REPORT

2009 ANNUAL REPORT GROUND-WATER MONITORING PROGRAM

Florida Power & Light Company
Turkey Point Plant
Miami-Dade County, Florida

Submitted To: Florida Power & Light Company
Turkey Point Nuclear Plant
700 Universe Boulevard
Juno Beach, Florida 33408

Submitted By: Golder Associates Inc.
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Certificate of Authorization Number: 1670

Harold A. Frediani, Jr., PE 36394

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September 18, 2009

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Mr. John Jones
Florida Power & Light Company
Environmental Affairs Department
Post Office Box 078768
West Palm Beach, Florida 33407-0768

RE: 2009 ANNUAL REPORT
GROUND-WATER MONITORING PROGRAM
TURKEY POINT PLANT
DADE COUNTY, FLORIDA

Dear Mr. Jones:

Golder Associates Inc. (Golder) is pleased to submit this Annual Report on the Ground-Water Monitoring Program at the Turkey Point Generating Station for the period of July 2008 through June 2009.

Rainfall totals for the 2008-2009 monitoring year were above the average year at S-20, but below the average year at S-20F. Rainfall data reported as S-20 from March 2008 onward is actually from FPL's meteorological tower near the Land Use Building.

Ground-water levels remained generally within historical limits, generally between 1 and 3 feet Mean Sea Level (MSL). Ground-water temperatures were within the historical envelope, except in well L-3, which had minor excursions of up to about 1^{o}C. Ground-water salinity exceeded historical envelope levels at lower levels during all months for all wells, by up to as much as 10 PPT in well L-3, up to 10 PPT in well L-5, up to about 10 PPT in well G-28, and up to about 5 PPT for well G-21.

The Interceptor Ditch Program is continuing to be responsive and effective in performing its design function. With respect to the changes described, no adverse impacts have occurred from the presence or operation of the cooling canal system.

If you have any questions concerning this Annual Report, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Harold A. Frediani, Jr., PE
Senior Water Resources Engineer

HAF/jlg

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1.0 INTRODUCTION

This is the 2009 Annual Report of the Ground-Water Monitoring and Interceptor Ditch Programs related to the cooling canal system at Florida Power & Light's (FPL's) Turkey Point Power Plant. This report is submitted in compliance with the Agreement between FPL and the South Florida Water Management District (SFWMD), dated July 15, 1983.

The July 15, 1983, Agreement is the most current modification of the Ground-Water Monitoring Program initially defined in previous Agreements. The original Agreement, dated February 2, 1972, required monitoring of water level elevation, ground-water temperature and conductivity in 38 G-Series wells, at 23 separate locations. This original Agreement has been modified by four amendments, as follows: October 21, 1974; August 14, 1975; September 10, 1976; and lastly, July 15, 1983. Each of these supplements modified the Ground-Water Monitoring and Interceptor Ditch Programs so that the operation of these programs became more efficient as justified by operational experience and data review.

The purpose of the Ground-Water Monitoring Program is to monitor the ground-water levels, conductivities, and temperatures in the Biscayne aquifer west of the cooling canal system, and to determine the operational characteristics of the Interceptor Ditch. The Interceptor Ditch Program was established to control the westward seepage of saline water from the cooling canal system. The system is underlain by the brackish portion of the Biscayne aquifer classified as G-III (unconfined), as differentiated from the potable section of the Biscayne aquifer west of the canal system. Since April 1972, up to 83 wells (G-, L-, X-, ID-, F-, and E-Series wells) around the cooling canal system have been used to monitor, for various lengths of time, the ground-water conditions in the upper 60 feet of the aquifer (Figure 1). The results of these programs were reported quarterly to SFWMD in January, April, July, and October from 1972 through July 1976, semi-annually in January and July from August 1976 through July 1979, and annually thereafter. In addition, a summary report was submitted in March 1976 that presented the initial four years of G-Series well monitoring data.

Through July 15, 1983, the results of the Ground-Water Monitoring and Interceptor Ditch Programs led to two general conclusions:

1. Construction and operation of the cooling canal system resulted in no significant impact to the potable section of the Biscayne aquifer located to the west of the system; and
2. Operation of the Interceptor Ditch protected the potable sections of the Biscayne aquifer from saltwater intrusion.

It was concluded from the monitoring data that construction of the cooling canal system had a localized effect similar to moving the shoreline of Biscayne Bay to the western edge of the cooling canal system as, in effect, the top of the saltwater wedge has moved to the western edge of the cooling canal system. Some slight landward movement of the toe of the saltwater wedge was observed through the brackish

sections of the Biscayne aquifer underlying the cooling canal system; however, water quality of the potable sections of the Biscayne aquifer west of the system was not affected. Saltwater wedge movement typically is seasonal in response to variations in rainfall and water levels.

The Interceptor Ditch operation is designed to prevent any seasonal inland movement of the saltwater into the potable portion of the Biscayne aquifer west of the site. The saline ground water is intercepted by the ditch and returned to the cooling canal system during the dry season when natural freshwater hydraulic gradients are low and the potential for saltwater intrusion exists.

The July 15, 1983, Agreement was executed on the general conclusion that movement of the saltwater wedge was confined to the western boundary of the cooling canal system by the operation of the Interceptor Ditch through a wide range of hydrometeorological conditions (with the exception of hurricanes). This continued high level of documented performance of the system justified reducing the ground-water monitoring requirements. The revised Ground-Water Monitoring Program requires the monitoring of water levels, temperature, and conductivity in Wells L-3, L-5, G-21, and G-28 on a quarterly basis (typically in October, January, April, and July). These wells are located west of the cooling canal system (as shown on Figure 2) to monitor any landward movement of the saltwater wedge. The Interceptor Ditch Program was not altered by the July 15, 1983, Agreement. A description of the Interceptor Ditch operation is contained in the Agreement, and is also presented in Appendix B.

In March 1985 the USGS modified Well G-21 by installing a two-inch casing inside the well for point sampling the aquifer below the -45 feet MSL elevation. Thus, Well G-21 was no longer suitable for monitoring the ground-water conditions to the west of the cooling canal system as required by the Agreement. During the April and July 1985 quarterly monitoring period, Well G-6 was monitored as an alternate for Well G-21. A new and identically constructed well was installed by FPL at the G-21 location in July 1985. Data derived from this new well is presented as Well G-21 in all ground-water monitoring reports since that time.

After the January 1989 sampling, the upper section of the USGS Well G-28 collapsed. The well was subsequently appropriately abandoned by grouting and sealing the entire length of the well. On January 17 through 19, 1989, a new replacement well was constructed to the same specifications as its predecessor. Specifically, the two-inch diameter well was installed to a maximum depth of about 70 feet. The upper 15 feet of well was cased with Schedule 40 PVC pipe, and the remaining 55 feet of well was screened (0.010 slot width). The annular space between the screen and the well was filled with 20/30 silica sand.

2.0 OPERATIONAL OR STRUCTURAL CHANGES

During the period July 1, 2008, through June 30, 2009, there were no operational or structural changes made to the Interceptor Ditch System, with the exception that the stop logs within the Interceptor Ditch pump structures were refurbished and placed back into operation. These stop logs separate the Interceptor ditch into three segments and allow the pumping of those individual segments as necessary.

Because SFWMD abandoned the rain gage located at S-20 in March of 2008, the rainfall quantities reported for S-20 from that month forward are taken from the records of FPL's meteorological tower near the Land Use Building (see Figure 3).

3.0 CLIMATOLOGICAL CONDITIONS

Daily rainfall data has been historically recorded by SFWMD at structures S-20 and S-20F, located along the Levee 31 Borrow Canal. However, the rain gage at S-20 was taken offline in March, 2008. Rainfall data from FPL's meteorological tower near the Land Use building has been used as a surrogate for the S-20 gage from March, 2008 forward in this report. S20 and S20F data are available from SFWMD via their DBHydro browser. Historical monthly rainfall data collected since 1968 are presented in Figure 4 for S-20 and Figure 5 for S-20F.

The rainfall measured for the 2008 – 2009 monitoring period was above the 1968 to 2007 average for the area for Station S-20[1] and below the 1968 to 2008 average for the area for Station S-20F. The rain gauge at structure S-20F recorded 40.7 inches of precipitation from July 2007 to June 2008. The rainfall total at S-20F for this monitoring year is approximately 5 inches below the average values for the prior monitoring years. The annual total recorded on a monthly basis at structure S-20F is presented in Table 1 and compared to an updated historical average for the 1968 to 2008 yearly reporting period. The historical average annual rainfall amount for structure S-20F is 45.8 inches per year. The rainfall total at S-20 for this monitoring year is approximately 14 inches above the average values for the prior monitoring years. The annual total recorded on a monthly basis at structure S-20 is presented in Table 1 and compared to an updated historical average for the 1969 to 2006 yearly reporting period. The historical average annual rainfall amount for structure S-20 is 45.8 inches per year.

As shown in Figures 4 and 5, the rainfall distribution for this past year was concentrated in the months of August, September, and October, 2008, and May and June, 2009. These are all months historically designated as during the wet season. During an average year, approximately 74 percent of the precipitation occurs during the wet season with the remainder occurring during the six-month-long dry season (November to April). During this past year, approximately 80 and 62 percent of the annual rainfall occurred during the wet season at S-20 and S-20F, respectively. Rainfall at S-20F was above average for August and October, 2008, and May, 2009, and below average the other nine months. Rainfall at S-20 was above average during July through October, 2008, and March, May, and June, 2009, and below average the other five months.

The 2008 hurricane season produced one tropical storm (Fay) which affected the rainfall at both stations, in August. The 2009 hurricane season produced no significant storms in the first half of 2009.

[1] Rainfall data reported as S-20 from March 2009 onward is actually from FPL's meteorological tower near the Land Use Building.

4.0 DATA REVIEW

4.1 Ground-Water Levels

Ground-water levels are measured quarterly in Wells L-3, L-5, G-21, and G-28 usually near the start of July, October, January, and April. The maximum and minimum levels recorded during the historical period, are shown on Figure 6. The start dates for the historical period for each well are as follows:

- L-3; April, 1974
- L-5; January, 1976
- G-21; April, 1972
- G-28; April, 1972

The end date of the historical period is April, 1990, for all four wells.

The ground-water levels measured during this monitoring period are also shown on Figure 6. These levels were in the upper part of the range between the historical maximums and minimums, except for G-21 in July, 2008, which exceeded the previous historical maximum by 0.2 feet. Other well water levels generally ranged between about 1 and 2 feet MSL, and were higher during July and November. Water levels in the G wells were generally higher than those in the L wells.

4.2 Ground-Water Temperatures

Ground-water temperatures are measured on a quarterly basis at one-foot intervals throughout the water column in all wells. The temperatures recorded during this monitoring period for the four wells (Figures 7 through 10) are compared with the historical envelope data. The historical envelope represents both the highest and lowest temperatures recorded during the period July, 1981, through June, 1991. The historical period represents the time during which the cooling canal system came to equilibrium.

With the exception of minor excursions in well L-5, in July, 2008, from elevations -7 to -13 feet MSL, only well L-3 had excursions in temperature above the historical respective maxima. None of the wells had excursions below the historical respective minima, with the very slight exception of well G-28, from elevation 0 to elevation -12 feet MSL in April, 2009, and at elevation 0 feet MSL in January, 2009. Well L-3 had minor excursions of up to about 1.0° C for all quarters, in the -22 to -52 feet MSL elevation interval, and 1°C in the -15/-18 to -22 feet MSL elevation interval during the sampling episodes other than April. Temperature variations in Wells L-3 and L-5 (both located near the cooling canal system) historically tend to respond to pumping activities in the Interceptor Ditch area while temperature variations in Well G-21 and Well G-28 are thought to change more in response to ground-water levels and rainfall quantities.

Overall the data indicate that temperatures are following the normal seasonal trends.

4.3 Ground-Water Chloride Contents

The procedure to determine the chloride level is to measure conductivity at one foot intervals in the entire water column in each well. The conductivity data are then converted to chloride values according to the procedures outlined in the Agreement. The chloride values have been compared to the historical range of values, which cover the same periods as described for the historical temperature envelope above. These comparisons are presented graphically in Figures 11 through 14.

None of the upper level recorded chloride data reported are outside the respective historical occurrence envelopes, down to the following elevations:

- L-3: -17 feet MSL
- L-5: -15 feet MSL
- G-21: -37 feet MSL
- G-28: -13 feet MSL

For well G-21, chloride slightly exceeds the maximum historical envelope in November, 2008, for the interval from elevation 0.0 to -18 feet MSL, except for -14 through -15. All of the well G-21 readings exceeded the historical envelope at depths below -38/-40 feet MSL, up to a maximum of about 5.5 parts per thousand (PPT) in April, 2009. Chloride at depth below about elevation -16/-19 in L-3 exceeds the historical envelope values by up to about 10 PPT during all sampling episodes except November, 2008, when they exceeded the historical envelope by about 2 ppt. Chloride at depth below about -15 feet MSL in L-5 exceeds the historical envelope values by up to about 2 PPT during July, 2008, and up to about 10 PPT in the other three sampling episodes. Chloride in G-28 exceeded the historical envelope by about 2 PPT between elevations -13 to about -28 feet MSL except in November, 2008, and by up to about 10 PPT at depths below elevation -28 feet MSL except during November, 2008. During November, 2008, chloride values in well G-28 did not exceed the historical envelope.

In every case the chloride exceedances of the historical envelope increase with increasing depth.

4.4 Surface Water Levels and Interceptor Ditch Operation

Surface water levels have been historically measured in the Levee 31E Borrow Canal (L-31E), the Interceptor Ditch (ID), and Cooling System Canal 32 (C-32) as required by the Interceptor Ditch Operation criteria outlined in Appendix B. The water levels are measured in these canals at pumping Lines A, B, C, D, and E as shown on Figure 15. Water levels recorded during the past 12-month monitoring period are presented on Figures 16 through 20. Operation of the ID pumps is shown on Figure 21, along with the measured rainfall.

Figure 16 shows the water levels along Line A. Water levels in L-31E at Line A exceeded water levels in the ID for the entire year except for a short period in February, 2009, and exceeded water levels in C-32

except brief periods in July, 2008; December, 2008, through March, 2009; and April through May, 2009. The head difference between L-31E and C-32 varied from 0.5 to – 1.08 feet. The head difference between L-31E and the ID varied between 0.88 and -0.38 feet.

Figure 17 shows the water levels along Line B. Water levels in L-31E at Line B exceeded water levels in the ID for the entire year, except briefly in February, 2009; and exceeded water levels in C-32 except in late December, 2008; January through March, 2009; and May, 2009. The head difference between L-31E and C-32 varied from 0.52 to -0.96 feet. The head difference between L-31E and the ID varied between 0.86 and -0.3 feet.

Figure 18 shows the water levels along Line C. Water levels in L-31E at Line C exceeded water levels in the ID for the entire year, except briefly in early July, 2008; and exceeded water levels in C-32 except in February/March, 2009; and May, 2009. The head difference between L-31E and C-32 varied from 0.56 to -0.76 feet. The head difference between L-31E and the ID varied between 0.84 and -0.10 feet.

Figure 19 shows the water levels along Line D. Water levels in L-31E at Line D exceeded water levels in the ID for the entire year, except briefly in late August, 2008; and in late October, 2008; and exceeded water levels in C-32 except in late April/May, 2009. The head difference between L-31E and C-32 varied from 0.86 to -0.30 feet. The head difference between L-31E and the ID varied between 0.78 and -0.04 feet.

Figure 20 shows the water levels along Line E. Water levels in L-31E at Line E exceeded water levels in the ID except brief instances in July and August, 2008; and October/November, 2008; and exceeded water levels in C-32 for the entire year except briefly in late April/early May. The head difference between L-31E and C-32 varied from 1.04 to - 0.06 feet. The head difference between L-31E and the ID varied between 0.72 and -0.20 feet.

Pump 1 was operated during January, 2009 (0.1 days), starting in February, 2009 (41 days), and during April, 2009 (10 days) to maintain the seaward gradient between L-31E and the ID. Pump 2 was operated for 6.44 days in August, 2008, 41 days starting in February, 2009, and 17 days in April, 2009. Pump 4 operated for 0.1 days in January, 2009, 41 days starting in February, 2009, and 36 days starting in April, 2009.

