


**LAW**

**LAWGIBB Group Member** 

**BI-ANNUAL GROUND-WATER MONITORING  
PLAN REVIEW  
WEST PASCO CLASS III LANDFILL**

*Prepared for*

**PASCO COUNTY  
BOARD OF COUNTY COMMISSIONERS**

**January 1999**

**D.E.P.**  
**JAN 14 1999**  
Southwest District Tampa

January 7, 1999

Ms. Danielle Nichols, Environmental Specialist  
Division of Waste Management  
Florida Department of Environmental Protection  
Southwest District  
3804 Coconut Palm Drive  
Tampa, Florida 33619

Subject: **Bi-Annual Ground-Water Monitoring Plan Review**  
**West Pasco Class III Landfill**  
**LAW Project 40141-8-0452**


Dear Ms. Nichols:

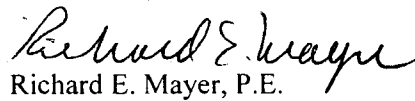
Law Engineering and Environmental Services, Inc. (LAW), on behalf of Pasco County, is submitting this Bi-Annual Ground-Water Monitoring Plan Review for the West Pasco Class III Landfill. The review covers the years 1995, 1996, 1997 and 1998.

If you have any questions concerning this response, please contact Richard Mayer or George Ellsworth at 813/289-0750.

Sincerely,

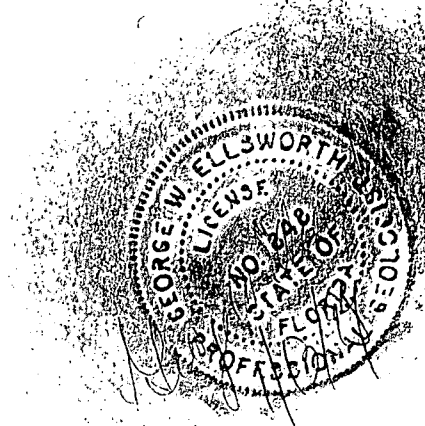
LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

  
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cc: Vincent Mannella  
Douglas Bramlett



**BI-ANNUAL GROUND-WATER MONITORING  
PLAN REVIEW  
WEST PASCO CLASS III LANDFILL**

*Prepared for*

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*Prepared by*

**LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.  
Tampa, Florida**

**January 1999**

**LAW Project 40141-8-0452**

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## **1.0 INTRODUCTION**

### **1.1 BACKGROUND**

The West Pasco Classes III Landfill is located in northwest Pasco County on Hays Road, approximately 2.5 miles north of State Road 52. The landfill is located adjacent to the Pasco County Resource Recovery facility and the West Pasco Class I Landfill. The West Pasco Class III Landfill is permitted separately from the adjacent West Pasco Class I Landfill.

The Ground-Water Monitoring Plan provides coverage for the 20-acre Class III Landfill which consists of four cells. The individual cells are five acres in size and are separated by interior berms.

The entire 20-acre landfill is lined with 60 mil HDPE geomembrane liner. Each cell has a separate leachate collection system.

Currently, only two cells are in use. The western most cell is being used for construction and demolition debris disposal. The eastern most cell is being used for yard-waste disposal.

### **1.2 FDEP-APPROVED QAPP**

Pasco County Environmental Laboratory (County Lab) has been collecting and analyzing samples from the ground-water monitoring system since 1990. Ground-water sampling procedures used by the County Lab, including sampling equipment decontamination, field measurements, and sample shipment, adhere to the FDEP-approved QAPP. The County Lab also performs analytical work. The laboratory procedures and analytical methods used at the County Lab are also described in the FDEP-approved QAPP.

Pasco County contracts for some laboratory services and currently has several FDEP-approved laboratories under annual contract. The contracts for laboratory services are re-bid every two to three years. The use of these contracted laboratories is reflected in the County Lab's FDEP-approved QAPP.

### **1.3 GROUND-WATER MONITORING PLAN**

The current ground-water monitoring plan consists of five surficial aquifer monitoring wells (2MW3A, 2MW7, 2MW8, 2MW9, and 2MW10) and four Floridan aquifer monitoring wells (4MW3A, 4MW7, 4MW8, and 4MW9). The well locations are shown on Figures 2 and 3. The monitoring wells are sampled and analyzed quarterly in 1995 and semi-annually during 1996, 1997, and 1998.

Florida Aquifer monitoring wells, 4MW7, 4MW8 and 4MW9, are located around the perimeter of the West Pasco Class III Landfill. These wells were installed during the construction of the West Pasco Class III Landfill. Florida Aquifer monitoring well 4MW-3A is located approximately 500 feet northeast of and downgradient of the next closest Floridan Aquifer monitoring well, 4MW9.



## **2.0 WATER LEVEL DATA**

### **2.1 DATA TABULATION**

Water level measurements were tabulated for the years 1995, 1996, 1997, and 1998. Water level elevations are shown in feet, NGVD (see Table 1). Water level measurements are available for all the Floridan aquifer wells. However, no water level measurements are available for the surficial aquifer wells because the wells were consistently dry.

### **2.2 HYDROGRAPHS**

Hydrographs were prepared for the Floridan aquifer monitoring wells. The Class III Landfill monitoring well hydrographs are presented on Figure 1.

### **2.3 GROUND-WATER CONTOUR MAPS**

Ground-water contour maps were prepared for the Floridan aquifer for the dry season and for wet seasons for 1998 (see Figures 2 through 3). No surficial aquifer water table maps were prepared because as previously stated, all the surficial aquifer wells were dry.

### **2.4 DATA INTERPRETATION**

#### **2.4.1 Water Levels**

Water levels in the Floridan aquifer ground-water monitoring wells do not vary significantly across the site. Water levels differ by less than five feet during individual sampling events. During the past four years, the fluctuation of water levels in the monitoring wells have been less than ten feet between the high and low values.

