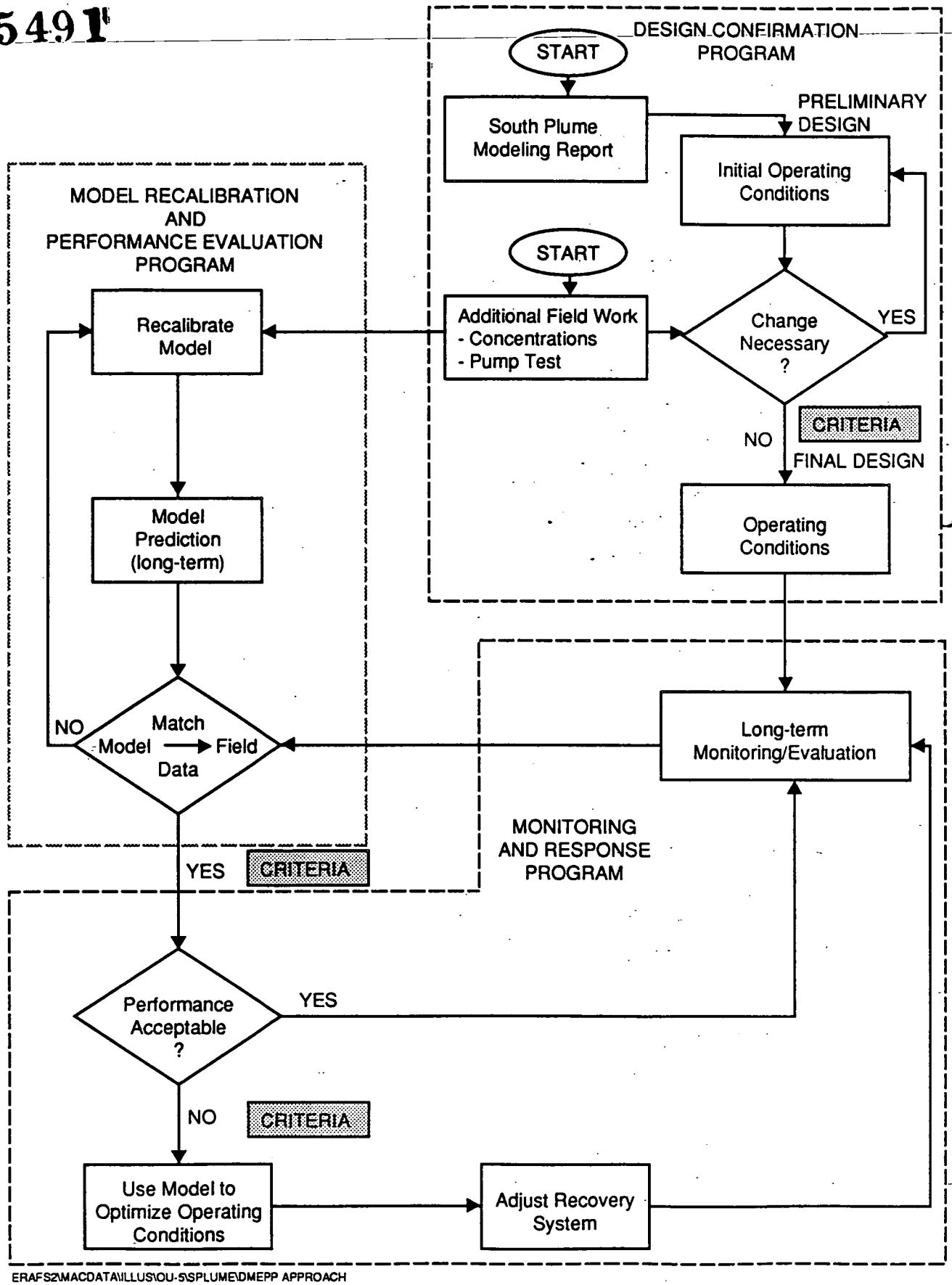


Figure 8.1-2 - Model Improvement Post-Audit and DMEPP Integration

000276

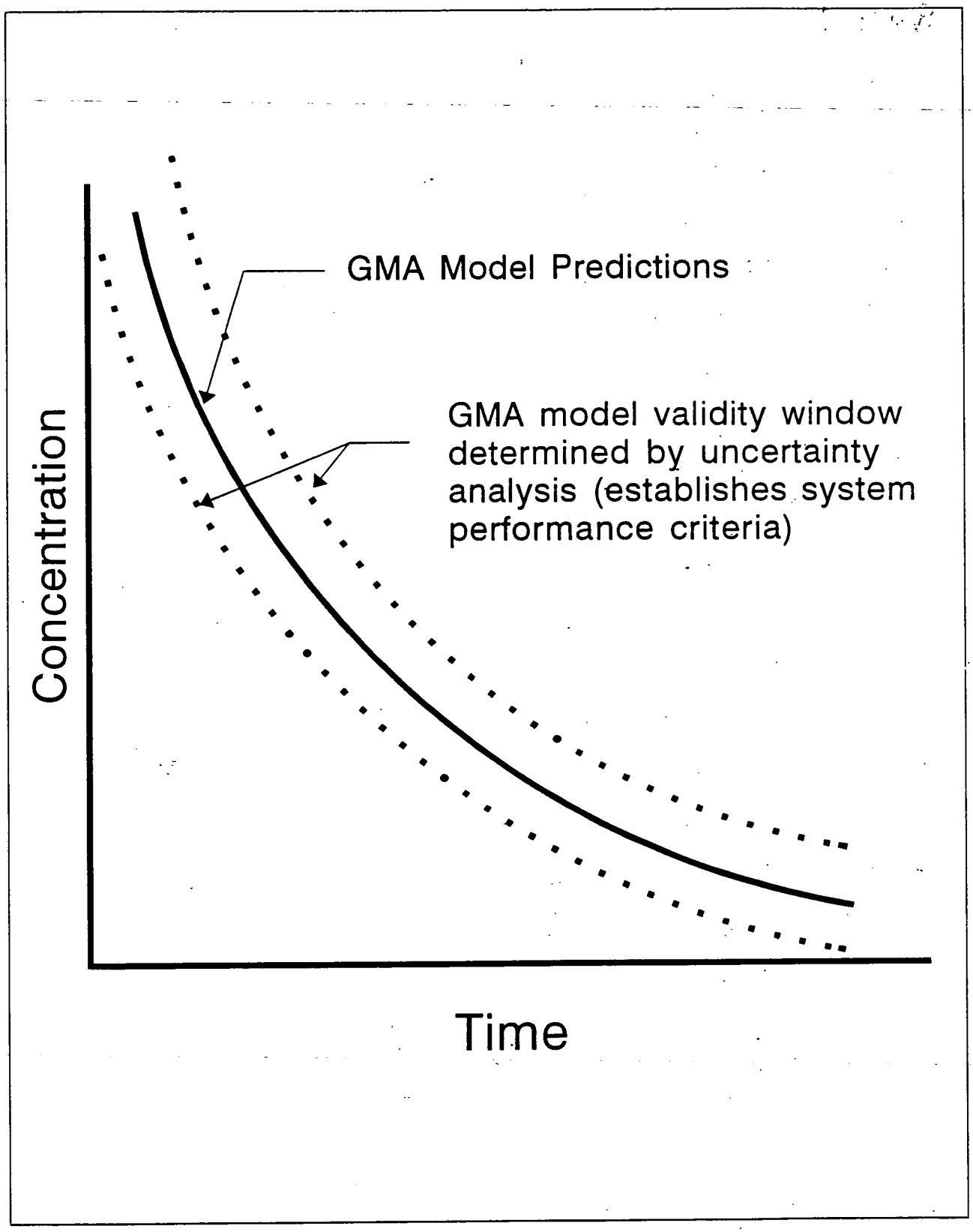