4.5 Data Interpretation

Rainfall recorded during the 2008/2009 monitoring period was above average (see Figures 4 and 5, and Table 1) at S-20[1] and below average at S-20F. Rainfall was concentrated in the months of August, September, and October, 2008 and May and June, 2009, reflecting a slightly higher than average differential between wet versus dry season rainfall distribution. Rainfall during the dry season months was significantly less than the historical average for these months.

Ground-water levels during this monitoring year were higher during the wet season month of July and the dry season month of November. The maximum water level in well G-21 exceeded the historical envelope during July, 2008.

No temperature excursions above historical levels were recorded in Wells L-5, G-21 and G-28. However, excursions of up to about 1 degrees C. were recorded in well L-3 at depths below elevation -22 feet during all sampling episodes, and excursions of up to 1 degrees C at elevation below -15/-18 feet during all episodes except April, 2009.

No excursions of chloride outside of historical limits were evident in the reported data at elevations above -13 feet MSL (-37 feet for Well G-21). The monitoring data also indicate that no apparent increase in elevation of the fresh/salt water transition zone has occurred in any of the wells during the July 2008 to June 2009 monitoring period.

The Interceptor Ditch Program is continuing to be responsive and effective in performing its design function. With respect to the changes described, no adverse impacts have occurred from the presence or operation of the cooling canal system.

[1] Rainfall data reported as S-20 from March 2009 onward is actually from FPL's meteorological tower near the Land Use Building.

5.0 SUMMARY AND CONCLUSIONS

Rainfall totals for the 2008-2009 monitoring year were above the average year at S-20[1], but below the average year at S-20F.

Ground-water levels remained generally within historical limits, generally between 1 and 3 feet MSL. Ground-water temperatures were within the historical envelope, except in well L-3, which had minor excursions of up to about 1^{o}C. Ground-water salinity exceeded historical envelope levels at lower levels during all months for all wells, by up to as much as 10 PPT in well L-3, up to 10 PPT in well L-5, up to about 10 PPT in well G-28, and up to about 5 PPT for well G-21.

The Interceptor Ditch Program is continuing to be responsive and effective in performing its design function. With respect to the changes described, no adverse impacts have occurred from the presence or operation of the cooling canal system.

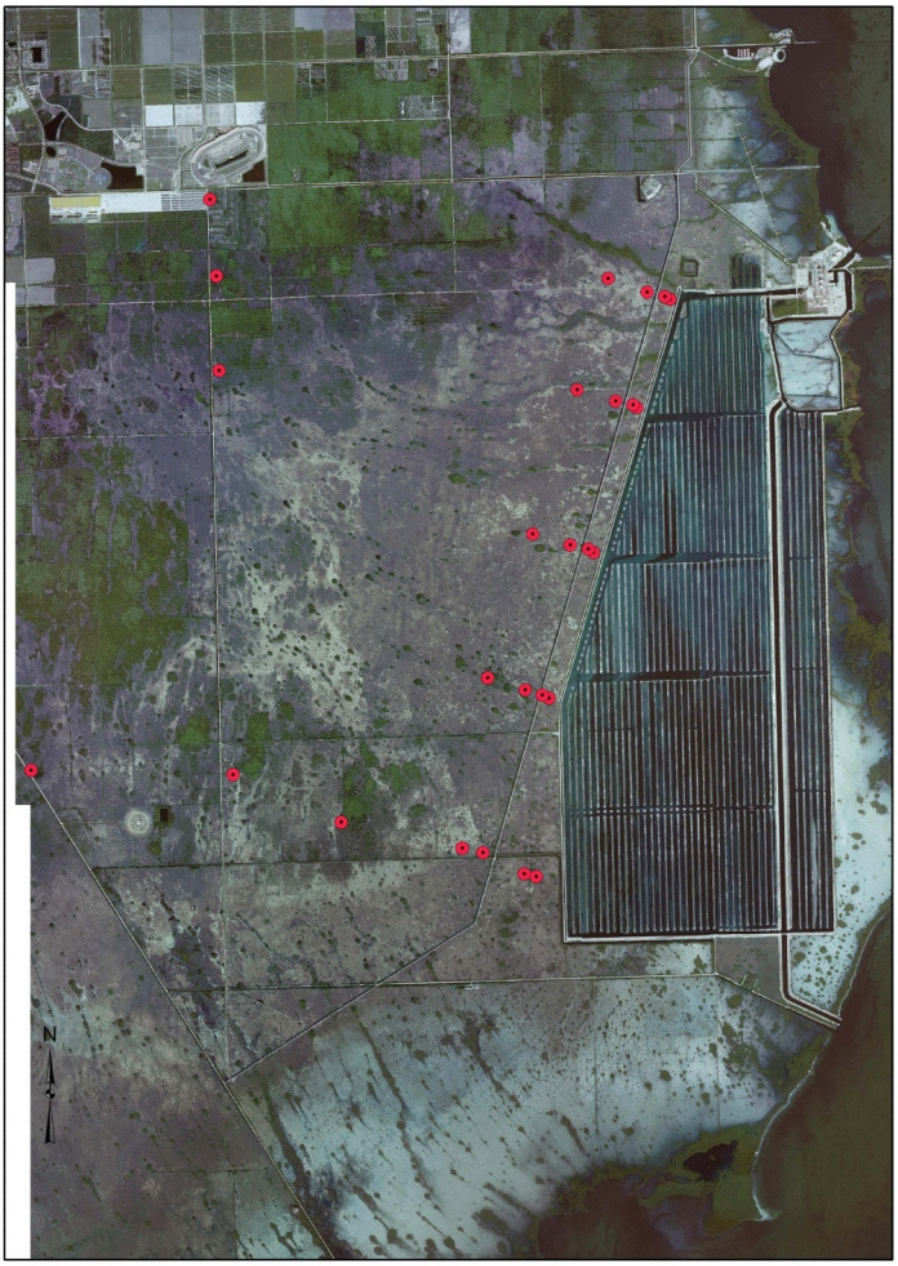
[1] Rainfall data reported as S-20 from March 2009 onward is actually from FPL's meteorological tower near the Land Use Building.

TABLES

Table 1				
Monthly Rainfall Data				
Turkey Point, Florida				
Month	**Station S-20 Rainfall (inches) ***		**Station S-20F Rainfall (inches)**	
	2008-2009	**1968-2008**	**2008-2009**	**1968-2008**
July, 2008	5.02	4.7	4.64	4.87
August, 2008	10.07	5.9	8.11	5.78
September, 2008	10.74	6.5	2.59	6.61
October, 2008	10.9	4.9	8.44	5.01
November, 2008	0.71	2.8	0.25	2.69
December, 2008	1.02	1.6	0.78	1.55
January, 2009	0.06	1.8	0.05	1.76
February, 2009	0.48	1.6	0.35	1.63
March, 2009	3.47	1.9	0.57	1.91
April, 2009	1.46	2.2	0.27	2.14
May, 2009	8.09	4.3	8.71	4.20
June, 2009	7.92	7.8	5.90	7.78
TOTALS:	**59.9**	**45.8**	**40.7**	**45.9**

* FPL Land Use Meteorological Tower data Used From March, 2008, Onward.

FIGURES



LEGEND

Monitoring Wells

0 1,050 2,100 4,200 Meters

FPL

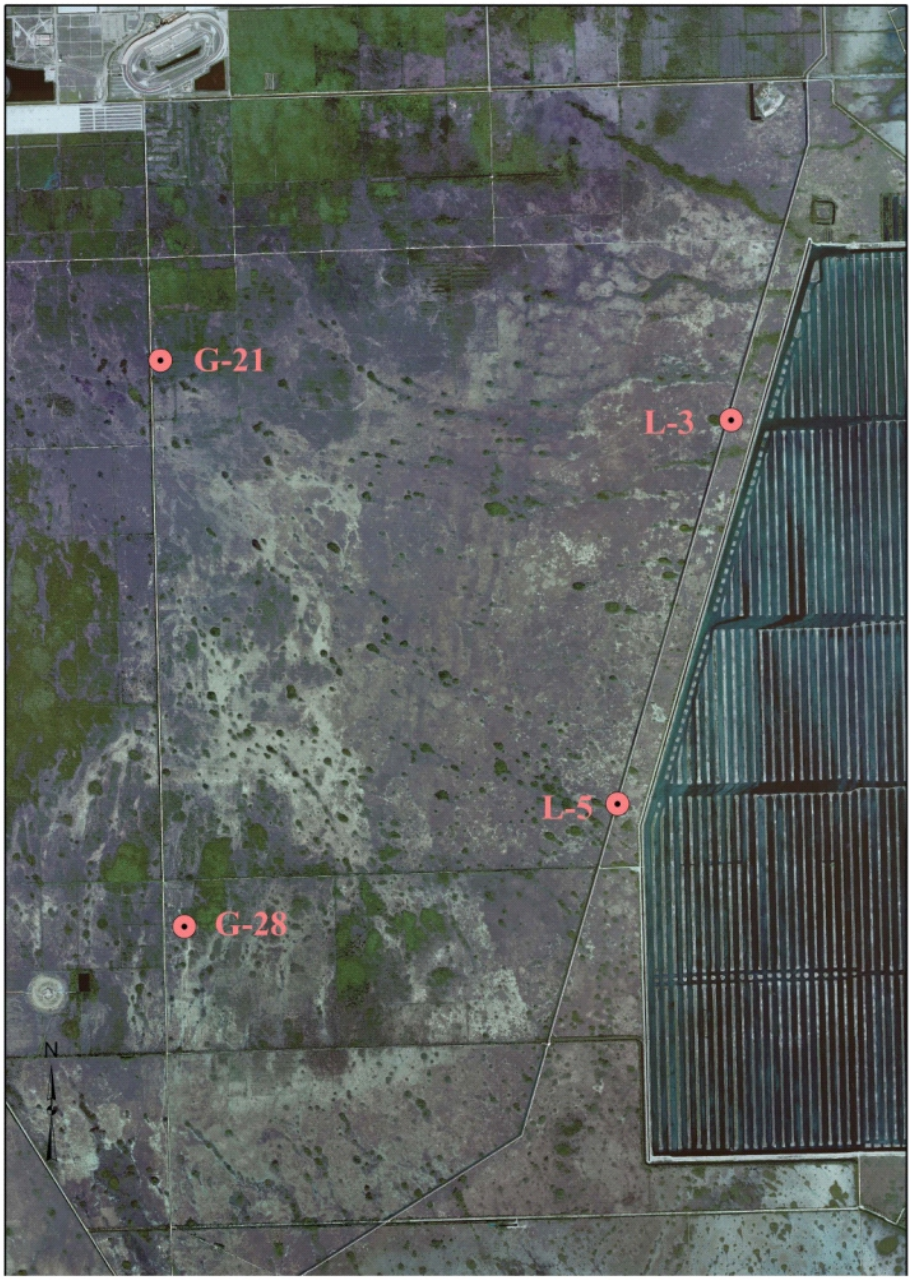
Golder Associates

Atlanta, Georgia

TITLE

Original Monitoring Program Well Locations

CLIENT/PROJECT	DRAWN	DATE	JOB NO.	
FPL/2009 Annual Report Groundwater Monitoring Program/FL	MT	9/11/09	09390244	
	CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
	REVIEWED HF	FILE NO. 09390244 Figure 1	SUBTITLE	FIGURE NO. 1



LEGEND

Monitoring Wells

0 37.5 75 150 Mile

PROJECT

FPL

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Atlanta, Georgia

TITLE

Present Ground Water Monitoring Locations

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MT	DATE 9/11/09	JOB NO. 09390244		
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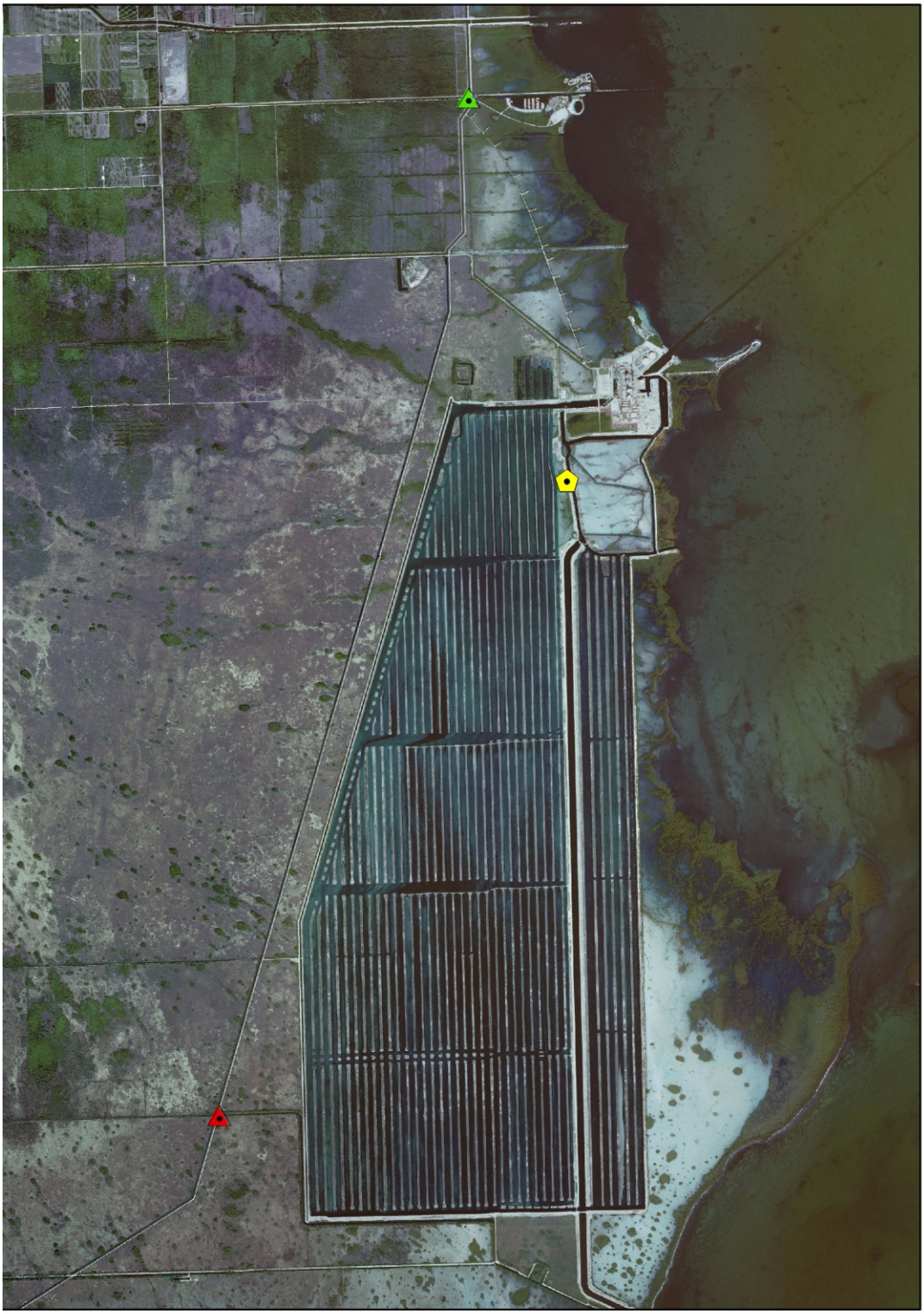

N

Legend

- Land Use Meteorological Tower
- s-20
- s20f

Note:
Rainfall data reported as S-20 from March 2008 onward is actually from FPL's Meteorological Tower near the Land Use Building.