The surficial aquifer ground-water monitoring wells are dry because of their location on a topographic high.

## 2.4.2 Ground-Water Flow Direction

The ground-water flow direction in the Floridan aquifer is consistently determined to be to the northwest (see Figures 2 and 3). This conforms to regional flow which is towards Weeki-Wachi Springs to the northwest. There is a slight depression to the southwest related to sinkholes and a water supply well located southwest of the site.

## 2.4.3 Ground-Water Gradient

The hydraulic gradient in the Floridan aquifer, based on the wet season potentiometric maps, is approximately 1.50 feet per 1,000 feet or  $1.5 \times 10^{-3}$  feet/foot. The hydraulic gradient during the dry season is approximately the same.

Figs 2 + 3 should flow  
to S.  
(I hate law reports!!)  
↳ grad. should be measured  
at the site

### **3.0 WATER QUALITY DATA**

#### **3.1 DATA TABULATION**

Ground-water sampling analytical results were tabulated for years 1995, 1996, 1997, and 1998 (see Tables 2 through 7). Individual tables were prepared for the following water quality parameters:

- Total Dissolved Solids (TDS)
- pH
- Sodium
- Chlorides
- Iron

#### **3.2 GRAPHICAL PRESENTATIONS**

All tabulated parameters are presented graphically (see Figures 4 through 8).

#### **3.3 DATA INTERPRETATION**

Maximum contaminant levels for seven parameters were exceeded in ground-water monitoring wells sampled at the West Pasco Class III Landfill. These were antimony, barium, chromium, fluoride, iron, total dissolved solids and zinc. These were one-time occurrences in a single well that were not subsequently repeated. These exceedances are shown in Table 7. Several of the tabulated parameters showed trends. Each of the tabulated parameters is discussed in the following sections.

##### **3.3.1 pH**

The established acceptable range for pH values in drinking water is between standard values of 6.5 and 8.5. Outside this range, the water quality is considered to be too acidic or caustic. The pH readings taken in the Floridan aquifer monitoring wells relative to the West Pasco Class III Landfill all were within the acceptable range (see Table 3).

### **3.3.2 Total Dissolved Solids**

One exceedances of the established MCL of 500 mg/l for total dissolved solids was detected in Florida Aquifer monitoring well 4MW-3A. This exceedance occurred in January 1998. In July 1998, the total dissolved solids concentration for 4MW-3A drop from the high of 1,040 mg/l to 480 mg/l (see Table 2).

### **3.3.3 Sodium**

No exceedances of the established MCL of the 160 mg/l for sodium were detected. The recorded values were less than 10 mg/l for three of the monitoring wells. However, in Floridan Aquifer monitoring well, 4MW-3A, sodium concentrations were up to 43 mg/l (see Figure 4).

### **3.3.4 Chlorides**

No exceedances of the established MCL of 250 mg/l for chloride were detected. The recorded values were less than 20 mg/l for three of the monitoring wells. However, in Floridan Aquifer monitoring well, 4MW-3A, chloride concentrations were up to 150 mg/l (see Figure 4).

### **3.3.5 Iron**

Only one exceedance of the MCL of 0.3 mg/l for iron was detected in the Floridan aquifer monitoring wells. This occurred in Floridan Aquifer monitoring well, 4MW-3A, in July 1996 (see Table 6).

## **3.4 SUMMARY**

None of the ground-water monitoring wells in the West Pasco Class III Landfill had any significant exceedances of the established regulatory levels. Occasional exceedances were observed for seven parameters. These were one-time occurrences in a single well that was not subsequently repeated.

There were noticeable trends observed in Floridan Aquifer monitoring well 4MW-3A. Total dissolved solids, sodium and chloride concentrations show a general increase over the four-year period from 1995 to 1998. This trend is shown on graphs prepared for these parameters. The concentrations of analytes of interest in the other three Florida Aquifer monitoring wells, 4MW-7, 4MW-8, and 4MW-9, are generally consistently, lower each year (see Figures 4 through 8).

## **4.0 GROUND-WATER MONITORING PLAN REVIEW**

### **4.1 SAMPLING LOCATIONS**

The existing well spacing on the downgradient side of the landfill does not meet the current rule, Chapter 62-701.510(3)(d)2, maximum spacing of "no greater than 500 feet apart across the down gradient direction of the ground-water flow". The existing spacing on the downgradient side of the landfill is approximately 1,000 feet. The spacing between monitoring wells on the upgradient side of the landfill is also about 1,000 feet, which is sufficient. The current rules specifies a maximum spacing of 1,500 feet in the upgradient direction.

### **4.2 MONITORING FREQUENCY**

The ground-water monitoring wells are currently sampled and analyzed semi-annually as specified in the current rule, Chapter 62-701 of the FAC.

## 5.0 CONCLUSIONS

The ground-water monitoring wells sampling frequency and parameter suite are in compliance with FAC Rule 62-701.

The spacing between ground-water monitoring wells on the downgradient side of the landfill is not in strict compliance with FAC Rule 62-701. However, given the landfill use and design, the spacing is adequate. The West Pasco Class III Landfill is lined with a 60 mil HDPE geomembrane and has a leachate collection system. Generally, Class III Landfills are not lined. Additionally, the waste stream is well monitored. Construction debris and yard waste are disposed of in different cells.

