FINAL REPORT

SALT WATER ORIENTATION IN THE BISCAYNE AQUIFER IN THE TURKEY POINT PLANT VICINITY PRIOR TO INSTALLATION OF THE COOLING CANAL SYSTEM

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Miami-Dade County, Florida

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1.0 INTRODUCTION

Florida Power & Light Company (FPL) and South Florida Water Management District (SFWMD) agreed to each review existing literature and to determine the orientation of the salt water within the Biscayne Aquifer in the vicinity of the Turkey Point Plant prior to installation of the Cooling Canal System (CCS, Figure 1). The purpose of these activities is to establish a baseline of the salt water orientation before installation of the CCS. This Final Report represents the culmination of that research by FPL and SFWMD. FPL and SFMWD find that this report represents, to their best scientific knowledge based on available data, the orientation of salt water prior to the installation of the CCS.

The CCS was installed according to the terms of a Consent Final Judgment dated September 10, 1971, which settled a lawsuit brought by the U.S. Department of Justice against FPL in March, 1970, and a counter-suit brought by FPL. In July, 1972, an Operating License was obtained for Turkey Point Unit 3, and cooling water for Units 1 and 2 was diverted to the 6.5-mile long canal to Card Sound during construction of the CCS. Unit 3 was placed into operation in December, 1972. By February 18, 1973, the CCS was 40% complete and was closed off from Biscayne Bay and Card Sound, i.e. the CCS commenced operating as a closed loop cooling system for Units 1, 2, and 3. In May, 1973, Unit 4 was placed into operation, also utilizing the closed loop CCS. By August, 1973, the construction of the CCS and Interceptor Ditch (ID) was complete. By December, 1973, the ID pumping system was operational.

FPL installed several sets of monitoring wells and measured conductivity levels over time at various depths in the Biscayne Aquifer. The G-Series wells and the E-Series wells were installed in compliance with the Consent Decree. FPL installed the F-Series wells under their own volition. Although conductivity was measured as a surrogate for chloride, multiple chemical analyses were performed on ground water samples taken at various depths in order to develop mathematical relationships between chloride and conductivity

The E-Series Wells Monitoring Program was initiated in April, 1972. Twenty-three monitoring wells were installed to the north, south, and east of the CCS (Figure 2). First data from the E-series wells was obtained between April and July, 1972, and were taken at depths of 20, 40, and 60 feet below the top of each well casing (TOC).

The G-Series Wells Monitoring Program was initiated in April, 1972. Thirty-eight monitoring wells were installed at twenty-three separate locations west of the CCS (Figure 3). Three existing USGS composite wells (cased with perforated PVC pipe to allow for the free flow of ground water through the well) were also incorporated into the G-wells monitoring system. Pairs of piezometers, at depths of 20 and 50 feet TOC were installed at fifteen of the twenty-three locations (G-2, G-3, G-5, G-9, G-10, G-12, G-16, G-17, G-19, G-23, G-24, G-26, G-30, G-31, and G-33). The remaining eight new wells (G-6, G-13, G-14, G-20,

G-27, G-34, G-34X, and G-35) were constructed as 70-foot deep composite wells. The three existing USGS composite wells incorporated into the monitoring plan (G-7, G-21, and G-28) are located along Tallahassee Road. Conductivities were measured at depths of 20, 40, and 60 feet TOC in the composite G-series wells, and at 20 and 50 feet TOC in the G-series piezometers. Data are available for the G-series wells starting in April, 1972.

The F-Series Wells Ground Water Monitoring Program was also initiated in April of 1972. FPL installed nine F-series wells in the area south of the CCS (Figure 4). The F-series wells are composite wells about 70 feet deep. Chloride data from five of the F-series wells are available starting from July –December, 1972, at depths of 20, 40, and 60 feet TOC.

FPL and SFWMD have reviewed the available literature, determined which of the documents contain relevant information to this study, and compiled a list of those references (see Table 1). Based on that review, data from 23 E-series wells, 26 G-series wells, and 5 F-series wells, for a total of 54 wells, have been utilized to estimate the locations of relevant iso-conductivity lines and isochlors in the aquifer. The estimation technique and iso-contour line locations are presented in the remainder of this report.

The CCS was utilized in closed cycle mode beginning on February 18, 1973, prior to its completion in August, 1973. The well monitoring programs described above all began in 1972. In order to estimate conductivity values prior to operation of the CCS, all available conductivity data values for each well and depth between January 1, 1972, and February 1, 1973, have been averaged. Similarly, all available chloride data over the same period of record have also been averaged. Calculations describing exact details of the data analysis are presented in Appendix A Calculations.

2.0 ISO-CONDUCTIVITY AND ISOCHLOR LOCATION ESTIMATION TECHNIQUE

The references include limited tabulations of the actual data in references 18 through 23; however, References 3 and 4 include scaled time-history plots of the well water levels, conductivities, and temperatures, and Reference 16 includes time-history plots of well water levels, temperature, and chlorinity. The averaged conductivity data are shown in Table 2 for the E-Series wells and Table 3 for the G-Series wells. Table 4 shows the averaged chloride data which were available for the F-Series wells, and the limited chloride data which were directly available for the E-Series wells.

The values were inserted into GIS shape files, and plotted using color codes to differentiate between different ranges of conductivity levels, at depths of 20, 40, 60, and 50 feet (Figures 5, 6, 7 and 8 respectively). Conductivity values at 20, 40, and 60 feet were available for all wells; values at 50 feet were only available at the fifteen piezometer locations in the G-Series wells. Similarly, chloride values were inserted into GIS shape files, and plotted using color codes to differentiate between different ranges of chloride levels, at a depth of 20 feet (Figure 9). The resultant maps were used to draw iso-contours (isochlors for chloride and iso-conductivity for specific conductance) for each depth. Iso-contour line positions are estimated by the following methodology:

1. Beginning with the point with the highest value, draw a line to a nearby point
2. Use linear interpolation to estimate the point (or points) on the line that correspond to the selected lines to be shown
3. Repeat the process for other points around the highest point
4. Sketch a smooth curve that connects all points estimated to have the same value. Each curve must pass through any points that have its value, and must divide the map so that all points on one side have higher values and all points on the other side have lower values.
5. Sketch a curve for the next value. The second curve should be similar in shape to the first curve and must not cross it.
6. Continue drawing lines until the entire area has been covered

The resultant iso-contour lines are shown on Figures 10, 11, and 12 for conductivity at depths of 20, 40, and 60 feet TOC, respectively, and on Figure 13 for chloride at a depth of 20 feet.

The piezometer conductivity levels at the 50-foot depth TOC are not numerous enough to develop contours.