Golder Associates

Atlanta, Georgia

TITLE

Location of FPL's Meteorological Tower near the Land Use Building

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MT	DATE 9/11/09	JOB NO. 09390244	
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
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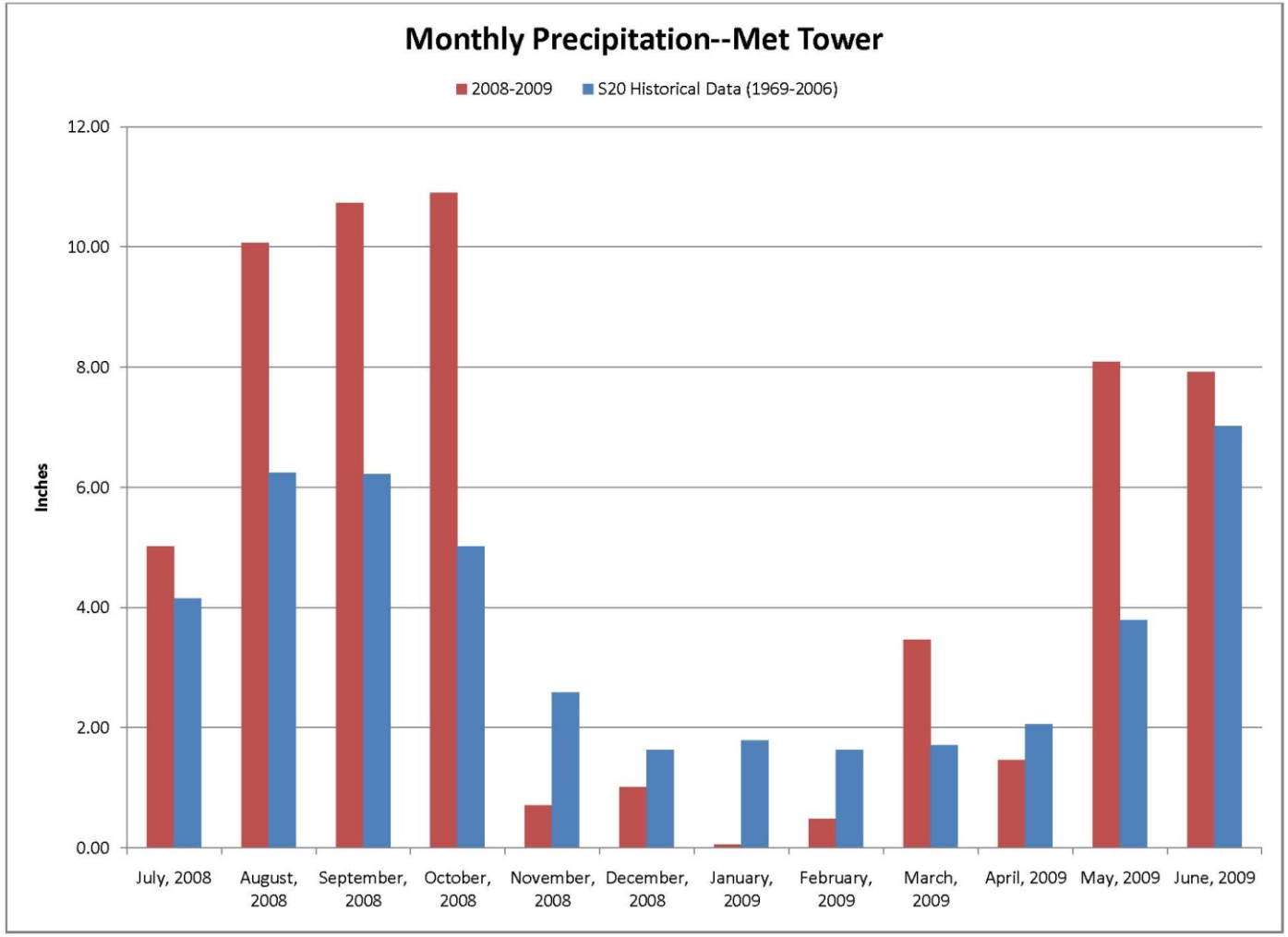

Note:
Rainfall data reported as S-20 from March 2008 onward is actually from FPL's Meteorological Tower near the Land Use Building.

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TITLE

Rainfall at Gage S-20

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MAT	DATE 9/11/09	JOB NO. 09390244		
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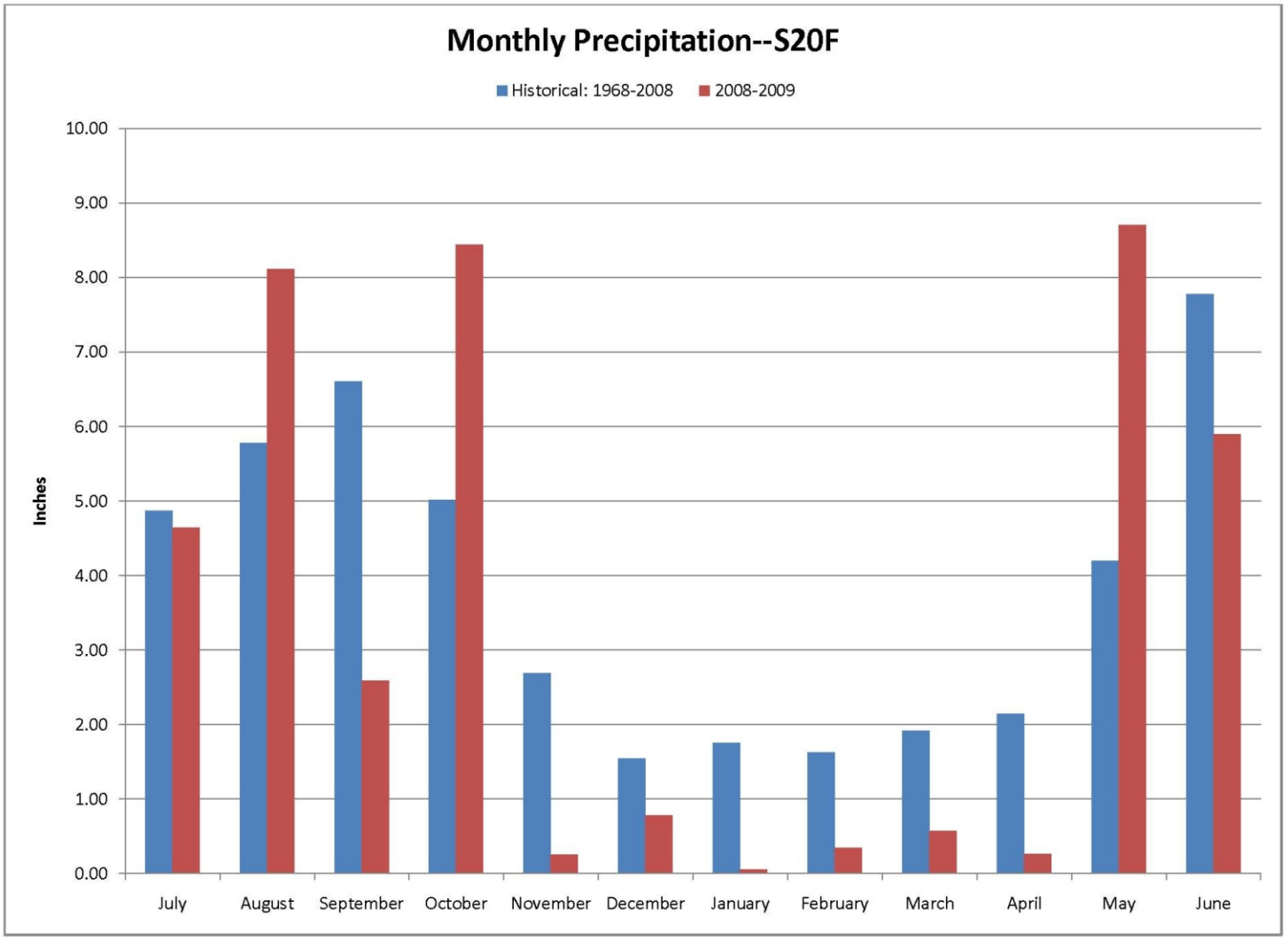

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TITLE

Rainfall at Gage S-20F

CLIENT/PROJECT

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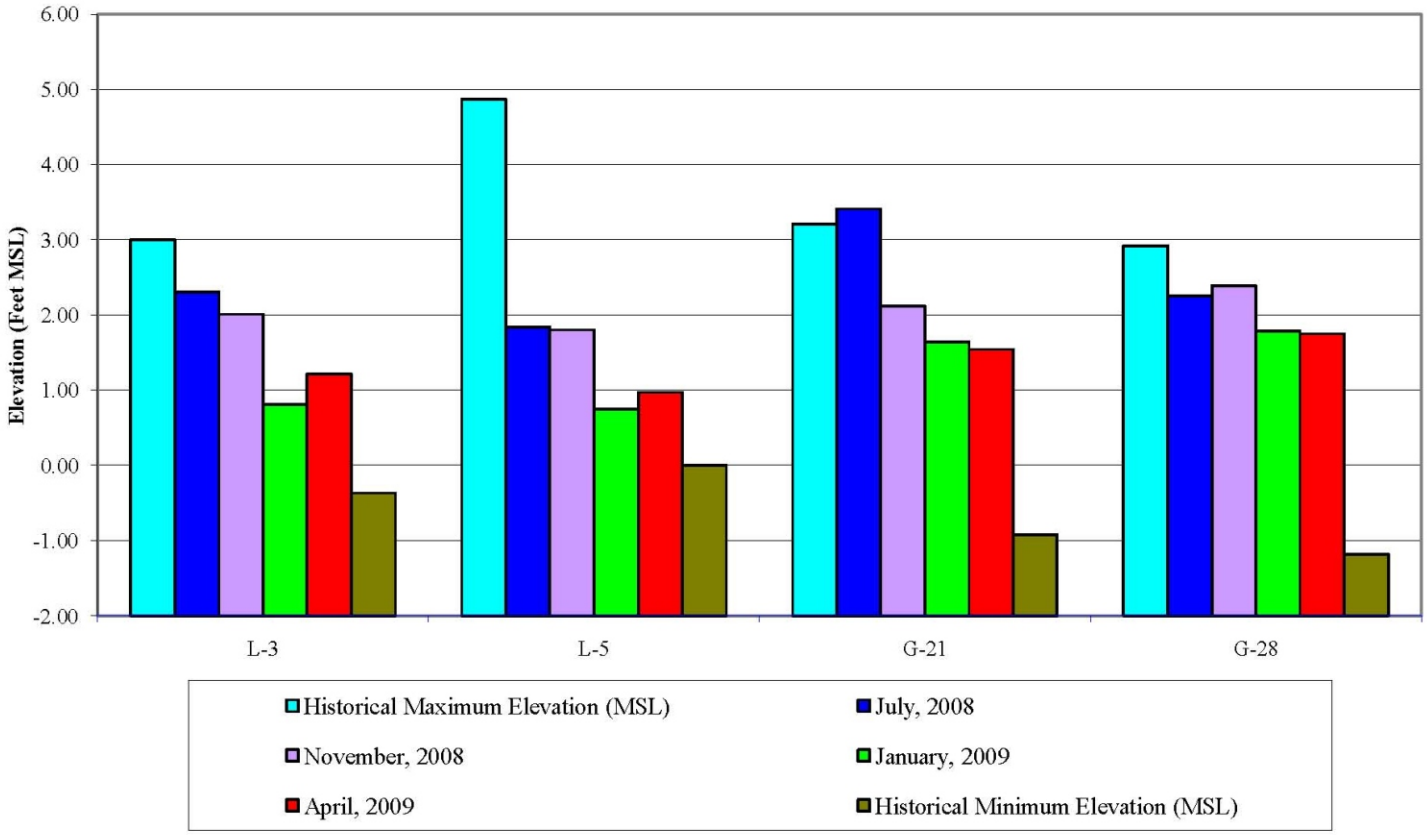

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TITLE

Ground-Water Levels

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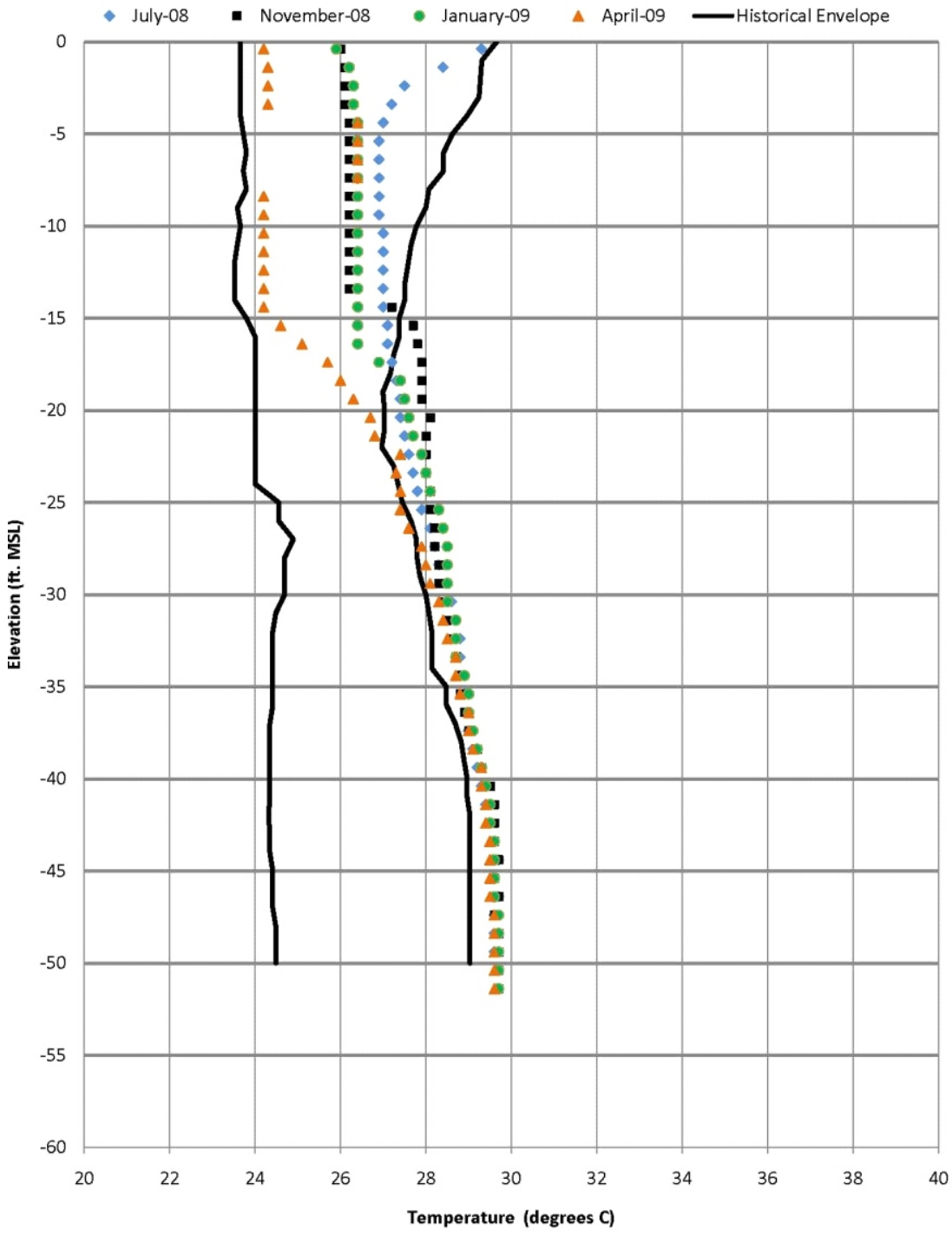
L-03 Temperature