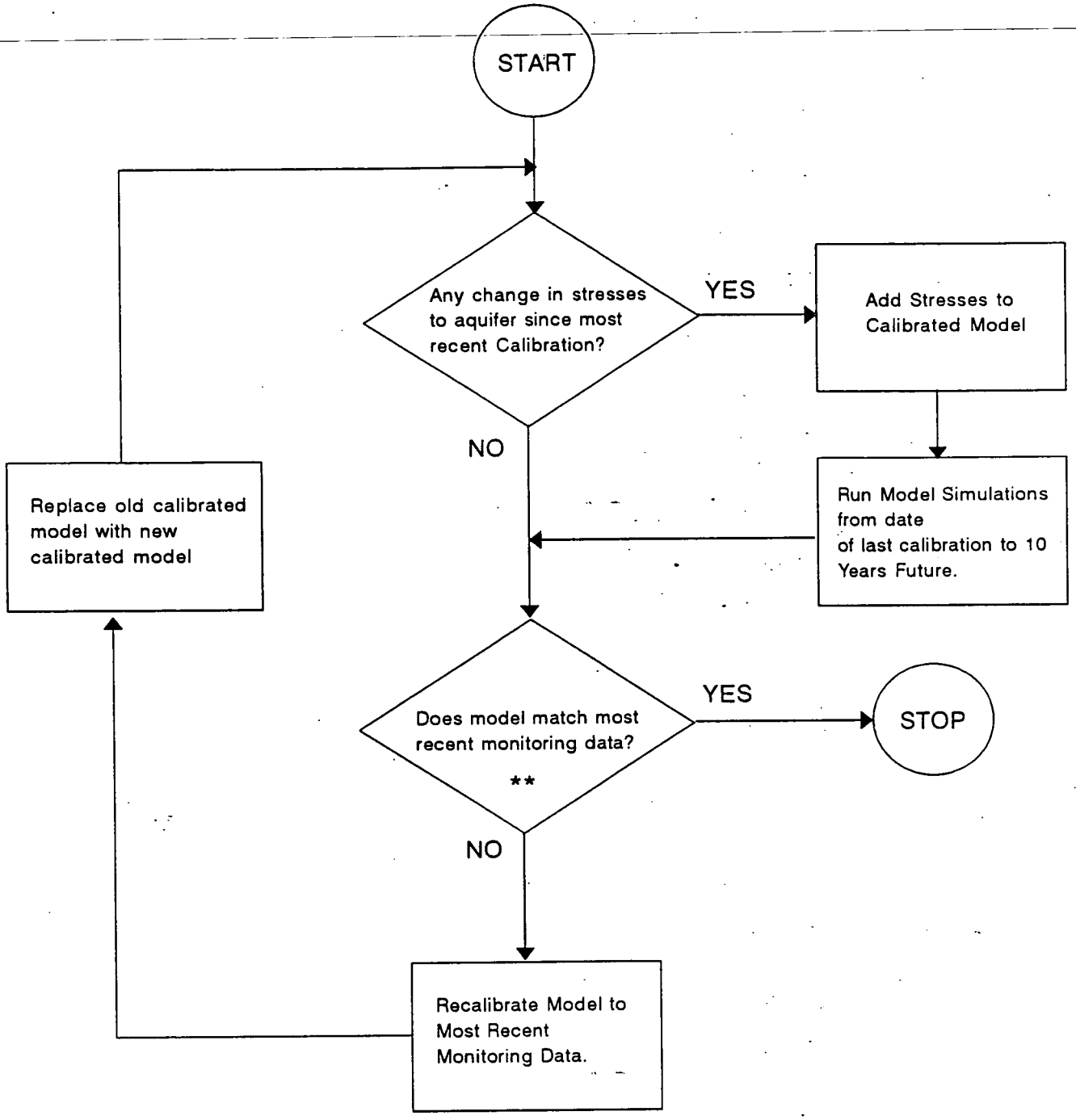


Figure 8.2-1 - Establishing Remediation System Performance Criteria Based on GMA Model Predictions



** Monitoring Data Includes:

- RCRA Program Data
- Performance Assessments from:
  Removal Actions,
  Remediation Systems, etc.

Figure 8.2-2 - GMA Fate and Transport Post-Audit Program