3.0 DISCUSSION

Figure 10 shows the iso-conductivity lines at the 20-foot depth. The 20,000 micro-mho per cm iso-conductivity line on figure 10 is approximately at the location of the Levee 31E. Virtually all of the area in which the CCS is built is above 30,000 micro-mho per cm, and the eastern half of that area is above 40,000 micro-mho per cm. The eastern-most portion of the area in which the CCS is built is above 45,000 micro-mho per cm, with an isolated point exceeding 50,000 micro-mho per cm. There is also another isolated point exceeding 50,000 micro-mho per cm south of the CCS.

Figure 11 shows the iso-conductivity lines at the 40-foot TOC depth. The 35,000 micro-mho per cm iso-conductivity line is west of the CCS. Conductivity levels drop off to the west, until the 1,000 micro-mho per cm line is reached near Tallahassee Road. All of the area in which the CCS is built is above 35,000 micro-mho per cm, with values exceeding 50,000 micro-mho per cm. South of the CCS, iso-conductivity levels exceed 55,000 micro-mho per cm.

Figure 12 shows the iso-conductivity lines at the 60-foot TOC depth. The distribution of the iso-conductivity lines at the 60-foot depth is similar to that shown at the 40-foot depth in Figure 11. Conductivity levels in virtually all of the area in which the CCS was built are above 35,000 micro-mho per cm, and most of that area is above 45,000 micro-mho per cm. Again, the conductivity levels drop off to the west, until the 1,000 micro-mho per cm level is reached near Tallahassee Road.

Figure 13 shows chloride values at the 20-foot depth TOC. The chloride values in Figure 13 range between 10,000 and 19,000 mg/L within the footprint of the CCS, and up to about 22,000 mg/L southwest of the CCS, in well F-4.

Figure 8 shows the conductivity values found in the 50-foot deep piezometers. The values shown in Figure 8 range between 29,500 and 43,900 micro-mho per cm.

References 2 and 15 include figures that depict what was estimated to be the measured ranges of the 1,000, 10,000, and 20,000 mg/L isochlors at the 20, 40, and 60 foot depths during the period between April, 1972, and January, 1975. This period does include time when the CCS was complete and all four units were operating; therefore, the areas shown in these figures are not directly comparable to the isochlors shown in Figure 13. However, it is of interest to compare them, as is done for the 20-foot isochlors in Figure 14. The isochlors from Figure 14 are consistent with the ranges depicted in Reference 2.

4.0 CONCLUSIONS

Based on the iso-conductivity lines developed, the entire area in the vicinity of the present location of the CCS between the coast and Tallahassee Road contained salt water prior to construction of the CCS. Florida Class I standards, and Class III fresh water standards include a numerical limit of 1275 micro-mho per cm for specific conductance. Based on Figures 11 and 12, the 1275 micro-mho per cm value is exceeded well west of the footprint of the CCS at the 40 and 60-foot depths below TOC. Based on Figure 10, the 1275 micro-mho per cm level is exceeded at the 20-foot depth below TOC well west of Levee 31E.

Based on the isochlors developed, the entire area in the present location of the CCS contained salt water prior to construction of the CCS. Although the USGS sometimes defines a "salt line" as the location where the 1,000 mg/L chloride concentration is at the bottom of the aquifer, the Drinking Water Standards provide a limit of 250 mg/L for chloride. In either case, salt water had extended in-shore to at least the 10,000 mg/L line shown on Figure 13. There were insufficient data to develop the lower value isochlors.

Based on Figure 14, it can also be concluded that the entire area between the coast and Tallahassee Road contained salt water prior to construction of the CCS. The locations of the isochlor lines developed within this report are completely consistent with the isochlor ranges published by Dames & Moore in 1975; this fact leads to the conclusion that the 1,000 mg/L range shown on Figure 14 is also accurate for the pre-CCS condition. It can further be concluded that if the Dames & Moore ranges are accurate at the 20-foot depth, they are most likely also accurate at the 40- and 60-fot depths.

Figure 15 shows the 1,000 mg/L range at a depth of 60 feet as published by Dames & Moore in 1975. The same figure includes two "salt water intrusion lines" published by the USGS, and generally described as the location of the 1,000 mg/L isochlor at the base of the aquifer. Two observations can be made:

1. The 1971 line is seaward of the 1951 line, and
2. The 1,000 mg/L line at the 60-foot depth as reported by Dames & Moore is consistent with the 1971 line.

With respect to the first observation, it should be noted that the salt line can move considerable distances because of changes in the local ground water hydraulic gradients. Likely causes of such changes include evaporation, precipitation, ground water withdrawals, and changes in ocean/Biscayne Bay water levels. Thus, while the 1971 line is seaward of the 1951 line, they are likely both located within the normal range within which the salt water intrusion line normally moved prior to installation of the CCS.

TABLES

Table .