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CLIENT/PROJECT FPL/2009 Annual Report Groundwater Monitoring Program/FL	TITLE L-3 Temperature			
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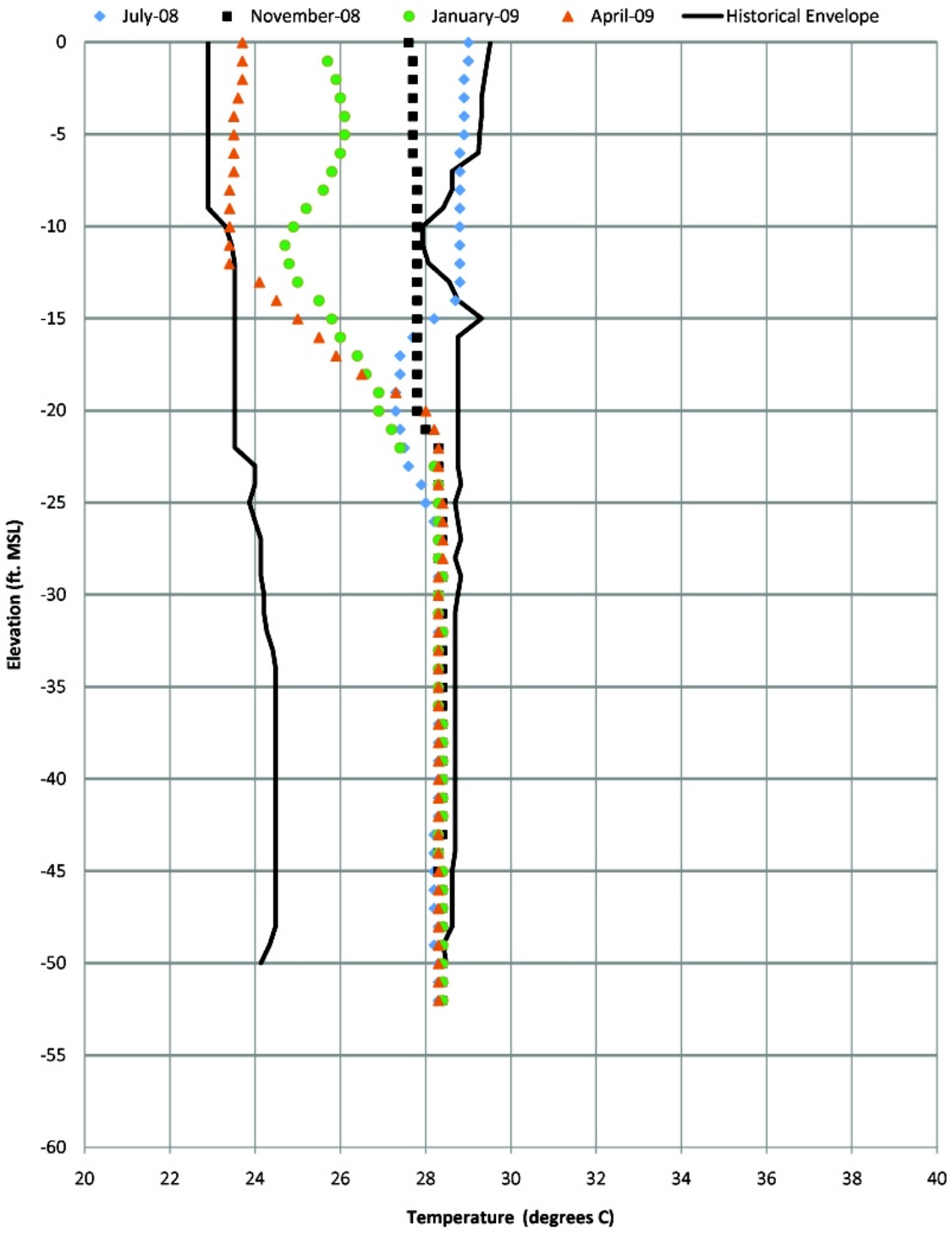
	REVIEWED HF	FILE NO. 09390244 Figure 7	SUBTITLE	FIGURE NO. 7

L-05 Temperature



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CLIENT/PROJECT: FPL/2009 Annual Report Groundwater Monitoring Program/FL	DRAWN: MT	DATE: 9/11/09	JOB NO.: 09390244	
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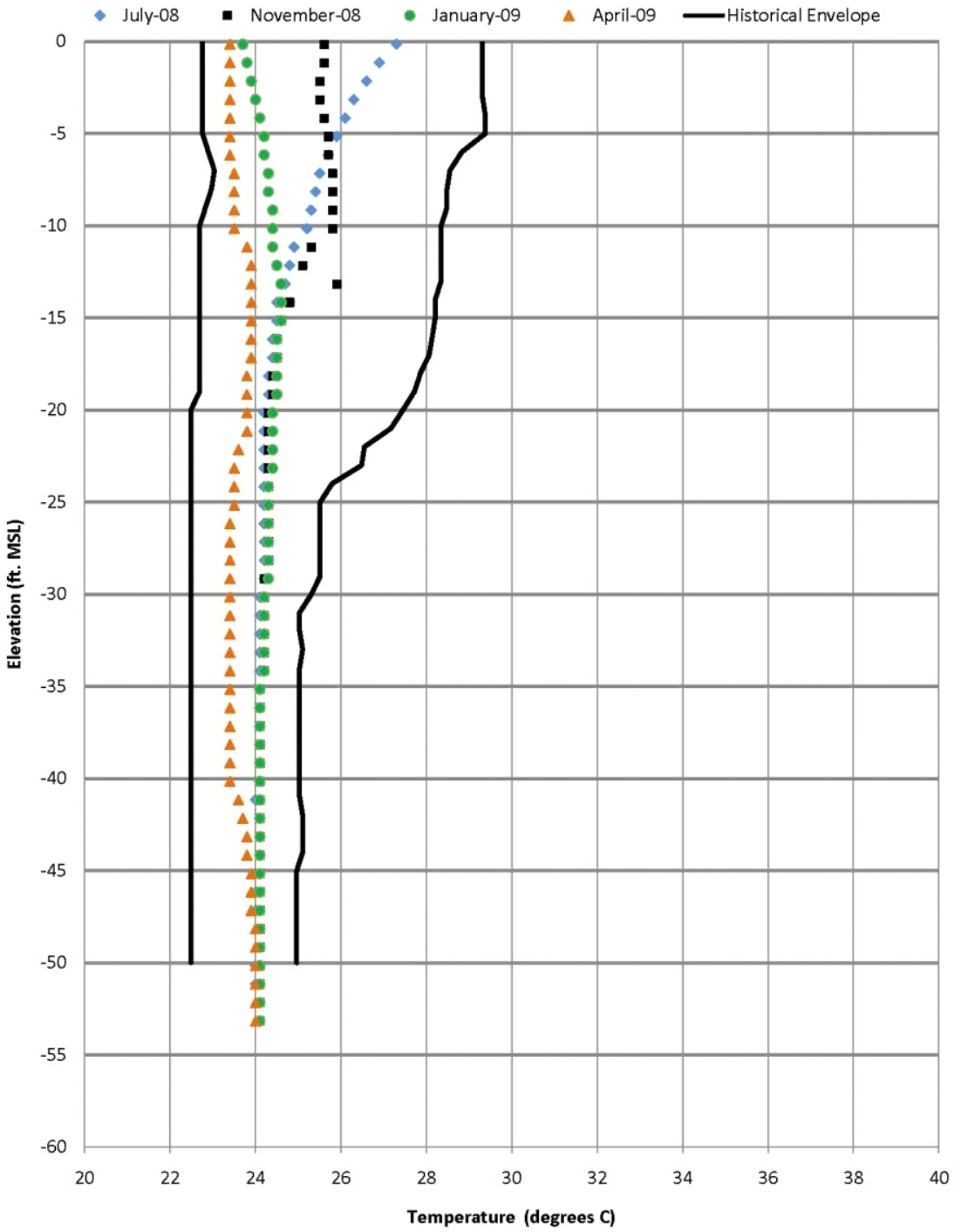
	REVIEWED: HF	FILE NO.: 09390244 Figure 8	SUBTITLE	FIGURE NO.: 8

TITLE: L-5 Temperature

G-21 Temperature



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TITLE: G-21 Temperature				
CLIENT/PROJECT: FPL/2009 Annual Report Groundwater Monitoring Program/FL	DRAWN: MT	DATE: 9/11/09	JOB NO.: 09390244	
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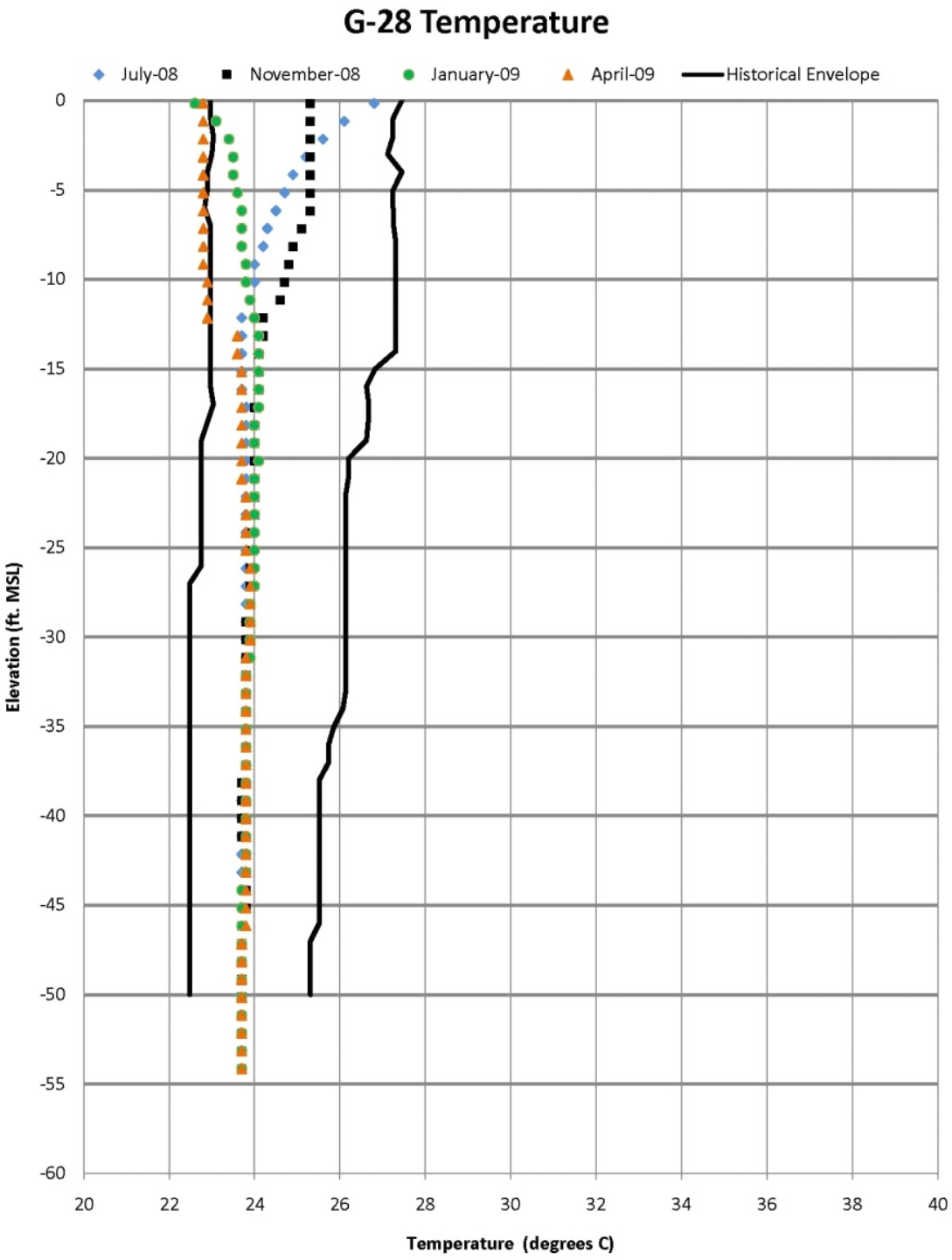
	REVIEWED: HF	FILE NO.: 09390244 Figure 9	SUBTITLE	FIGURE NO.: 9



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TITLE: G-28 Temperature				
CLIENT/PROJECT: FPL/2009 Annual Report Groundwater Monitoring Program/FL	DRAWN: MT	DATE: 9/11/09	JOB NO.: 09390244	
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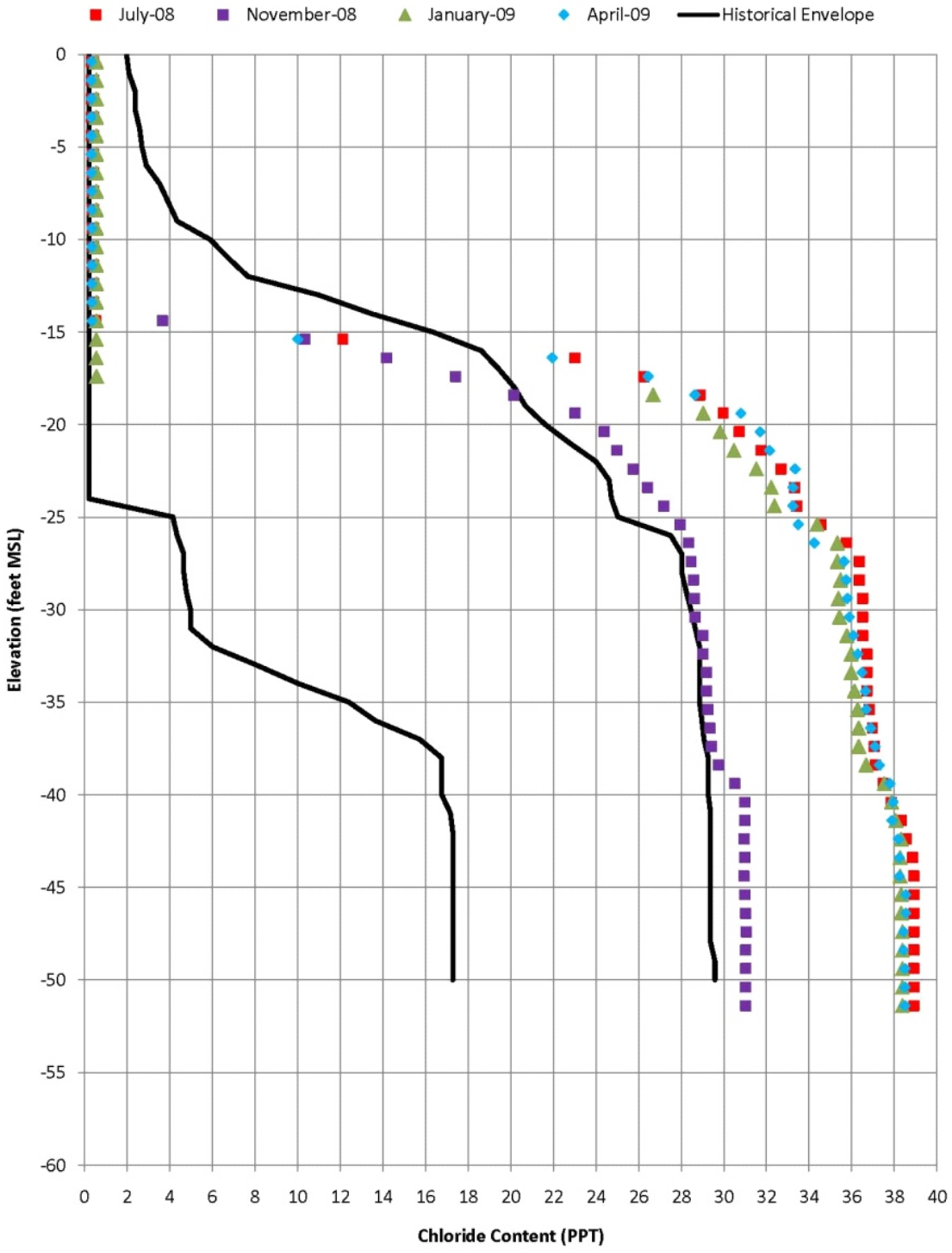
	REVIEWED: HF	FILE NO.: 09390244 Figure 10	SUBTITLE	FIGURE NO.: 10