No significant exceedances of the established ground-water MCLs were observed for any of the wells located around the perimeter the West Pasco Class III Landfill. However, the trend is rising levels for several parameters monitored were observed in Floridan Aquifer monitoring well, 4MW-3A. No comparable trend was observed in Florida Aquifer monitoring, 4MW-9, which is located between 4MW-3A and the West Pasco Class III Landfill and upgradient of 4MW-3A. Based on the analytical results from the 4MW-9 and its upgradient position relative to 4MW-3A, it is concluded that the observed trends showing an increase in total dissolved solids, sodium and chlorides in Floridan Aquifer monitoring well 4MW-3A, are not a result of a source emanating from the West Pasco Class III Landfill.

They show gw flow  
moving to the S/SE,  
so 4MW3. is upgradient  
of the Class 3. Other  
data shows flow to N.  
in this area

## **6.0 RECOMMENDATIONS**

No changes in the ground-water monitoring plan are recommended.



## TABLES

**Table 1: Water Level Elevations**

Units: feet

Well / Date	Jan-95	Apr-95	Aug-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	29.45	29.10	28.60	N/A	31.75	31.10	28.10	25.60	34.80	32.45
4MW- 7	27.93	27.68	27.38	29.80	30.23	27.38	BDL	BDL	33.28	30.83
4MW- 8	29.65	29.50	29.15	30.95	32.15	31.60	28.40	26.50	35.25	32.50
4MW- 9	27.88	27.53	26.98	29.03	30.28	29.88	26.63	24.48	33.38	30.98
Well / Date	Jan-95	Apr-95	Aug-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENIRO/4014180452.XLS/WATERLEVEL

Prepared/Date: \_\_\_\_\_  
Check/Date: GWE 1/7/99

**Table 2: Total Dissolved Solids Analytical Results**

MCL: 500

Units: mg/L

Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	272	244	221	N/A	295	402	270	305	1020	480
4MW- 7	161	142	136	170	204	149	BDL	BDL	268	180
4MW- 8	181	186	151	185	181	176	161	181	192	176
4MW- 9	202	209	226	203	232	185	199	217	295	232
Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENVIRO/4014180452.XLS/TDS

MCL = Maximum Contaminant Limit

DL = Detection Limit

BDL = Below Detection Limit

Prepared/Date: \_\_\_\_\_ / \_\_\_\_\_  
Checked/Date: GWS / 1/7/99

**Table 3: pH Analytical Results**

MCL: 6.5 to 8.5

Units: Std. Units

Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW-7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	7.31	7.22	7.35	N/A	7.30	7.25	7.35	7.25	7.29	6.95
4MW- 7	7.42	7.24	7.21	7.57	7.14	7.78	BDL	BDL	7.65	7.24
4MW- 8	7.35	7.25	7.27	7.55	7.12	7.54	7.21	7.02	7.54	7.13
4MW- 9	7.25	7.15	7.19	7.49	7.47	7.26	7.09	7.11	7.30	7.00
Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENVIRO/4014180452.XLS/Ph

MCL = Maximum Contaminant Limit

DL = Detection Limit

BDL = Below Detection Limit

Prepared/Date: DH / 1/7/99  
Checked/Date: BWE / 1/7/99

**Table 4: Sodium Analytical Results**

MCL: 160

Units: mg/L

Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW-7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	7.55	6.02	6.25	N/A	10.90	17.20	9.26	10.7	43.00	38.50
4MW- 7	3.62	3.88	3.56	3.23	3.30	3.45	BDL	BDL	3.51	3.23
4MW- 8	3.41	3.70	3.55	3.44	3.54	3.56	3.49	3.51	3.55	3.73
4MW- 9	3.61	3.60	5.39	4.30	4.22	3.82	3.80	4.08	4.24	4.88
Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENVIRO/4014180452.XLS/SODIUM

MCL = Maximum Contaminant Level

DL = Detection Limit

BDL = Below Detection Limit

Prepared/Date: DWI / 1/7/99  
Checked/Date: GWE / 1/7/99

**Table 5: Chloride Analytical Results**

MCL: 250

Units: mg/L

Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW-7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	33.90	22.40	23.70	N/A	47.70	67.20	39.60	41.90	150.00	143.00
4MW- 7	4.70	6.64	6.20	5.08	4.70	5.15	BDL	BDL	5.18	7.34
4MW- 8	6.40	6.64	6.30	6.11	5.60	6.20	5.50	5.31	6.82	7.31
4MW- 9	8.00	9.69	16.30	10.20	9.70	6.60	10.80	12.10	9.90	18.10
Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENVIRO/4014180452.XLS/CHLORIDE

MCL = Maximum Contaminant Limit

DL = Detection Limit

BDL = Below Detection Limit

Prepared/Date: DWI 1 1/7/99  
Checked/Date: BWE 1 1/7/99

**Table 6: Iron Analytical Results**

MCL: 0.3

Units: mg/L

Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98
2MW- 3A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW-7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 9	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2MW- 10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4MW- 3A	0.11	0.16	0.19	N/A	0.19	0.34	0.25	0.21	0.17	0.15
4MW- 7	<0.02	0.07	0.02	0.02	0.04	<0.01	BDL	BDL	0.03	<0.02
4MW- 8	<0.02	<0.02	0.08	0.21	0.08	0.02	0.06	0.05	0.04	<0.02
4MW- 9	<0.02	0.02	0.05	0.08	0.08	0.03	0.06	0.07	0.03	0.03
Well / Date	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Jul-96	Feb-97	Jul-97	Jan-98	Jul-98

ENVIRO/4014180452.XLS/IRON

MCL = Maximum Contaminant Limit

DL = Detection Limit

BDL = Below Detection Limit

Prepared/Date: DWM 1 1/7/99  
Checked/Date: GWE 1 1/7/99

Table 7: Parameters Exceeding MCLs

Units: mg/L

Well / Date	Antimony	Barium	Chromium	Flouride	Iron	TDS	Zinc
4MW- 3A	0.022, 1/96	0.045, 8/96	0.008, 2/96		0.34, 7/96	1020, 7/98	
4MW- 7	0.026, 2/96; 0.027, 1/96			5.61, 7/95			
4MW- 8	0.027, 1/96	0.025, 7/96					
4MW- 9	0.018, 1/96						0.083, 2/96