Ref. No.	File Name	Document Title	Relevant Section	Relevance
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figure 1	locations of E, F, and G wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figure 2	locations of L, G, S, and ID wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Section 2	history of monitoring wells installation and purpose
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figures 25 - 43	Chlorinity Profiles-1976-ID, L, & G-6,7,21,27,28,35, and X wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figures 44 - 48	10 PPT Cl Cross Sections Lines A-E
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	GROUNDWATER SALINITIES	description of groundwater salinities 1975
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	Plates 5, 6, and 7	Isochlor lines - 1, 10, 20 PPT - 4/72 to 1/75
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	Plates 8 and 9	5 PPT @ 20 ft, and 15 PPT @ 50 ft, isochlors near Line D - 7/72 to 6/73
3	Dames and Moore 3-final.pdf	Summary Report GWMP E-Series Wells	Figures 4, 5, and 6	12/72 - 20 PPT Isochlor @ 20 ft, 40 ft, and 60 ft depth
3	Dames and Moore 3-final.pdf	Summary Report GWMP E-Series Wells	Figures in Appendix A	Time/History Plots for E wells, starting May 1972, 20, 40, and 60 ft depth
4	Dames and Moore 5 final.pdf	GWMP G-Series Wells	Appendix	Time/History Plots for S-1 and G wells, starting 9/1/73 - 20, 40, and 60 ft depth
4	Dames and Moore 5 final.pdf	GWMP G-Series Wells	Plates 3.3.4.R through 3.3.4.Y	Isochlor maps - Figures missing from pdf file
5	data summary f-series wells.pdf	Data Summary, F-Series Wells GWMP	Figures 4, 5, and 6	Isochlor maps - 1, 10, and 20 PPT @ depths of 20, 40, and 60 feet
6	engineering design reservoir.pdf	The Engineering Design of the Turkey Point Cooling Reservoir	VII. , page VII-1 thru VII-5	Narrative discussion of salt water intrusion
6	engineering design reservoir.pdf	The Engineering Design of the Turkey Point Cooling Reservoir	VIII. , page VIII-1 thru VIII-3	Narrative discussion of surface water usage
7	fpl reservior sect 2.pdf	Florida Power & Light Company, Reservoir Concept - Appendix A:Geohydrological Conditions Related to the Construction of Cooling Ponds	Plate 1	Plate 1 shows 1,000 ppm isochlor at base of aquifer
7	fpl reservior sect 2.pdf	Florida Power & Light Company, Reservoir Concept - Appendix A:Geohydrological Conditions Related to the Construction of Cooling Ponds	Table 1	Table 1 shows chloride in L-31E borrow canal ranged from 520 to 650 ppm during November, 1970.
8	intensive mon.prog..pdf	Intensive Monitoring Program, Turkey Point Site	Table 3	Table 3 shows chloride values in some E- and G- wells, including G-28, at 20, 40, and 60 feet during Nov/Dec 1972
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figures 3 - 7	Time-History Plots of Cl in ID wells, @ depth of 20, 40, and 60 feet below top of casing--11/73 through 5/82 (pp. 12-16 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figure 1	Location of wells X-1 and X-2 (p. 10 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figure 8	Estimated Levels of Cl in wells G-21, G-13, E-8, and E-9 with cooling canals(p. 17 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Table 1	Weekly Salinity in cooling canals, 1981 (p. 20 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	un-numbered table	Salinity in cooling canals, Sept-Nov, 1982 (p. 23 of 96)
10	NPDES DIS. MON. REP 95-98.pdf	NPDES DMRs	1995,1996, 1997, & 1998 sampling reports	Salinity in cooling canals, 1995-1998
11	REPORT JULY 1978 SEMI ANNUAL REPORT GROUND WATER MONITORING PROGRAM TURKEY POINT FLORIDA FLORIDA POWER AND LIGHT COMPANY.pdf	Report, July 1978, Semi-Annual Report, GWMP	pages 169 and 170	Time-History Plots Wells X-1 and X-2 April, 1974--June, 1978
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter VII Salinity and Table VII-1	Salinities in CCS and Biscayne Bay/Card Sound 5/73 - 11/73
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter X	Narrative description of Salinity in E wells
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter XI	Biscayne Aquifer under CCS was normally saline prior to construction of CCS;ID design was to "intercept any cooling canal seepage and prevent it from flowing to the west."
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter XI	G-wells consist of 11 composite wells and 30 piezometers at 26 locations. Piezometers are co-located two to a location
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figures 2 - 4	Cl values for pairs of wells east, west, and south of CCS at 40 ft depth
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	page 2	Natural sea water intrusion has occurred throughout the area

Ref. No.	File Name	Document Title	Relevant Section	Relevance
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figure 6	Fresh Water - Salt Water Interface Under Original Ground Water Conditions
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figure 7	Fresh Water - Salt Water Interface Under Projected Ground Water Conditions - shows brackish water in L-31E Canal
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Text of report	Discussion of causes of salt water intrusion in this area.
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Last page entitled "Figures"	Mentions that this summary is based on a more detailed report dated 12/15/77
14	therm perf cool sys 1988.pdf	Thermal Performance of the Turkey Point Cooling Canal System In 1988	Figure 4	Infrared Photograph of CCS
14	therm perf cool sys 1988.pdf	Thermal Performance of the Turkey Point Cooling Canal System In 1988	Figure 5	Flow rates in individual Canals
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Ground Water Salinity pp 12-14 of 122	description of groundwater salinities 1974
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Plates 5, 6, and 7 pp 24 - 26	Isochlor lines - 1, 10, 20 PPT - 4/72 to 10/74
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Plates 8 and 9 pp 27 - 28	5 PPT @ 20 ft. and 15 PPT @ 50 ft. isochlors near Line D - 7/72 to 6/73
16	1-79 semi annual report gw mon. prog.pdf	January, 1979 Semi-Annual Report GWMP	pages 173-177	Time-History Plots Wells F-3, F-4, F-6, F-7, and F-8
17	NPDES DISCHARGE 91-94.pdf	DMRs for 1/91 through 6/94	monthly DMR salinity tables	max, average, and min monthly salinities in CCS 1/91 through 6/94
18	EPA Turkey Point Wells.pdf	Storet LDC--Detailed Data Report	all	Specific conductance for E-Wells for 7/31/72 at 20', 40' and 60' depths
19	E-Series_Wells-Dec-11-1972.pdf	Groundwater Monitoring Data--Report Sequence #6	all	Specific conductance for E-Wells for 12/5/72 and 12/6/72 at 20', 40' and 60' depths
20	E-Series_Wells-Jan-8-1973.pdf	Groundwater Monitoring Data--Report Sequence #7	all	Specific conductance for E-Wells for 1/2/73 and 1/4/73 at 20', 40' and 60' depths
21	E-Series_WQ-Oct-18_1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 10/72 at 20' and 40' (E-1 only) depth
22	E-Series_WQ-Nov-14-1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 11/72 at 20' depth
23	E-Series_WQ-Dec-18-1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 12/72 at 20' depth

Table 2
Average Conductivity[1] (micro-mhos per cm) in E-Series Wells

Well	Cond @ 20 '	Cond @ 40 '	Cond @ 60 '
E-1	39,100	46,600	47,800
E-2	42,200	46,900	47,900
E-3	30,900	48,200	49,100
E-4	37,800	50,100	52,700
E-5	43,200	47,300	49,300
E-6	41,900	48,700	51,600
E-7	47,900	49,900	52,200
E-8	44,100	48,900	51,500
E-9	48,600	54,100	54,700
E-10	48,800	51,000	52,900
E-11	48,200	51,200	52,400
E-12	50,200	50,300	51,700
E-13	49,600	49,900	50,400
E-14	46,900	48,700	49,400
E-15	45,000	49,400	50,700
E-16	41,200	49,000	50,100
E-17	45,700	50,900	51,500
E-18	43,400	50,000	51,100
E-19	32,800	45,800	46,800
E-20	35,100	44,600	46,200
E-21	44,500	53,100	54,200
E-22	50,000	55,600	56,400
E-23	49,900	55,700	56,200

Note 1: Period of Record is 4/1/1972 through 2/1/1973

Table 3
Average Conductivity[1] (micro-mhos per cm) in G-Series Wells

Well	Cond @ 20 '	Cond @ 40 '	Cl @ 50 '	Cond @ 60 '
G-2	25,300		43,100	
G-3	27,000		43,100	
G-5	14,800		42,800	
G-6	7,800	28,600		40,500
G-7	900	900		900
G-9	27,900		43,900	
G-10	18,700		45,000	
G-12	7,500		42,700	
G-13	5,900	37,800		41,300
G-14	1,000	1,100		1,000
G-16	17,500		42,800	
G-17	15,100		40,900	
G-19	6,100		37,600	
G-20	5,900	30,100		31,200
G-21	1,200	1,100		1,300
G-23	19,500		31,500	
G-24	19,800		32,600	
G-26	7,000		29,500	
G-27	3,500	26,200		26,100
G-28	3,000	16,600		26,300
G-30	30,800		40,200	
G-31	31,300		39,300	
G-33	18,600		35,800	
G-34	6,500	29,500		29,600
G-34X	4,700	17,000		22,600
G-35	1,100	4,400		27,700