L-3 Chlorides



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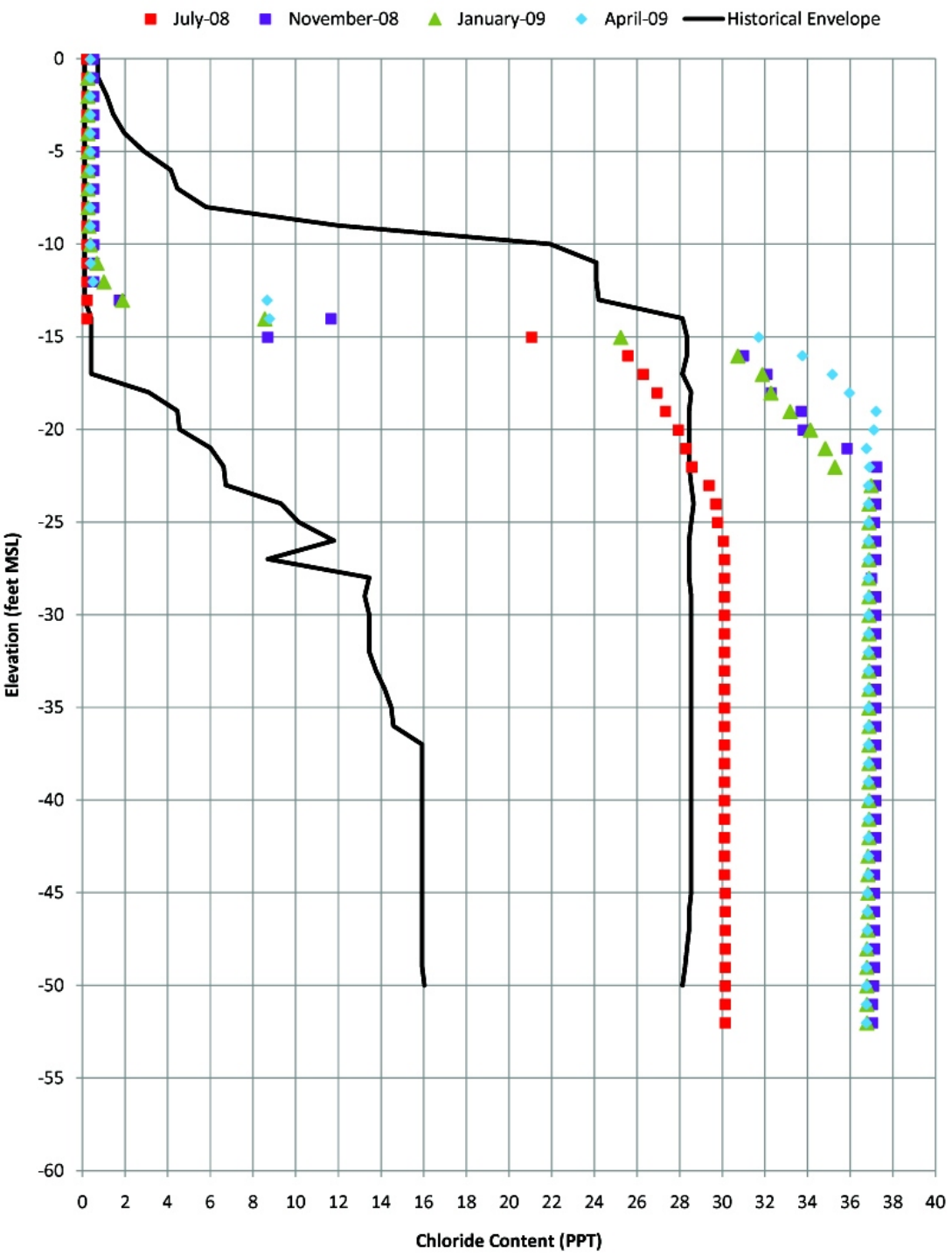
TITLE: L-3 Chloride

CLIENT/PROJECT: FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN	DATE	JOB NO.	
MT	9/11/09	09390244	
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
REVIEWED HF	FILE NO. 09390244 Figure 11	SUBTITLE	FIGURE NO. 11



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TITLE

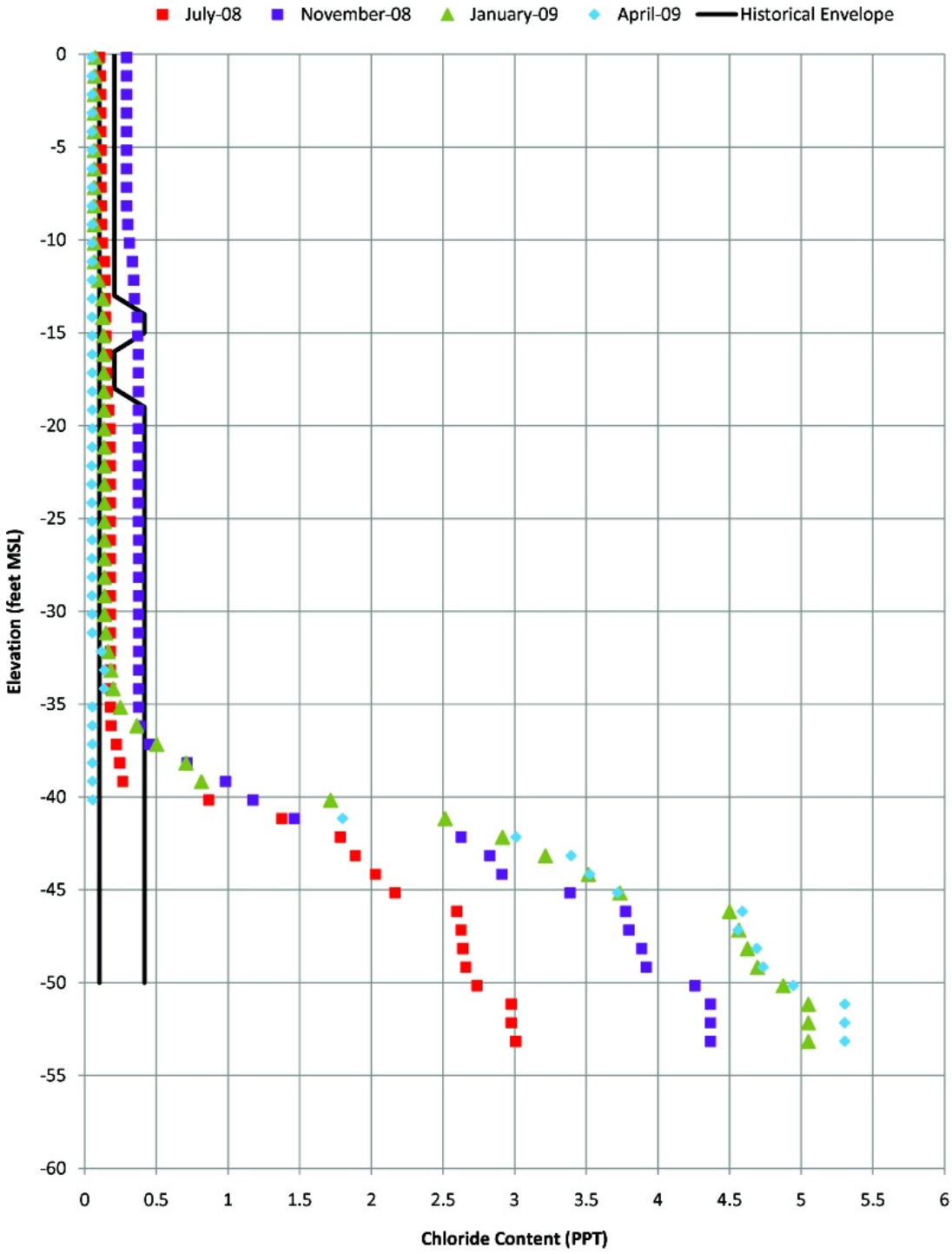
L-5 Chloride

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MT	DATE 9/11/09	JOB NO. 09390244	
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
REVIEWED HF	FILE NO. 09390244 Figure 12	SUBTITLE	FIGURE NO. 12

G-21 Chlorides



Golder Associates — Atlanta, Georgia	TITLE: G-21 Chloride			
CLIENT/PROJECT: FPL/2009 Annual Report Groundwater Monitoring Program/FL	DRAWN: MT	DATE: 9/11/09	JOB NO.: 09390244	
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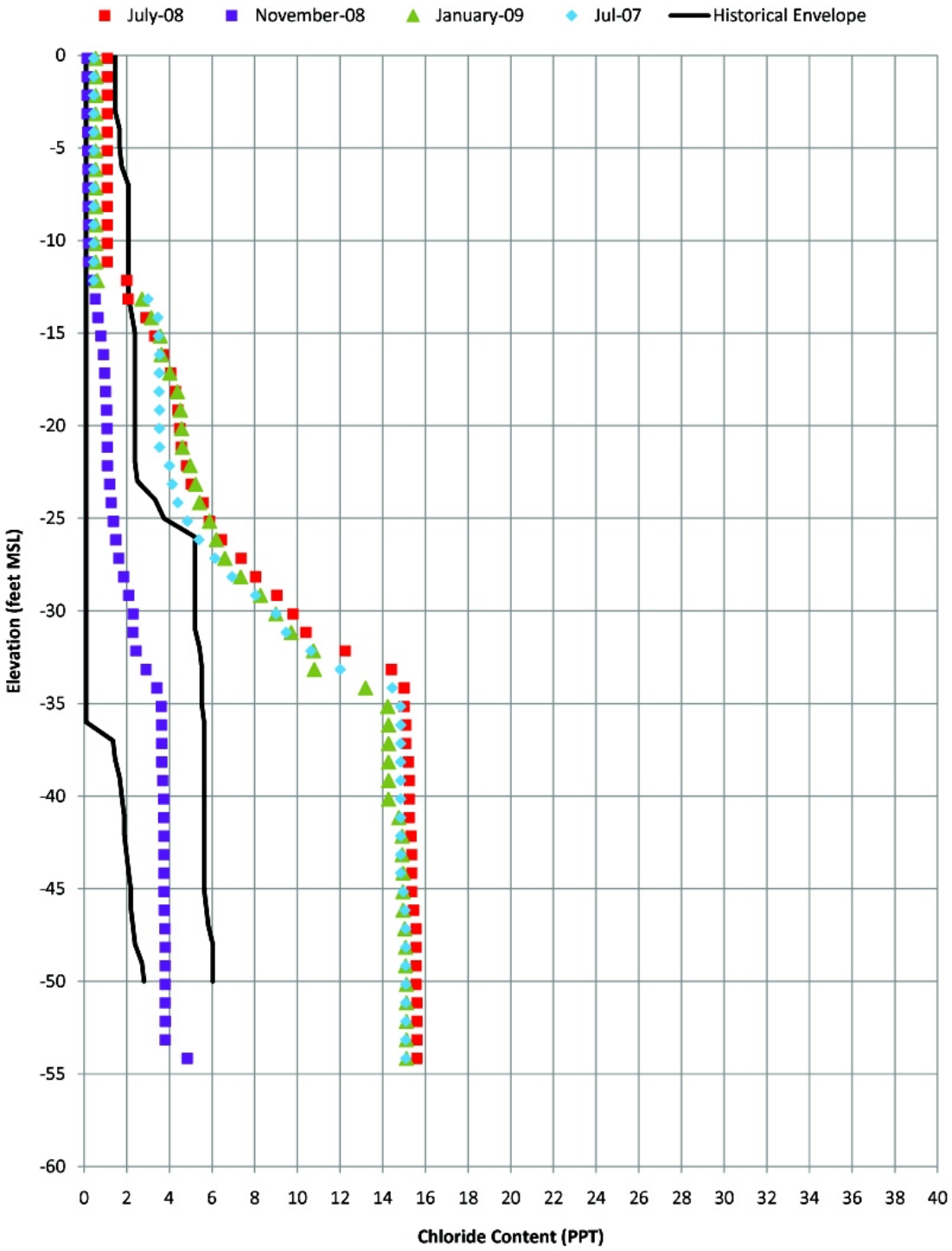
G-28 Chlorides



FPL

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TITLE	G-28 Chloride
CLIENT/PROJECT	FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MT	DATE 9/11/09	JOB NO. 09390244		
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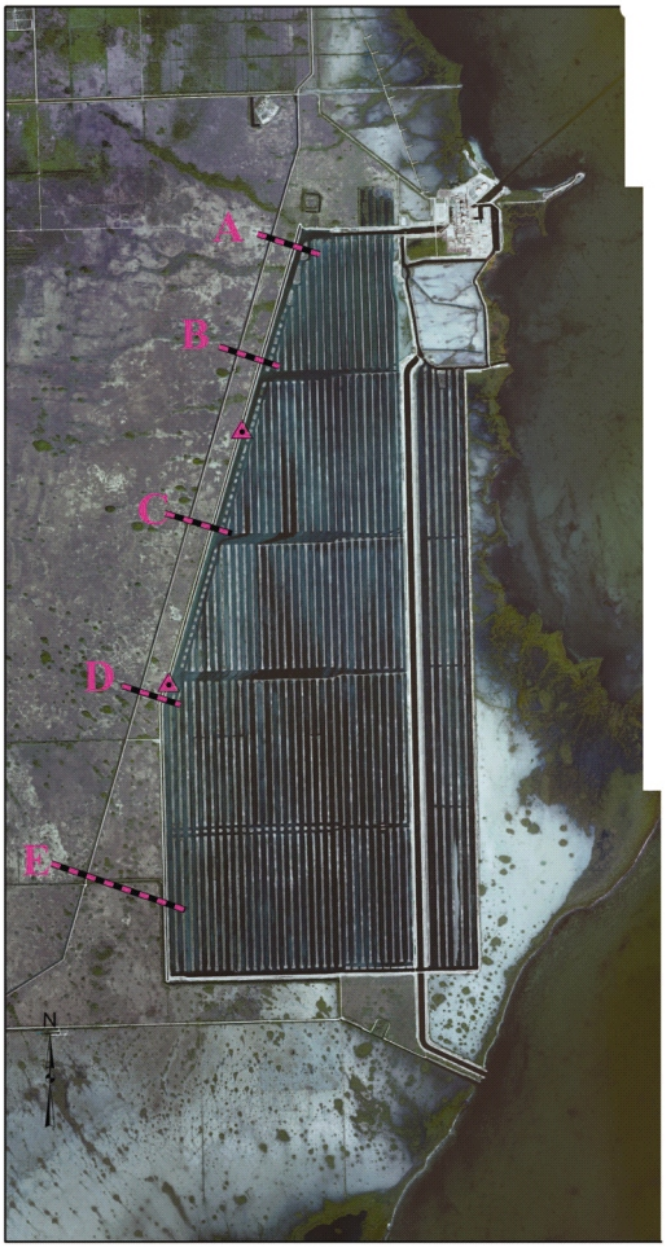
REVIEWED HF	FILE NO. 09390244 Figure 14	SUBTITLE	FIGURE NO. 14	



LEGEND

0 37.5 75 150 Mile

FPL

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TITLE

Interceptor Ditch Surface Water Monitoring Lines

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MT	DATE 9/11/09	JOB NO. 09390244	
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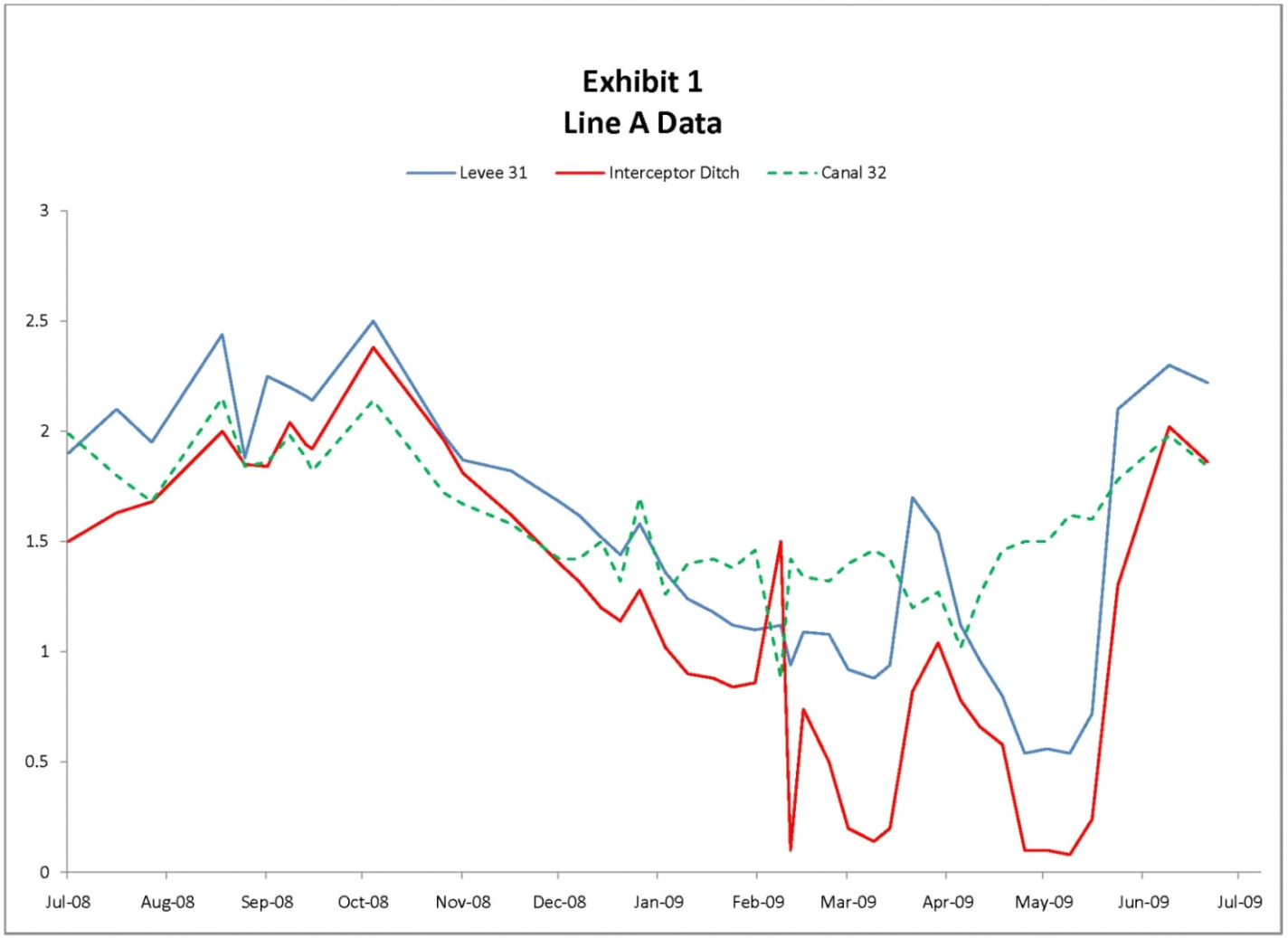