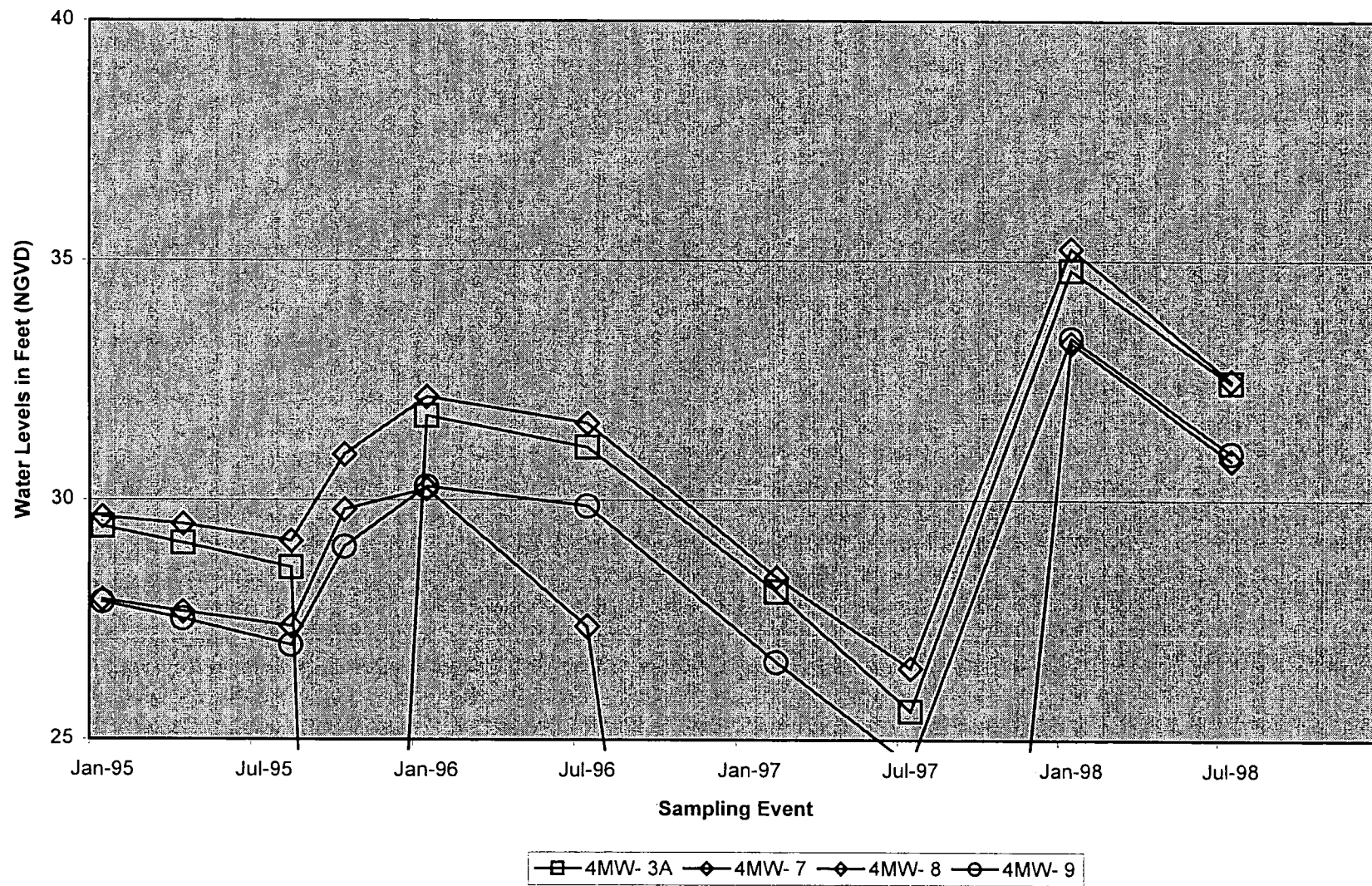
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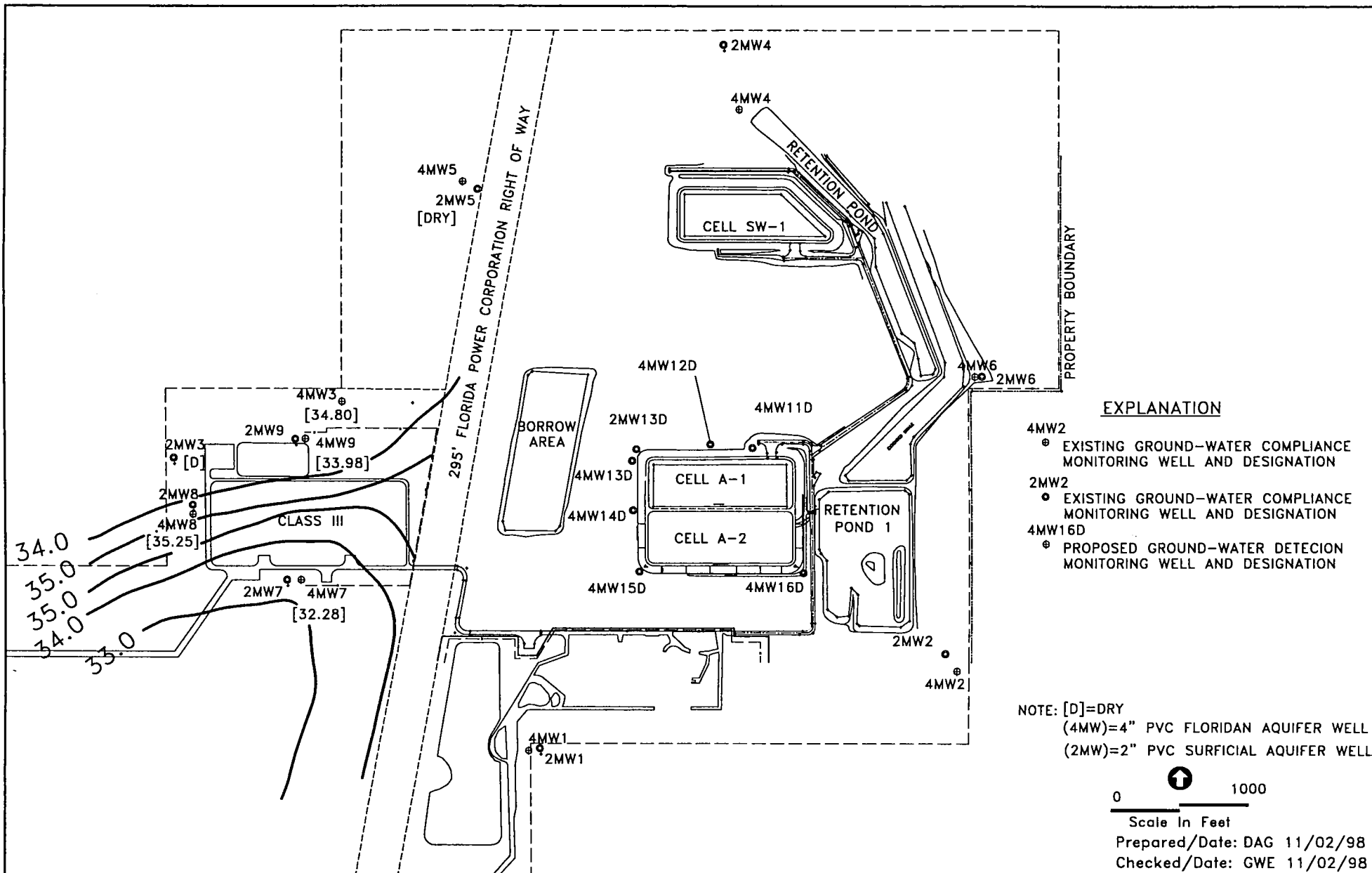
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**FIGURES**