Note 1: Period of Record is 4/1/1972 through 2/1/1973

Table 4
Average Chloride[1] Values (mg/L) in E-Series and F-Series Wells

Well	Cl @ 20 '	Cl @ 40 '	Cl @ 60 '
E-1	15,125	17,250	
E-2	15,750		
E-3	10,667		
E-4	14,083		
E-5	15,167		
E-6	12,750		
E-7	17,417		
E-8	16,333		
E-9	17,083		
E-10	18,917		
E-11	18,500		
E-12	19,083		
E-13	19,083		
E-14	17,583		
E-15	16,667		
E-16	15,500		
E-17	17,083		
E-18	15,750		
E-19	9,917		
E-20	12,750		
E-21	16,750		
E-22	18,750		
E-23	18,500		
F-3	19,800	20,400	21,300
F-4	21,900	21,700	22,200
F-6	13,600	17,200	17,600
F-7	1,400	13,600	15,200
F-8	800	10,100	10,900

Note 1: Period of Record 4/1/1972 through 2/1/1973 as available

FIGURES

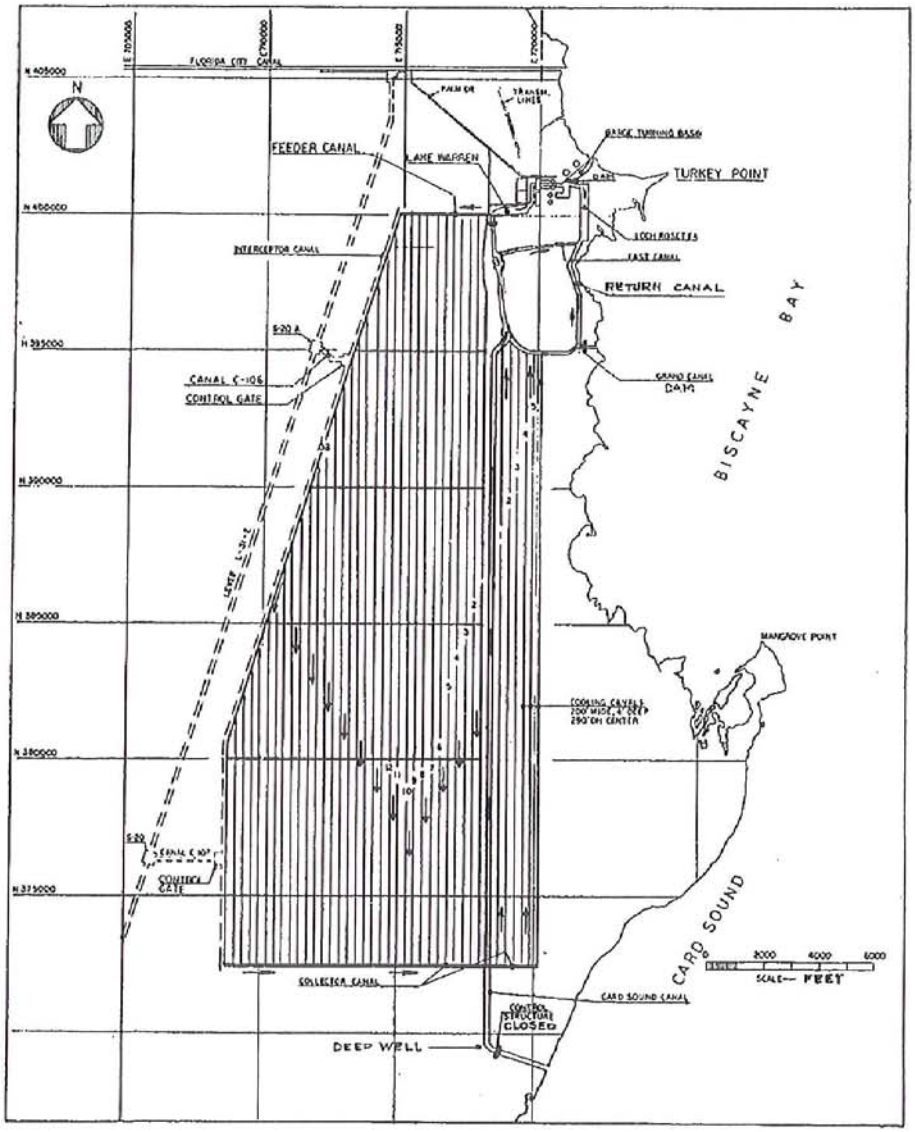

Figure -1 Turkey Point Cooling Canal System
Source: FPL, 1972

Golder Associates Atlanta, Georgia	TITLE: Turkey Point Cooling Canal System			
CLIENT/PROJECT: FPL/Saltwater Orientation/FL	DRAWN: MT	DATE: 10/19/10	JOB NO.: 10390308	