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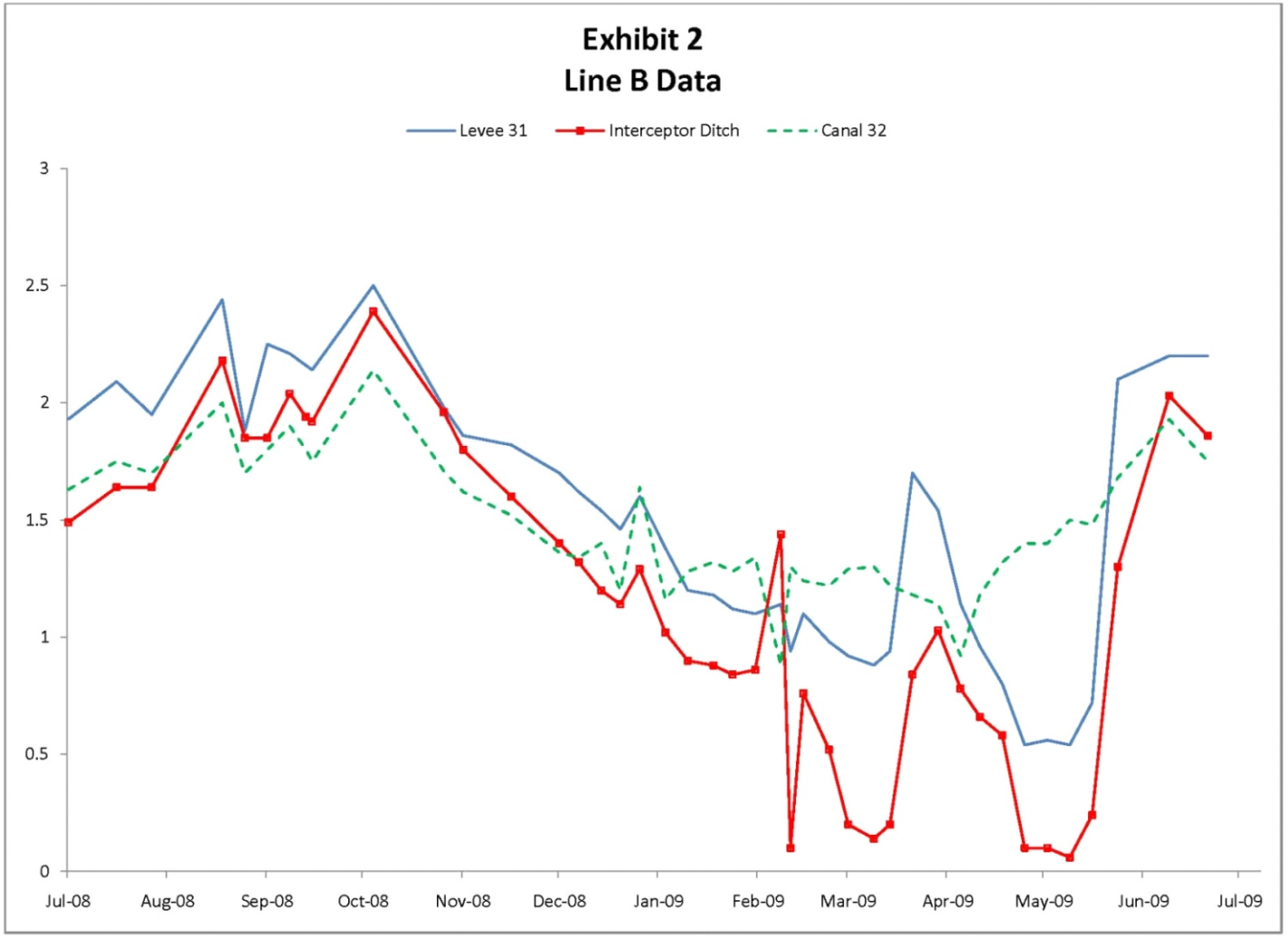
TITLE

Line A Water Level Data

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MAT	DATE 9/11/09	JOB NO. 09390244		
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.	
REVIEWED HF	FILE NO. 09390244 Figure 16	SUBTITLE	FIGURE NO. 16	



FPL

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TITLE

Line B Water Level Data

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

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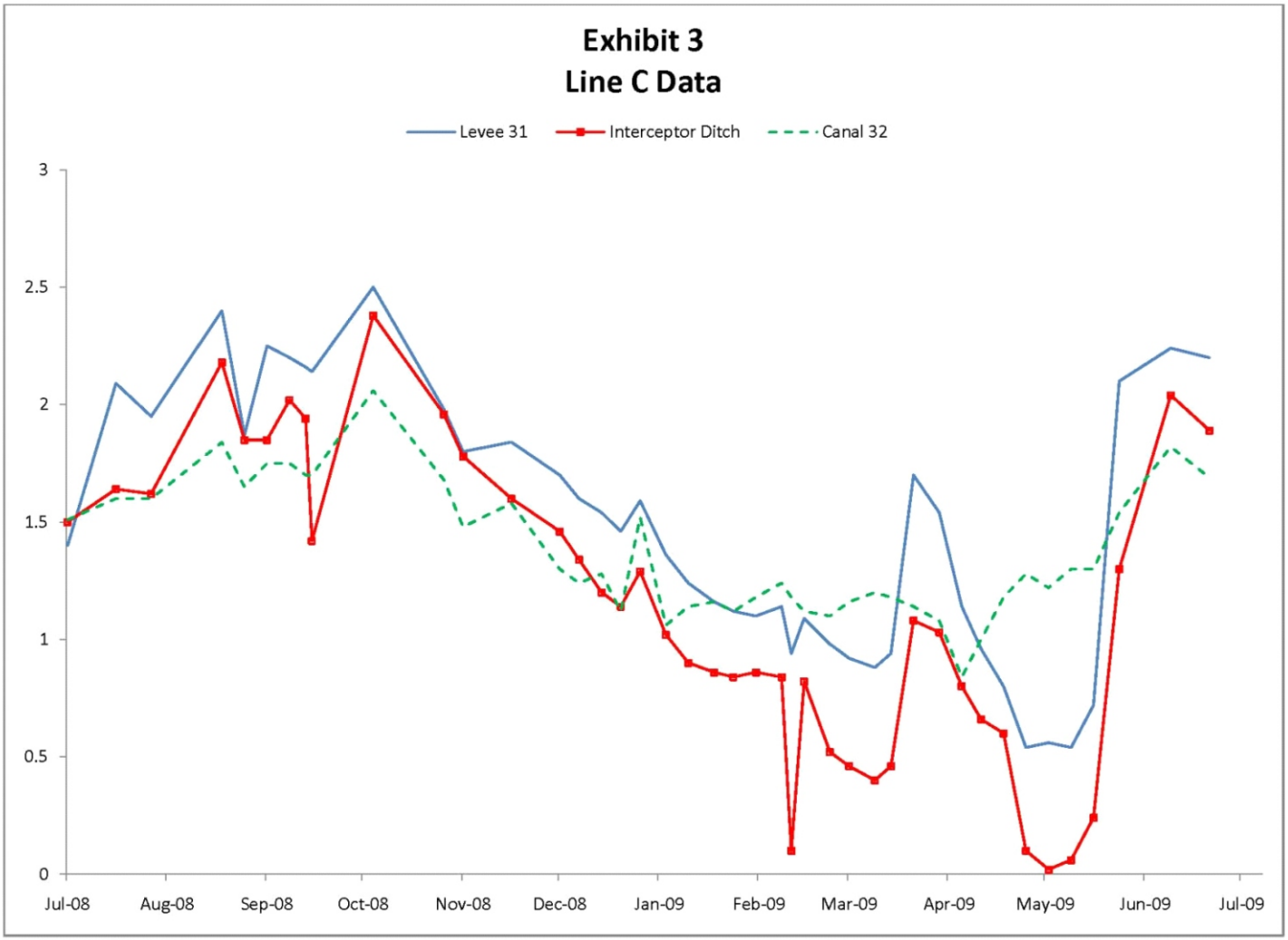
CHECKED	SH	SCALE	NTS	DWG. NO.	REV. NO.
REVIEWED	HF	FILE NO.	09390244 Figure 17	SUBTITLE	FIGURE NO. 17



FPL

Golder Associates

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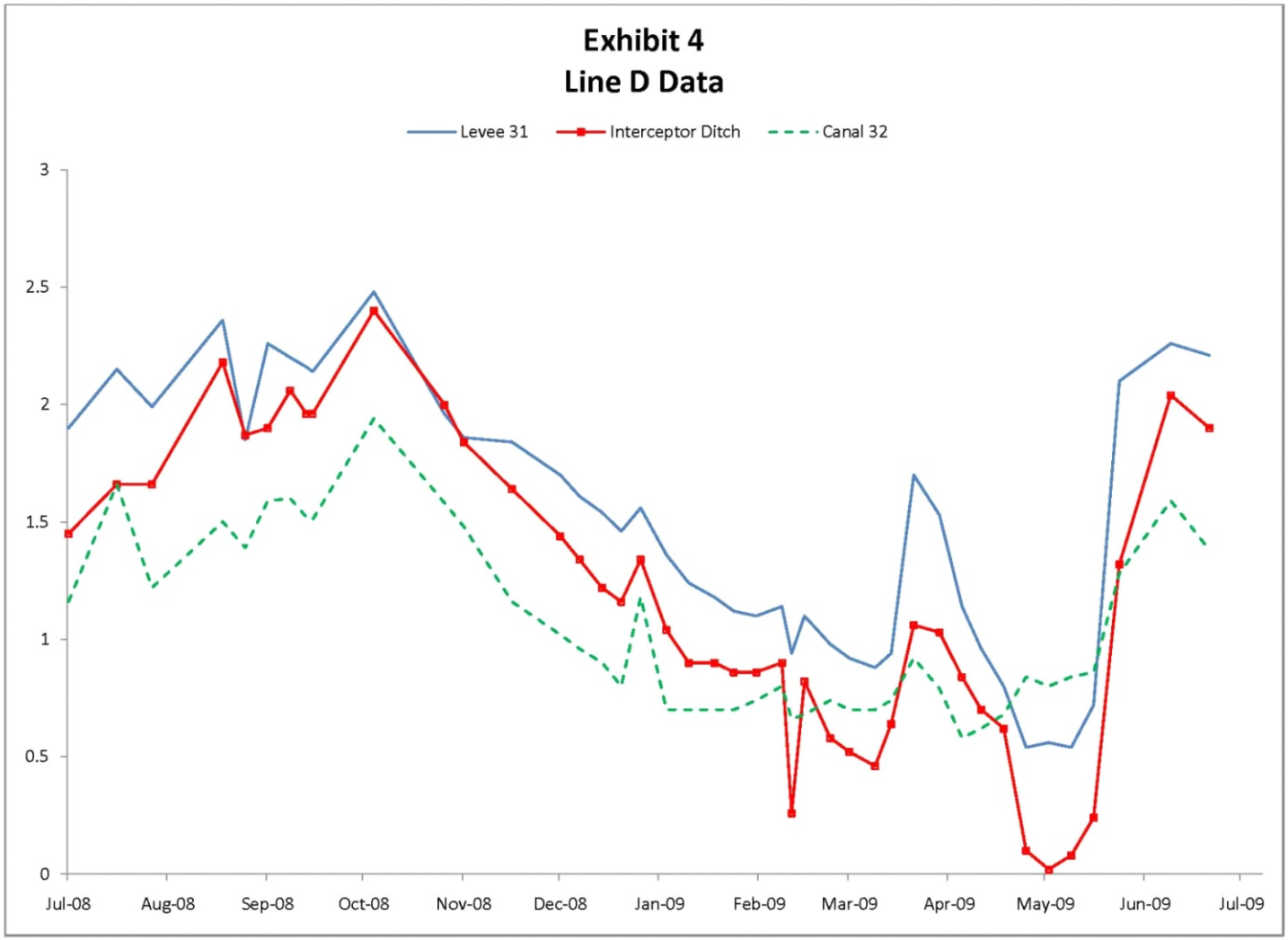
TITLE

Line C Water Level Data

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MAT	DATE 9/11/09	JOB NO. 09390244		
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.	
REVIEWED HF	FILE NO. 09390244 Figure 18	SUBTITLE	FIGURE NO. 18	



FPL

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TITLE

Line D Water Level Data

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

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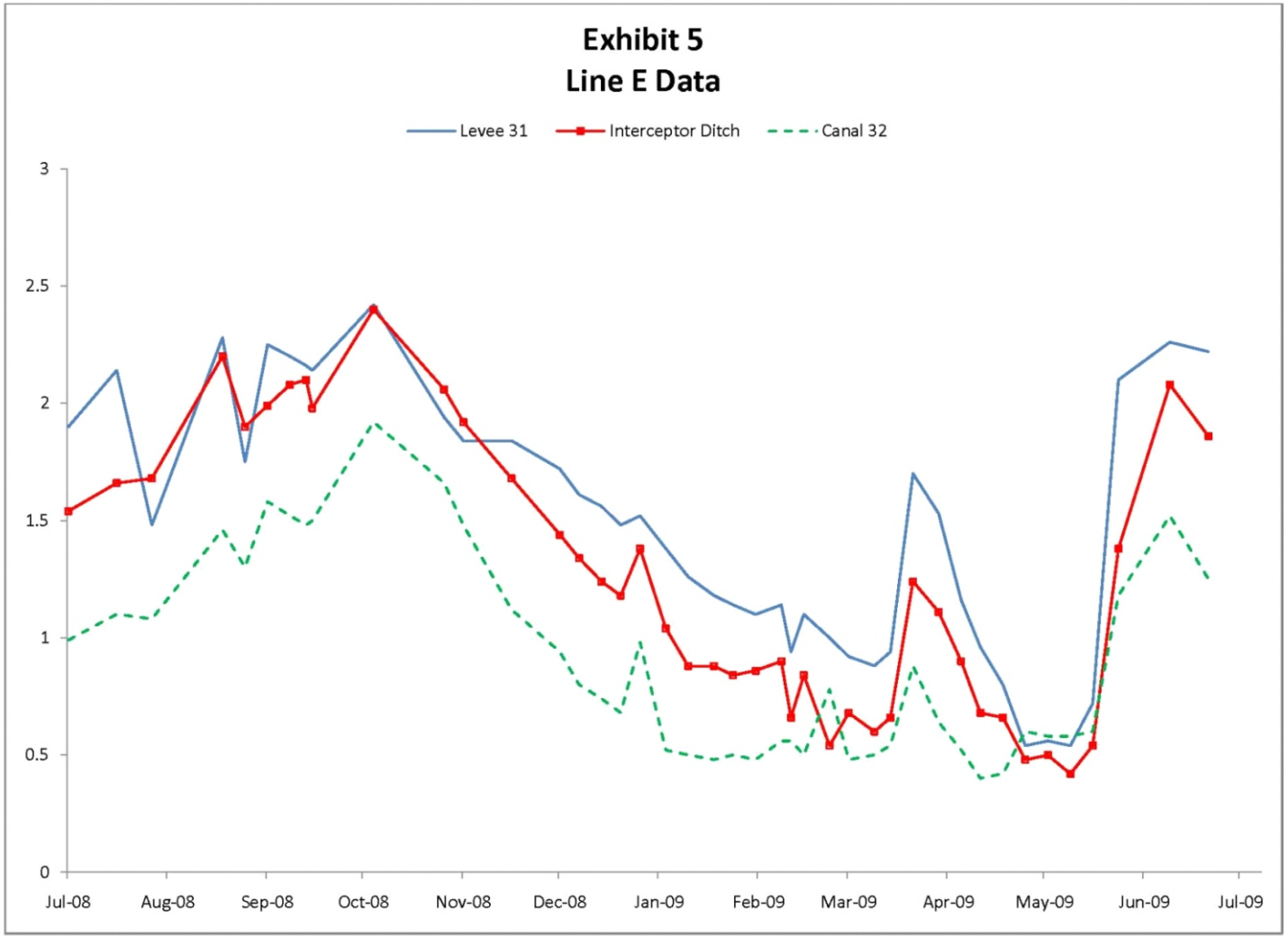