Figure 1: Hydrographs - West Pasco Class III Landfill





West Pasco Class III Landfill  
 Pasco County  
 Board of County Commissioners  
 Utility Services Branch  
 Pasco County, Florida

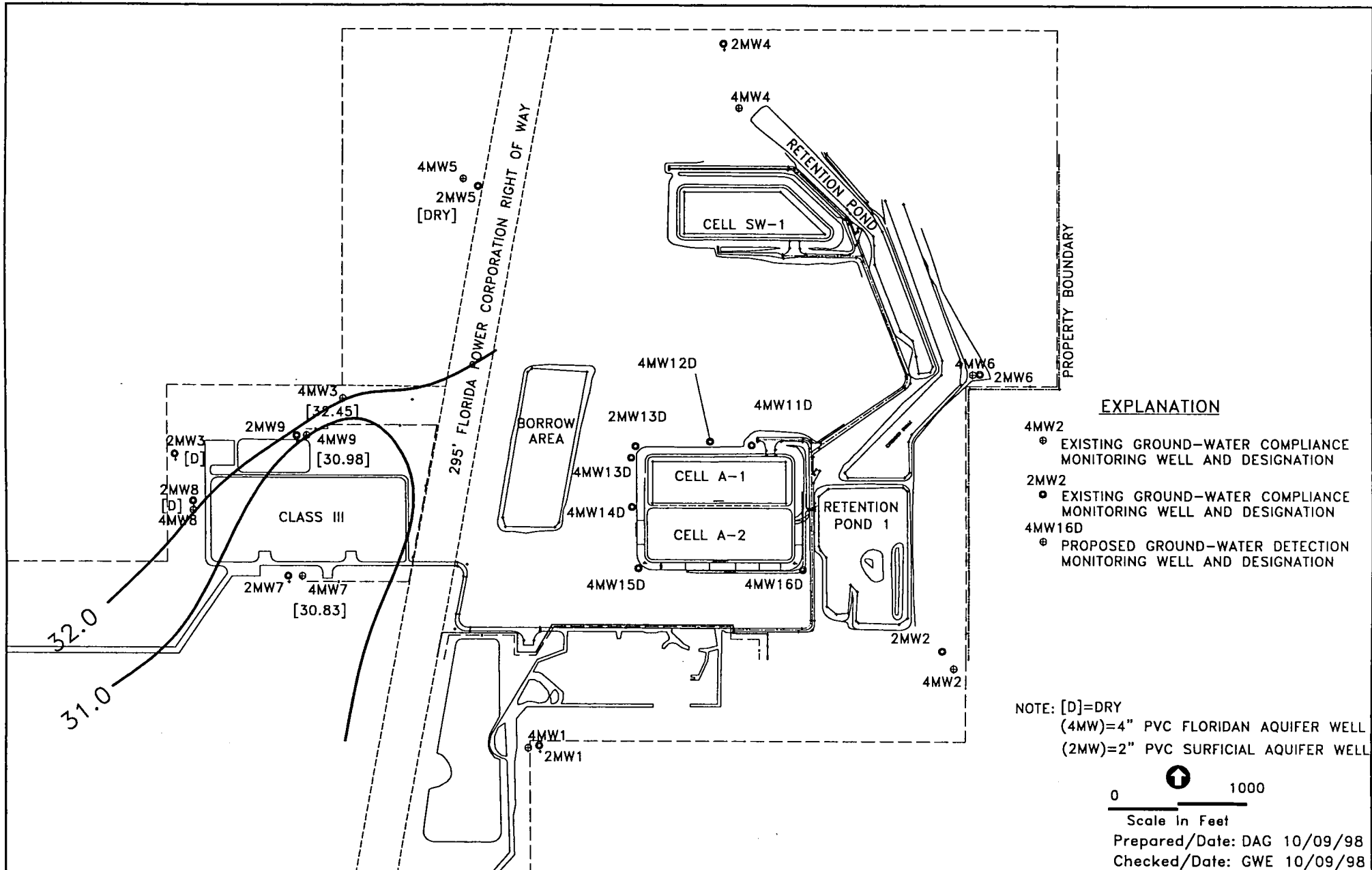


**LAW**  
 ENGINEERING AND ENVIRONMENTAL  
 SERVICES

WEST PASCO CLASS III LANDFILL  