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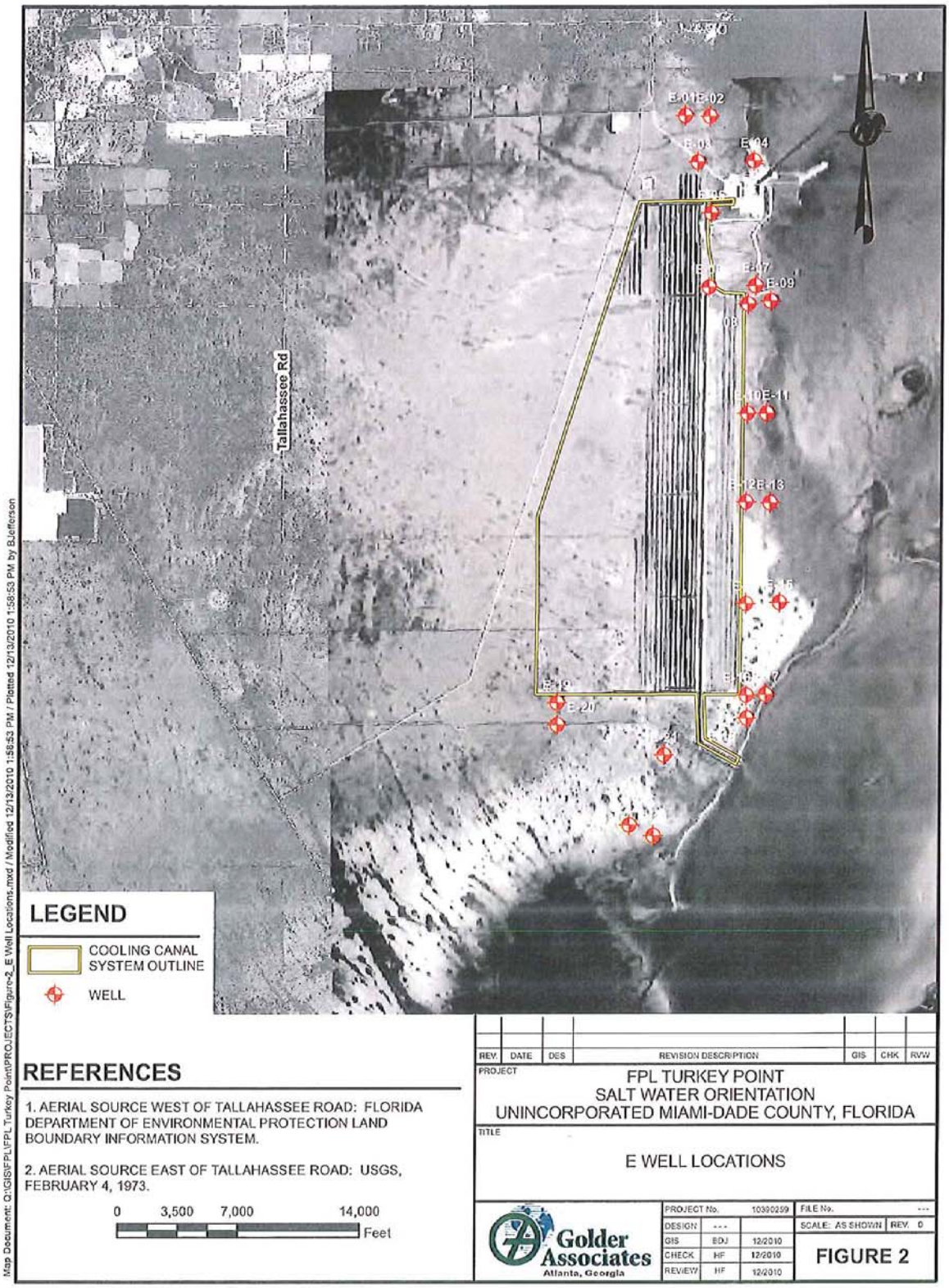
	REVIEWED: HF	FILE NO.: 10390308 Figure 1	SUBTITLE	FIGURE NO.: 1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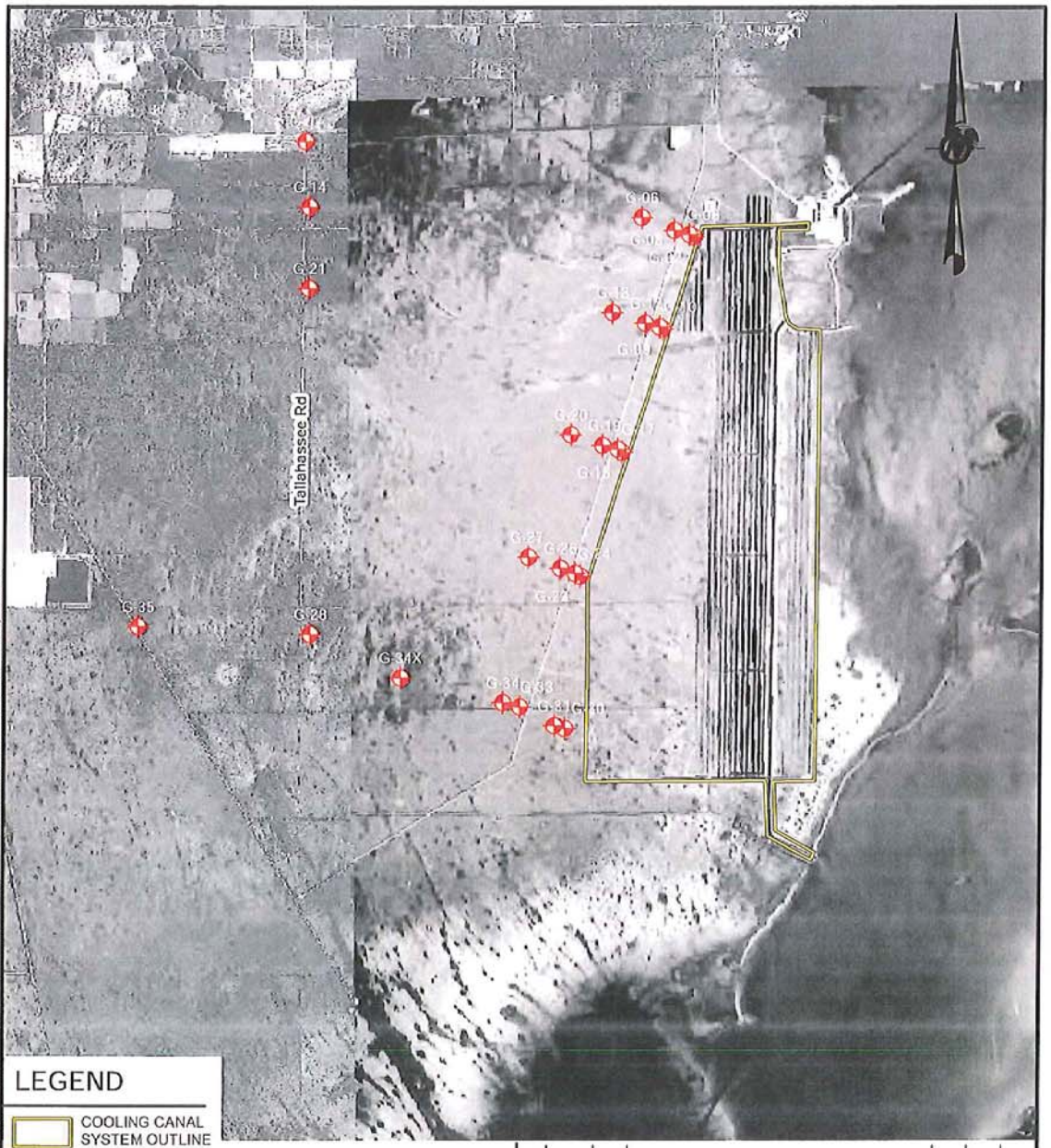
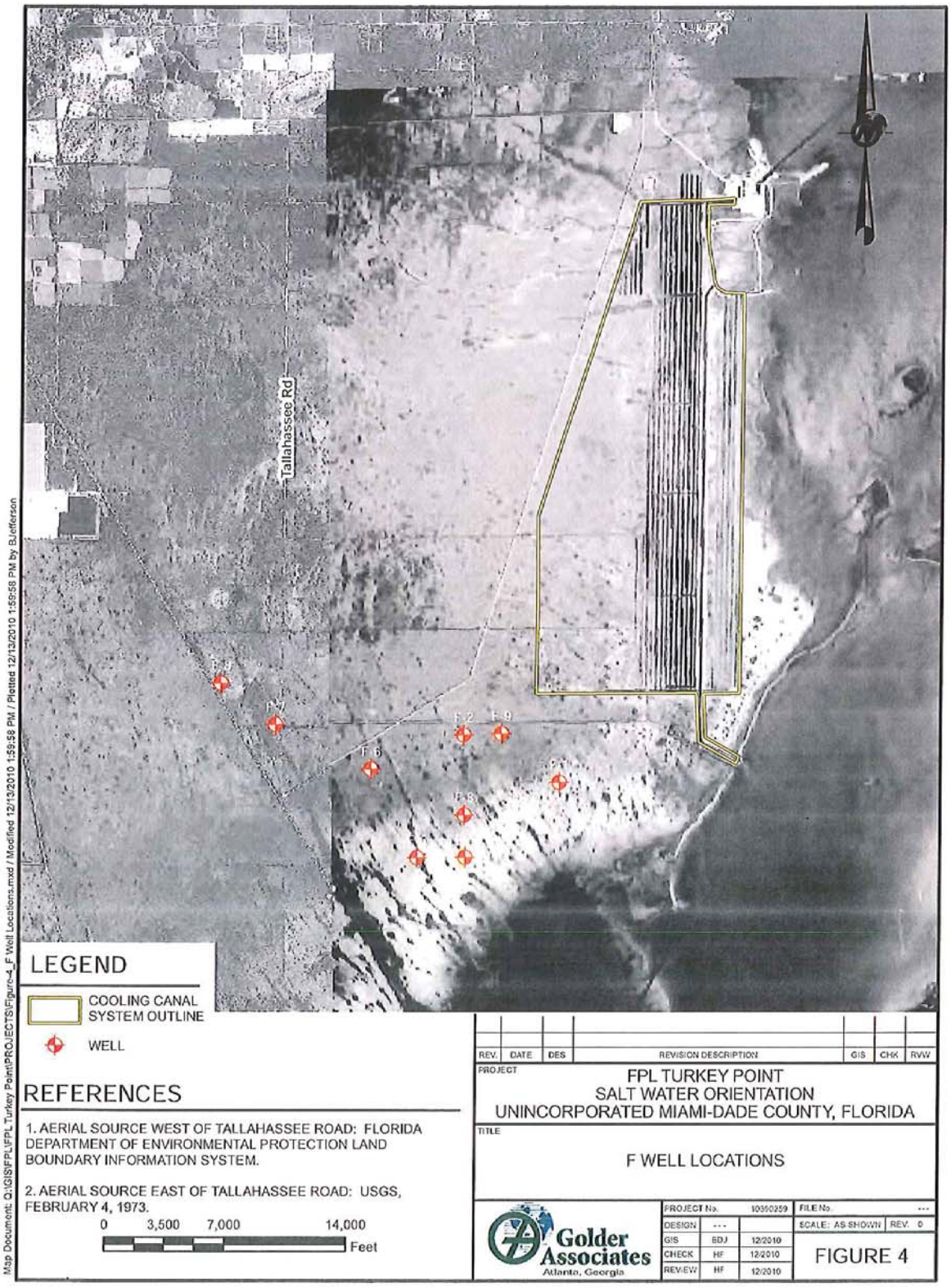
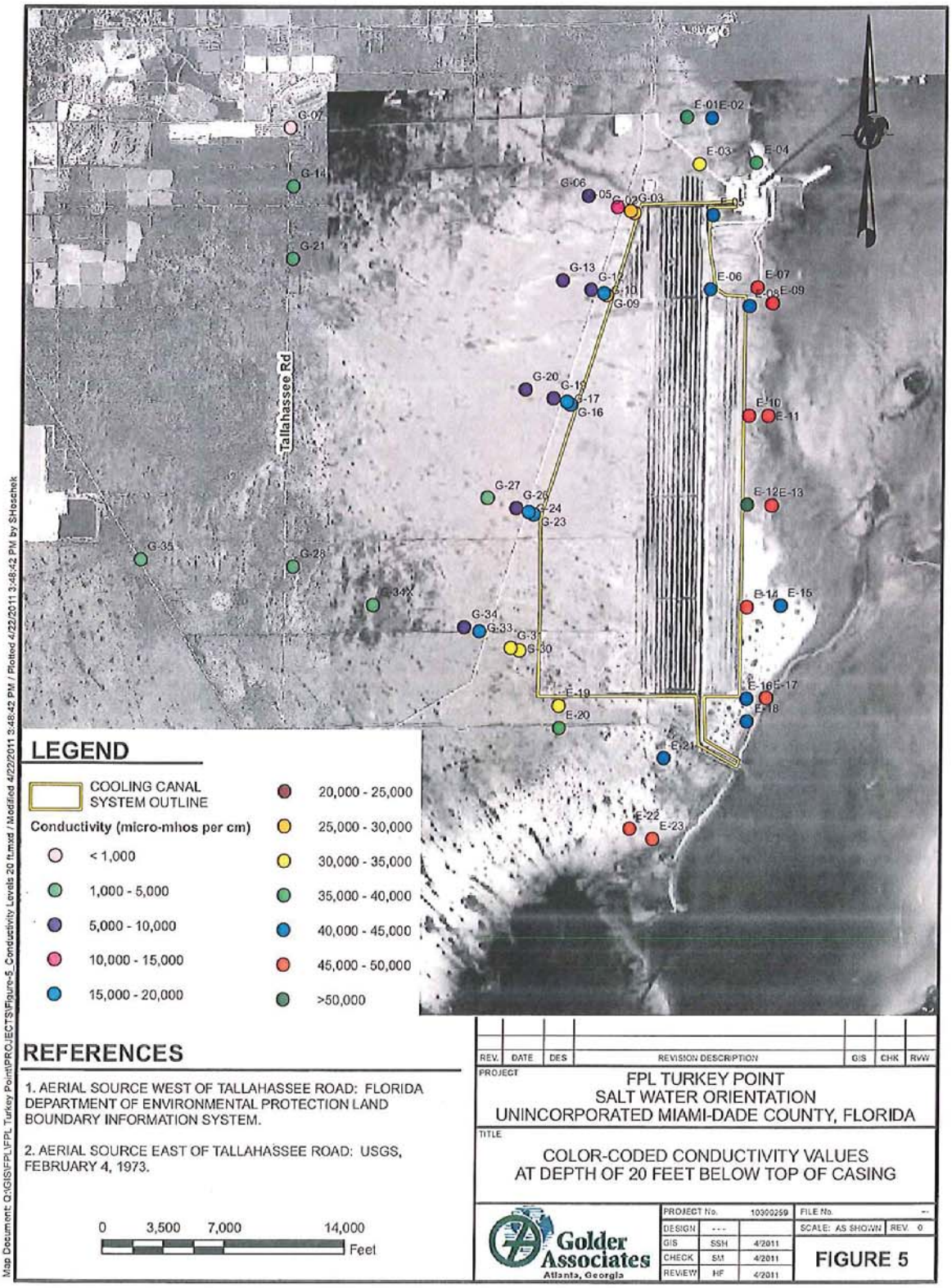
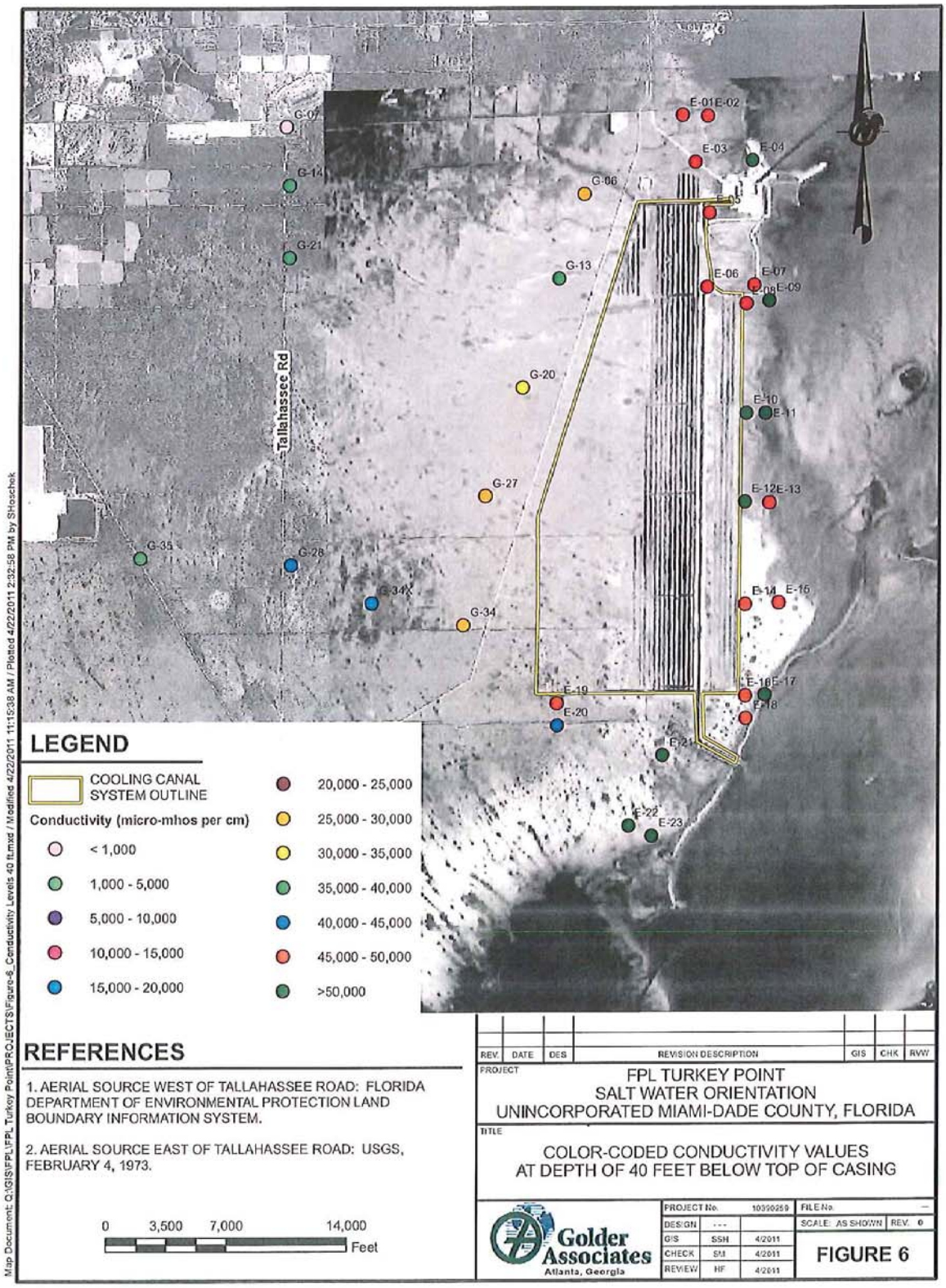
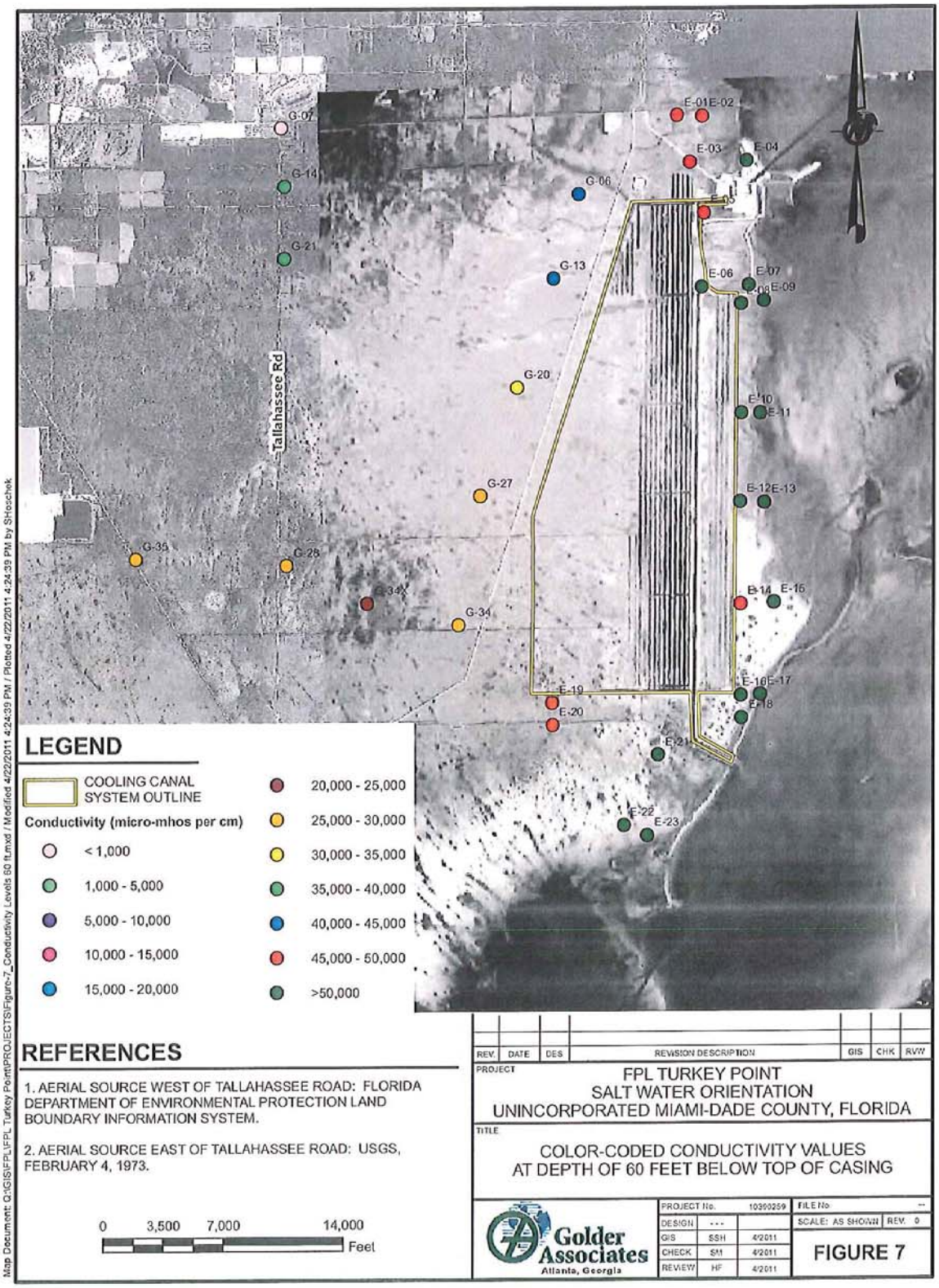
E-01
E-02
E-04
E-07
E-08
E-09
E-10
E-11
E-12
E-13
E-15
E-16
E-17
E-18
E-19
E-20
LEGEND
COOLING CANAL SYSTEM OUTLINE
WELL
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
E WELL LOCATIONS
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
FILE No. ---
DESIGN --- SCALE: AS SHOWN REV. 0
GIS BDJ 12/2010
CHECK HF 12/2010
REVIEW HF 12/2010
FIGURE 2
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure=2_E Well Locations.mxd / Modified 12/13/2010 1:58:53 PM / Plotted 12/13/2010 1:58:53 PM by BJefferson