FPL

Golder Associates

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TITLE

Line E Data

CLIENT/PROJECT

FPL/2009 Annual Report Groundwater Monitoring Program/FL

DRAWN MAT	DATE 9/11/09	JOB NO. 09390244		
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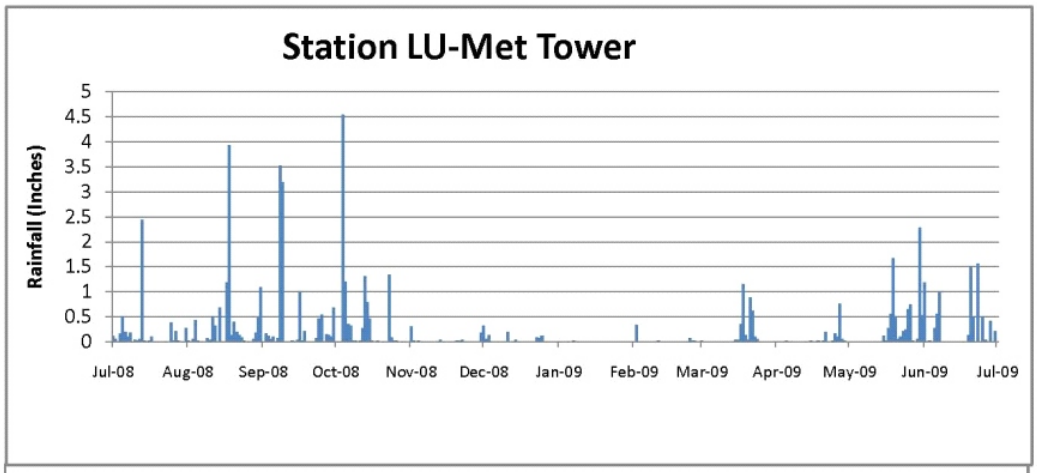

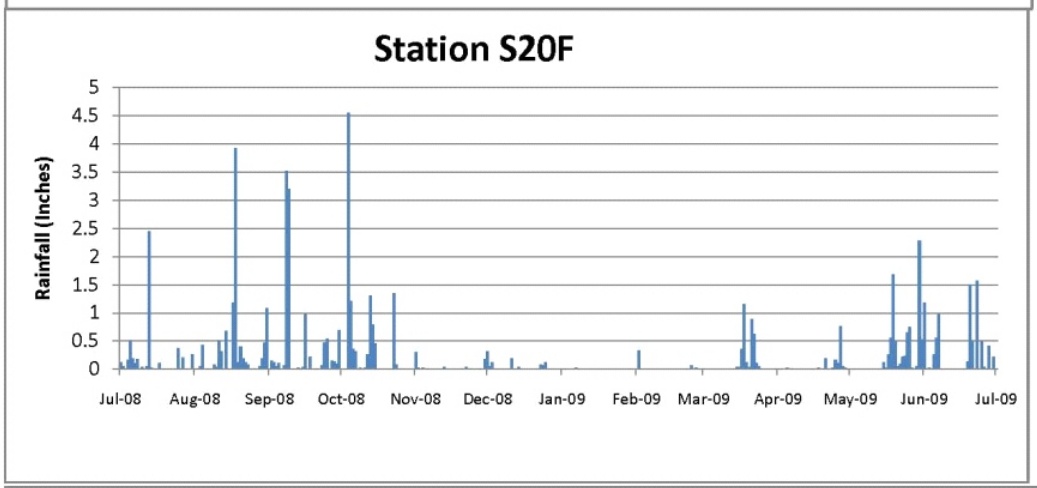

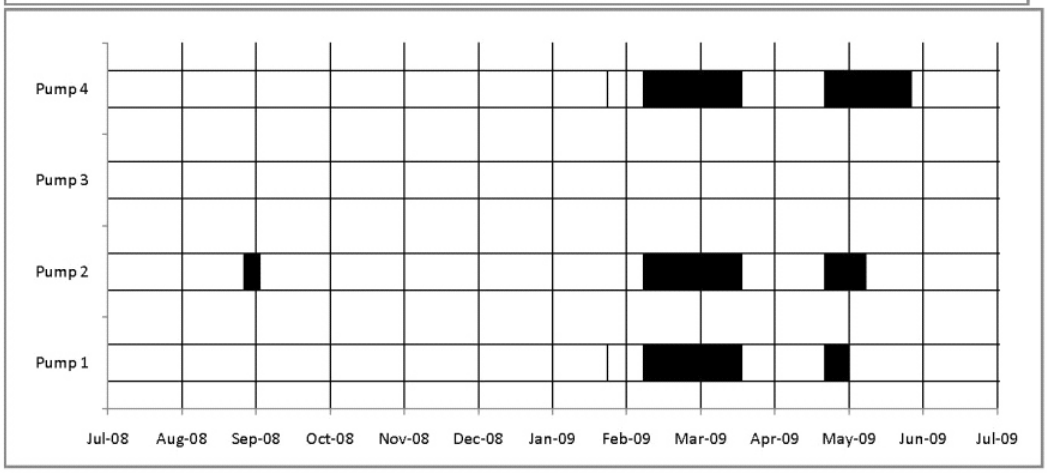

Note:
Rainfall data reported as S-20 from March 2008 onward is actually from FPL's Meteorological Tower near the Land Use Building.

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TITLE

Interceptor Ditch Pump Operation and Rainfall

CLIENT/PROJECT

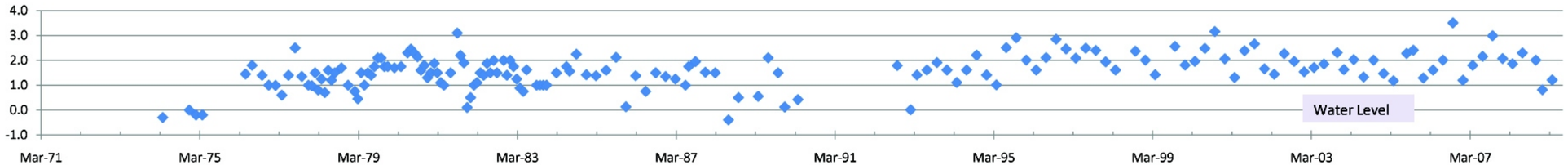
FPL/2009 Annual Report Groundwater Monitoring Program/FL

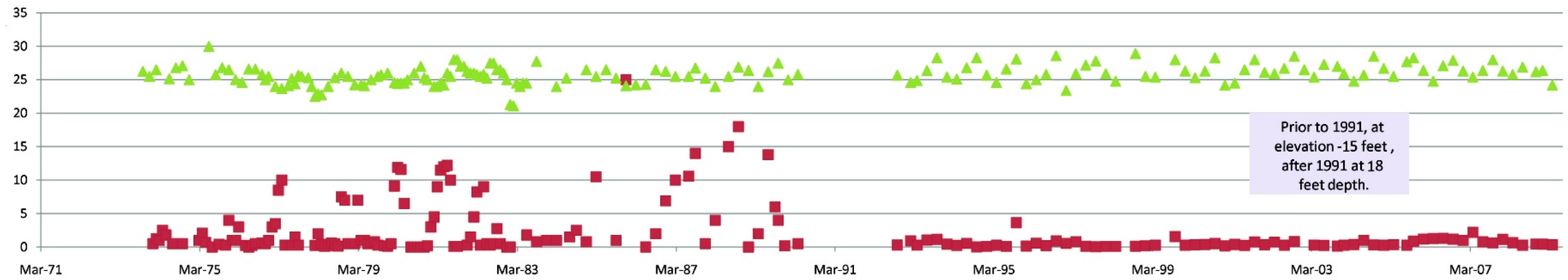
DRAWN MT	DATE 9/11/09	JOB NO. 09390244	
CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
REVIEWED HF	FILE NO. 09390244 Figure 21	SUBTITLE	FIGURE NO. 21

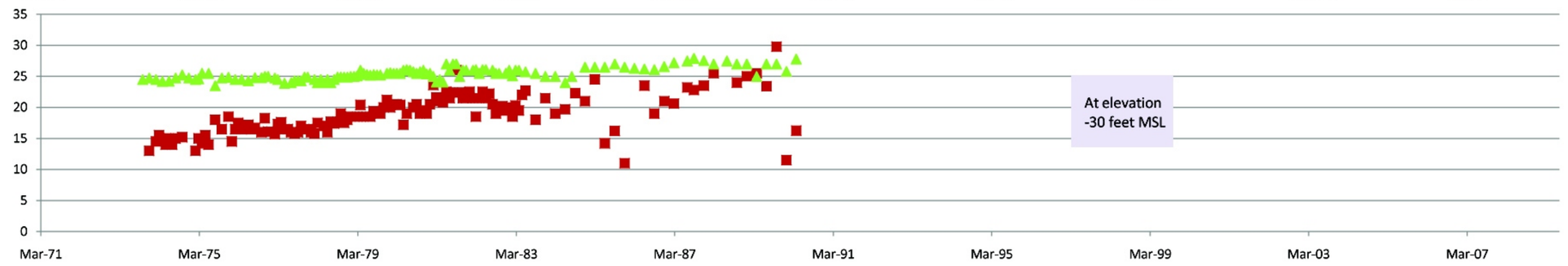
APPENDIX A
TIME-HISTORY PLOTS

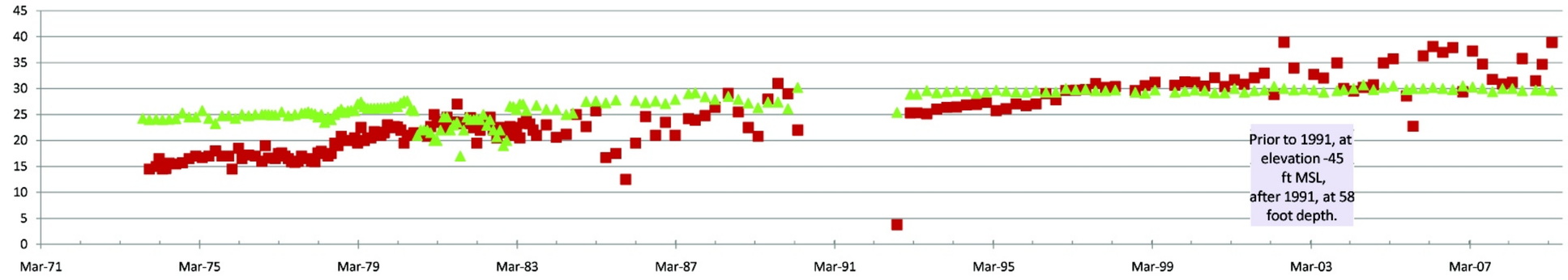
APPENDIX A
TIME-HISTORY PLOT

The following figures A-1 through A-4 present the time-history plots of water levels, temperatures, and estimated chloride content (chlorinity) for wells L-3, L-5, G-21, and G-28, respectively. Figure A-5 presents rainfall and selected water levels, and ground-water temperatures and chlorinities.









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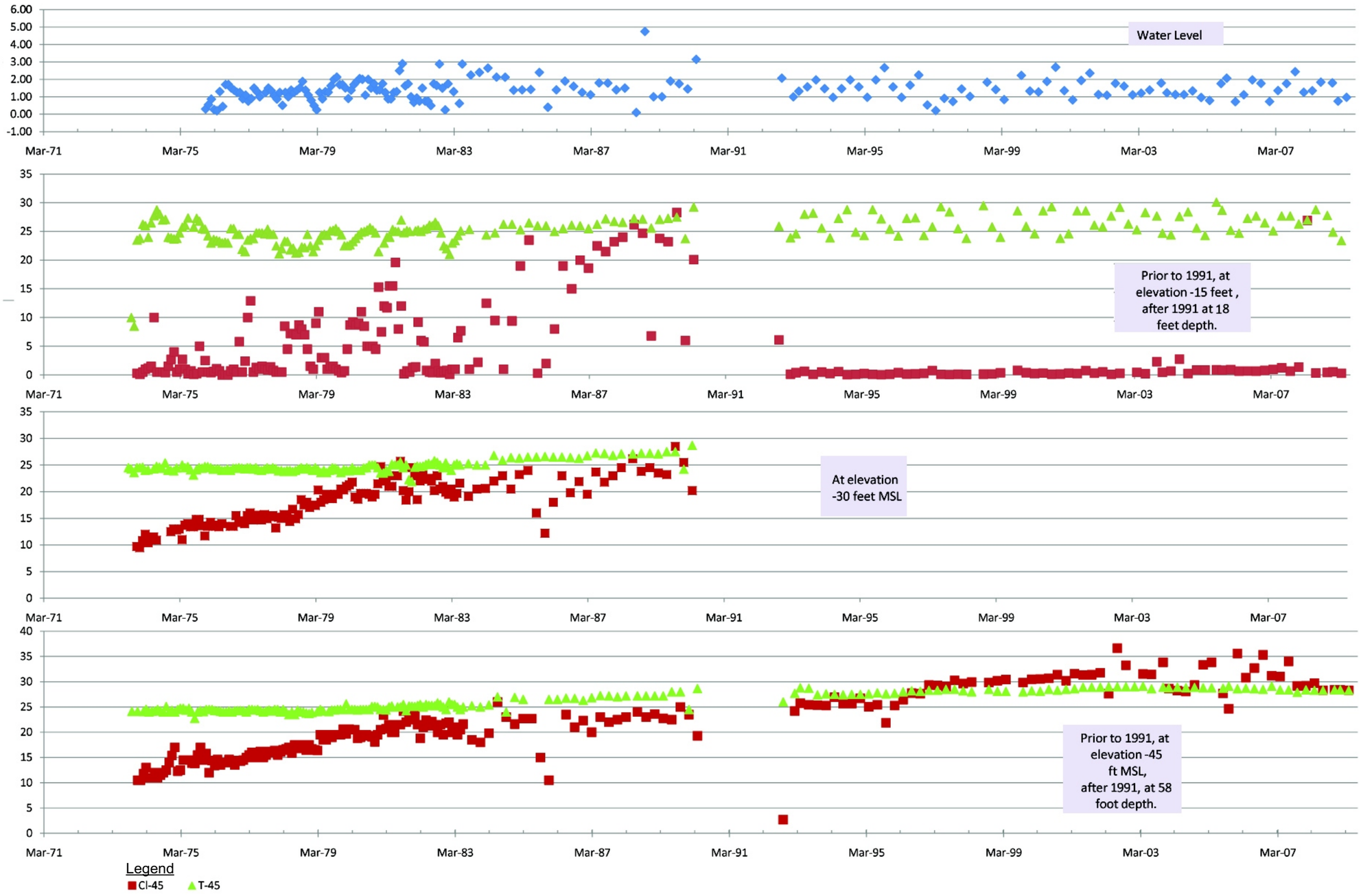
DWG NO. 09390244 Figure A-1	
REV. NO.	JOB NO. 09390244
DATE xxx	DRAWN MAT
SCALE NTS	CHECKED SH
FILE NO.	REVIEWED HAF