 FLORIDAN AQUIFER POTENTIOMETRIC  
 SURFACE MAP  
 JANUARY 1998

Project 40141-8-0452

Figure 2



West Pasco Class III Landfill  
 Pasco County  
 Board of County Commissioners  
 Utility Services Branch  
 Pasco County, Florida



**LAW**

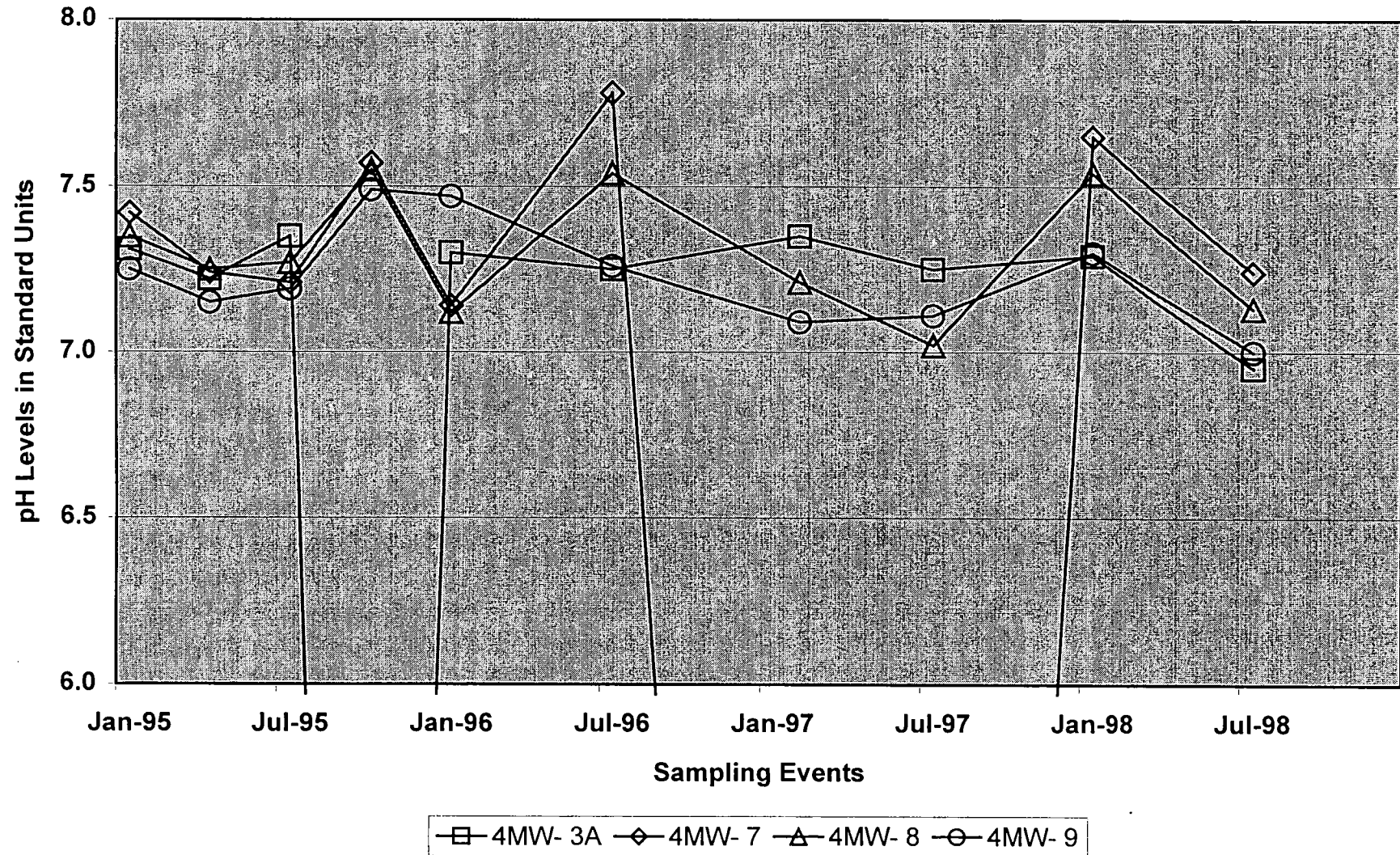
ENGINEERING AND ENVIRONMENTAL  
 SERVICES