CLIENT/PROJECT
FPL/2009 Annual Report Groundwater Monitoring Program/FL

TITLE
TIME-HISTORY PLOTS
WELL NUMBER L-3

FIGURE NO.
A-1



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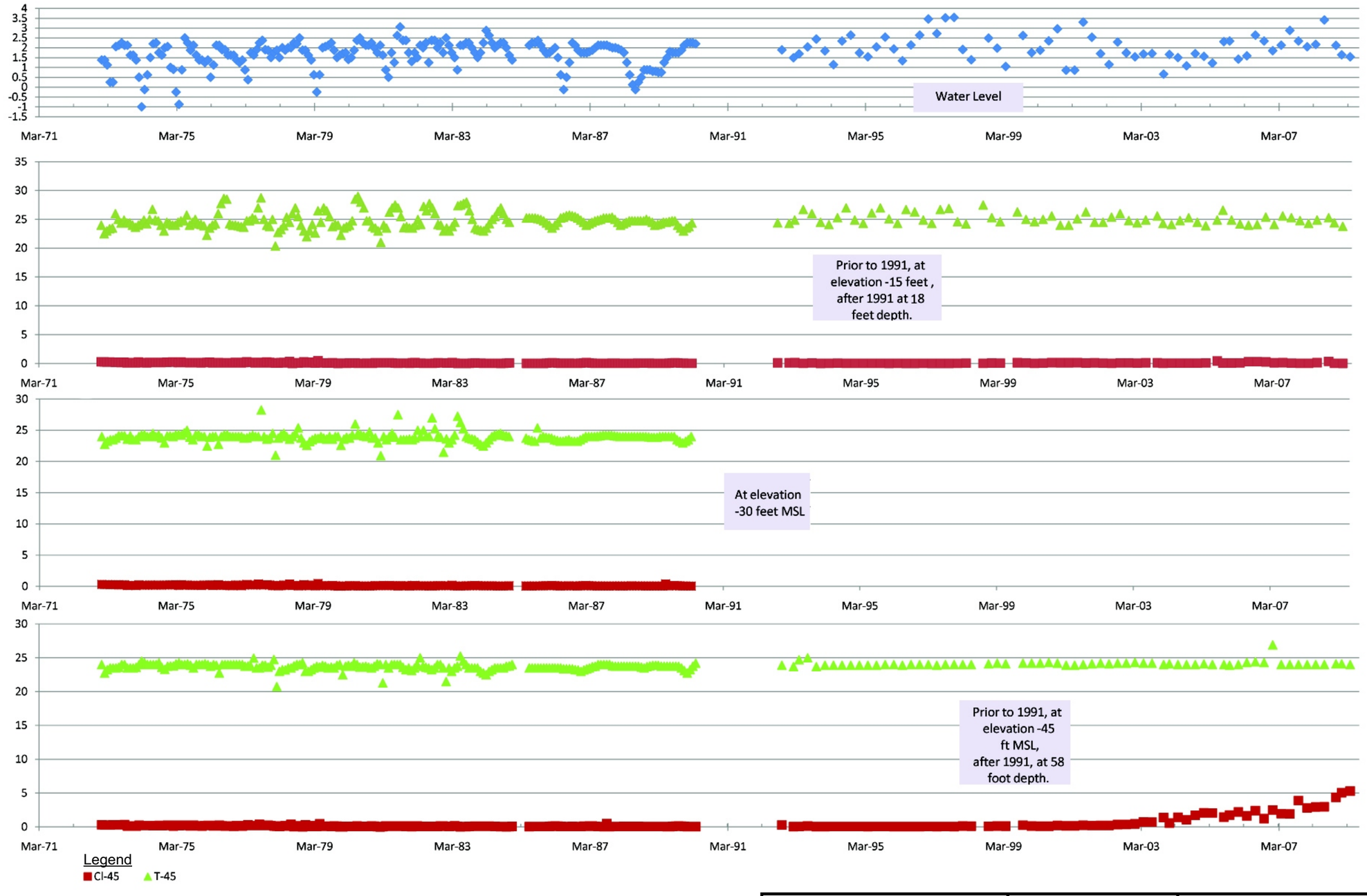
DWG NO. 09390244 Figure A-2	
REV. NO.	JOB NO. 09390244
DATE xxx	DRAWN MAT
SCALE NTS	CHECKED SH
FILE NO.	REVIEWED HAF

CLIENT/PROJECT
FPL/2009 Annual Report Groundwater Monitoring Program/FL

TITLE
TIME-HISTORY PLOTS WELL NUMBER L-5

FIGURE NO.
A-2



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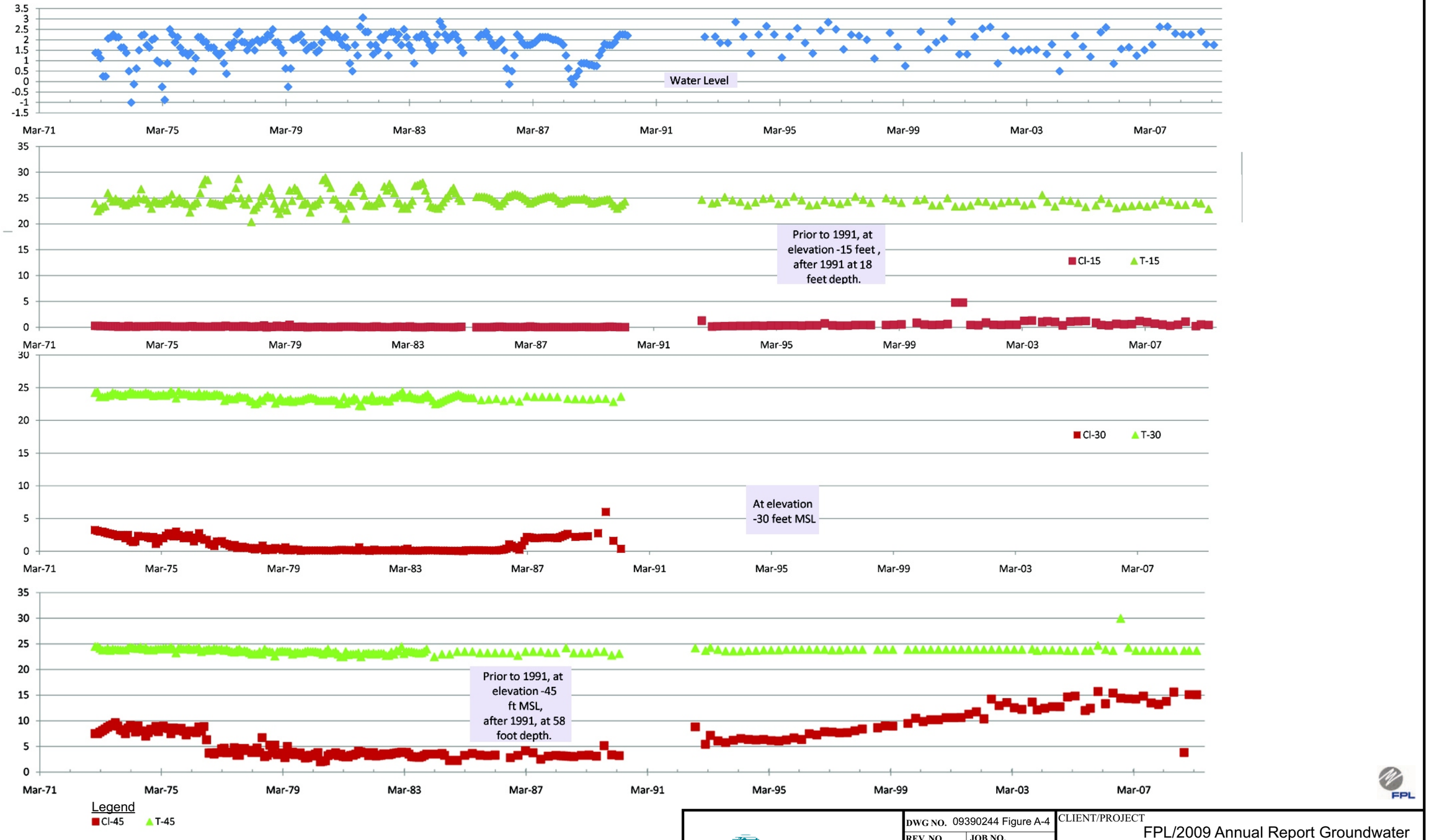
DWG NO. 09390244 Figure A-3	
REV. NO.	JOB NO. 09390244
DATE xxx	DRAWN MAT
SCALE NTS	CHECKED SH
FILE NO.	REVIEWED HAF

CLIENT/PROJECT
FPL/2009 Annual Report Groundwater Monitoring Program/FL

TITLE
TIME-HISTORY PLOTS
WELL NUMBER G-21

FIGURE NO.
A-3



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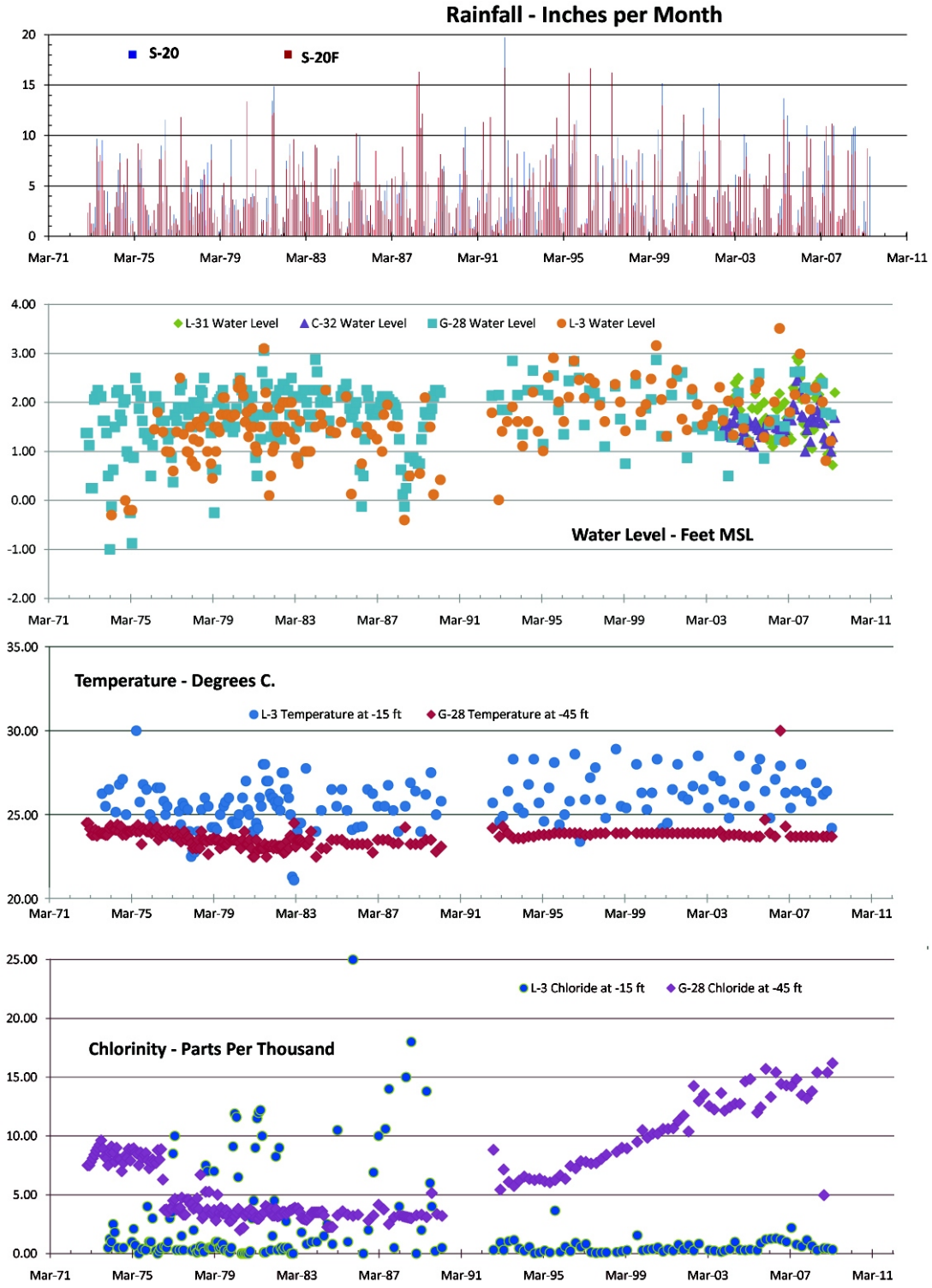
DWG NO. 09390244 Figure A-4	
REV. NO.	JOB NO. 09390244
DATE xxx	DRAWN MAT
SCALE NTS	CHECKED SH
FILE NO.	REVIEWED HAF

CLIENT/PROJECT
FPL/2009 Annual Report Groundwater Monitoring Program/FL

TITLE
TIME-HISTORY PLOTS
WELL NUMBER G-28

FIGURE NO.
A-4



Note:
Rainfall data reported as S-20 from March 2008 onward is actually from FPL's Meteorological Tower near the Land Use Building.

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TITLE

Rainfall, Water Level, Water Temperatures and Chlorinites

CLIENT/PROJECT	DRAWN MT	DATE 9/11/09	JOB NO. 09390244	
FPL/2009 Annual Report Groundwater Monitoring Program/FL	CHECKED SH	SCALE NTS	DWG. NO.	REV. NO.
	REVIEWED HF	FILE NO. 09390244 Figure A-5	SUBTITLE	FIGURE NO. A-5

APPENDIX B
INTERCEPTOR DITCH OPERATION

APPENDIX B
INTERCEPTOR DITCH OPERATION

INTRODUCTION

The purpose of the Interceptor Ditch is to restrict inland movement of cooling canal water by maintaining a seaward ground-water gradient during times when a natural seaward gradient does not exist. During the wet season and the early part of the dry season, a natural seaward gradient usually does exist. During the rest of the year, however, it may be necessary to artificially generate a seaward gradient east of the levee 31 Borrow Canal by pumping water out of the Interceptor Ditch. The procedure for monitoring the ground-water gradient and operation of the Interceptor Ditch is presented in the following sections.

MONITORING LOCATIONS

Surface water elevations shall be monitored at staff gauges located in the West Feeder Canal 32 of the Cooling Canal System, Levee 31 Borrow Canal and the Interceptor Ditch at five locations relative to Lines A, B, C, D and E, as show on the inset, Figure 1 in the main text. When pumping of the Interceptor Ditch commences, additional data shall be obtained at each of the two ID pump stations. Locations of the pump stations are also shown Figure 1.

MONITORING FREQUENCY

Water elevation data shall be collected at the five monitoring locations twice a month during non-pumping periods. These elevations will be measured on or about the first of each month and again near the middle of the month. Non-pumping periods typically reflect the wet season high water levels, i.e., June through November.

During the dry period, December through May, water elevation data will be collected once a week except during periods when pumping is necessary to create a seaward gradient. When pumping is required, water surface elevation data will be collected at least twice weekly. Adequate surveillance shall be set up to assure proper Interceptor Ditch operation. Data on pump run time and segments of the Interceptor Ditch being pumped will be recorded in the Interceptor Ditch Pump Operation Log.

PUMPING CRITERIA

As long as a natural seaward ground-water gradient exists, pumping of the Interceptor Ditch is not required. The following criteria define when a natural seaward gradient exists and when the Interceptor Ditch must be pumped to create an artificial gradient east of Levee 31 Borrow Canal.

Natural Seaward Gradient – a natural seaward gradient exists when the Levee 31 Borrow Canal water surface elevation (Feet MSL) minus the West Feeder Canal, Number 32 water surface elevation (feet MSL) is greater than 0.20 feet.

If this criterion is not met, a natural seaward gradient still exists if the Levee 31 Borrow Canal water surface elevation (feet MSL) minus the Interceptor Ditch water surface elevation (feet MSL) is greater than 0.30 feet.

Artificial Seaward Gradient – If a natural seaward gradient does not exist, pumping of the Interceptor Ditch must be initiated to artificially create a seaward gradient. Pumping shall be adjusted so that the water surface elevation (feet MSL) in the Interceptor Ditch is maintained greater than 0.30 feet lower than the water surface elevation (feet MSL) in Levee 31. Pumping can be terminated when the criteria for a natural seaward gradient is met.

The flow chart on the subsequent page depicts the requirement for pump operations. This chart should be used each time water elevation data are obtained in order to more easily determine when pumping is or is not required.

The pump stations show on Figure 1, divide the Interceptor Ditch into three segments. Each segment is evaluated separately with respect to the seaward gradient operating criteria. One segment, therefore, might require pumping while another might not. Pumping shall be initiated when any of the lines of staff gauges governing that segment fails to meet the specified criteria for a natural seaward gradient. Adjustable intake gates (stoplogs) in each pump intake basin allow for various pump combinations to drawdown specific Interceptor Ditch segments.