WEST PASCO CLASS III LANDFILL  
 FLORIDAN AQUIFER POTENTIOMETRIC  
 SURFACE MAP  
 JULY 1998

Project 40141-8-0452

Figure 3

Figure 4: pH Analytical Results





**Figure 5: Total Dissolved Solids Analytical Results**

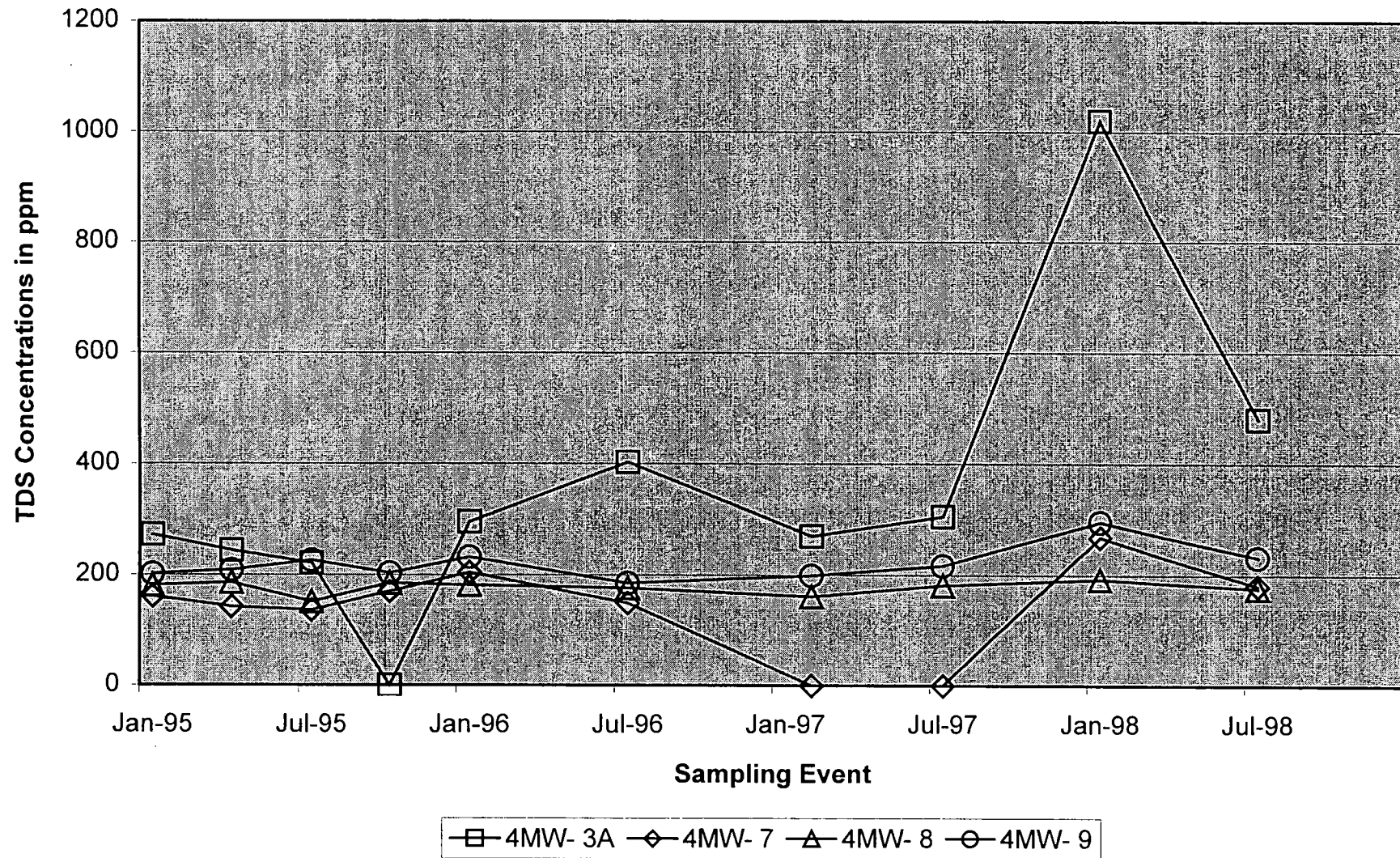


Figure 6: Sodium Analytical Results

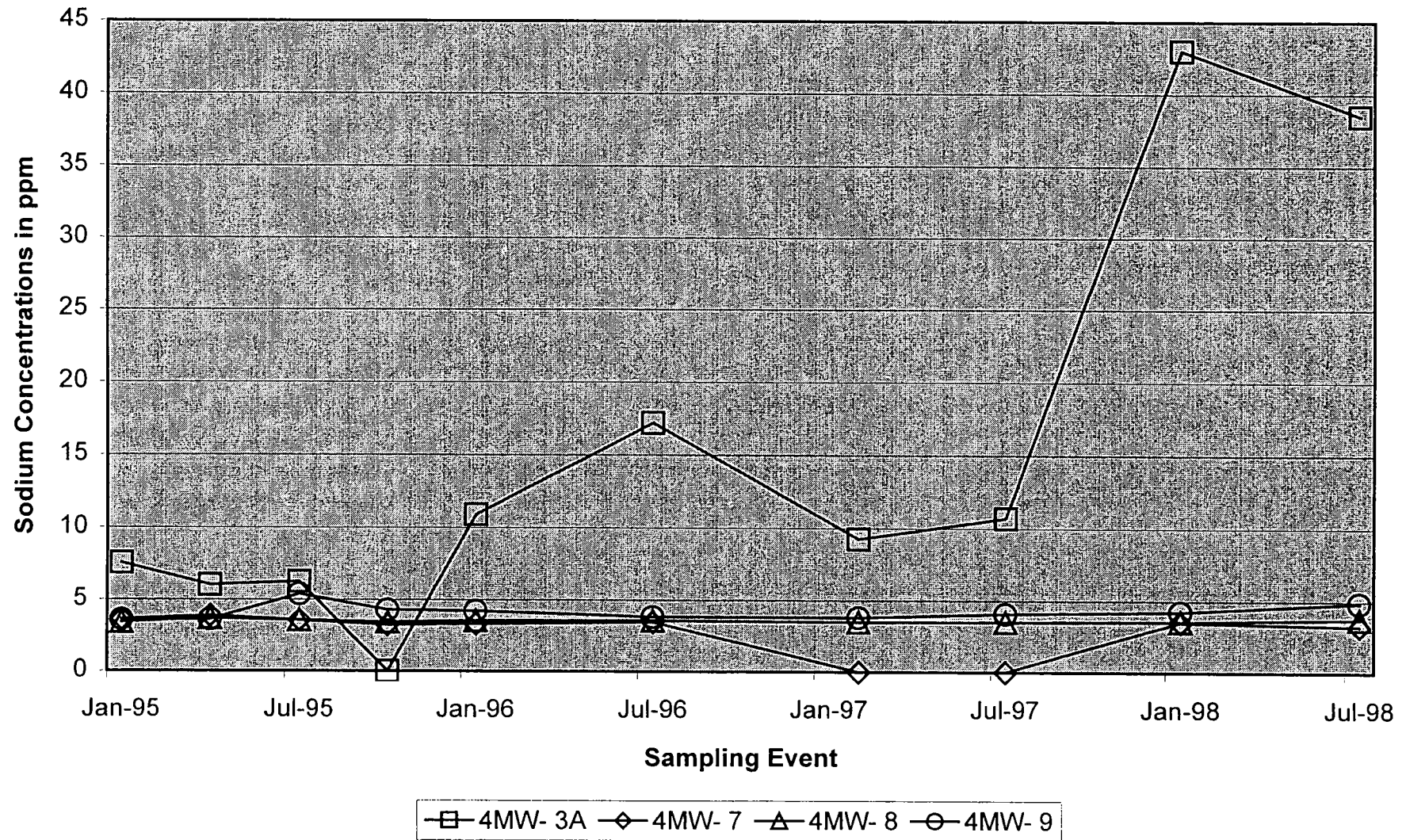


Figure 7: Chloride Analytical Results

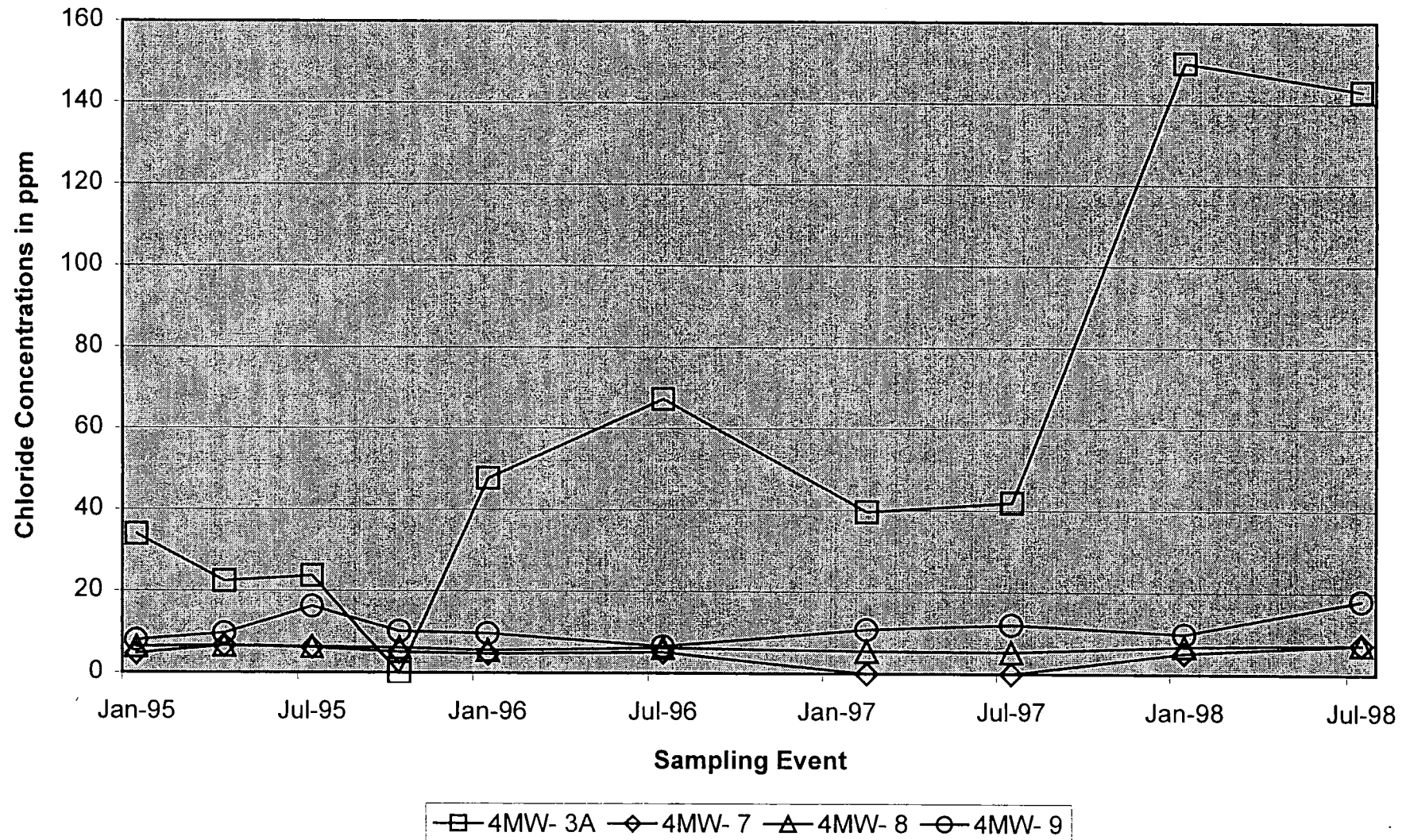




Figure 8: Iron Analytical Results