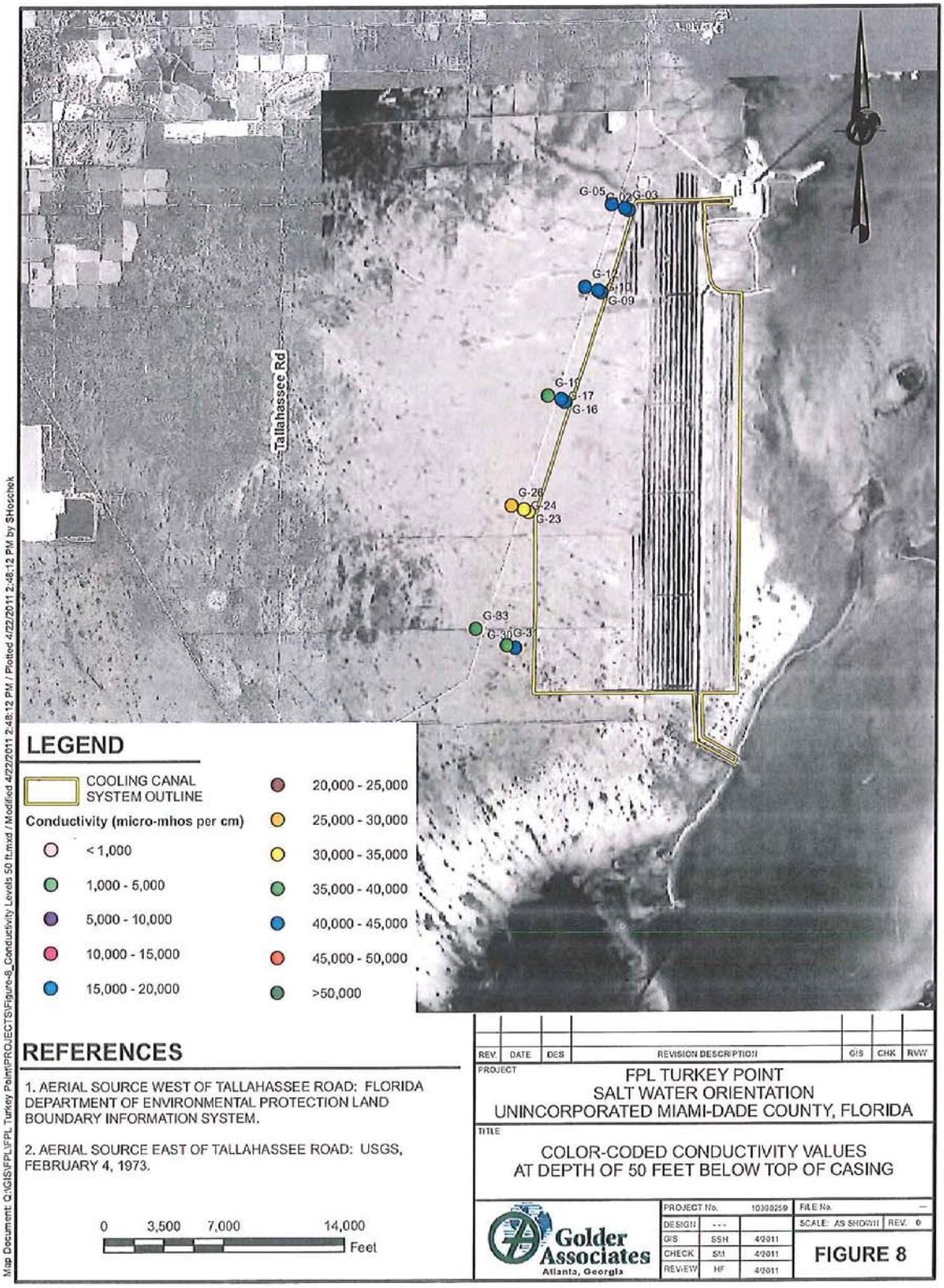

G-14
G-21
Tallahassee Rd
G-35
G-28
G-34X
G-06
G-20
G-27
G-24
LEGEND
COOLING CANAL SYSTEM OUTLINE
WELL
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
G WELL LOCATIONS
Golder Associates
Atlanta, Georgia
PROJECT No. 10350259
FILE No. ---
DESIGN --- SCALE: AS SHOWN REV. 0
GIS BDJ 12/2010
CHECK HF 12/2010
REVIEW HF 12/2010
FIGURE 3
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-3_G Well Locations.mxd / Modified 12/13/2010 1:59:35 PM / Plotted 12/13/2010 1:59:35 PM by BJefferson

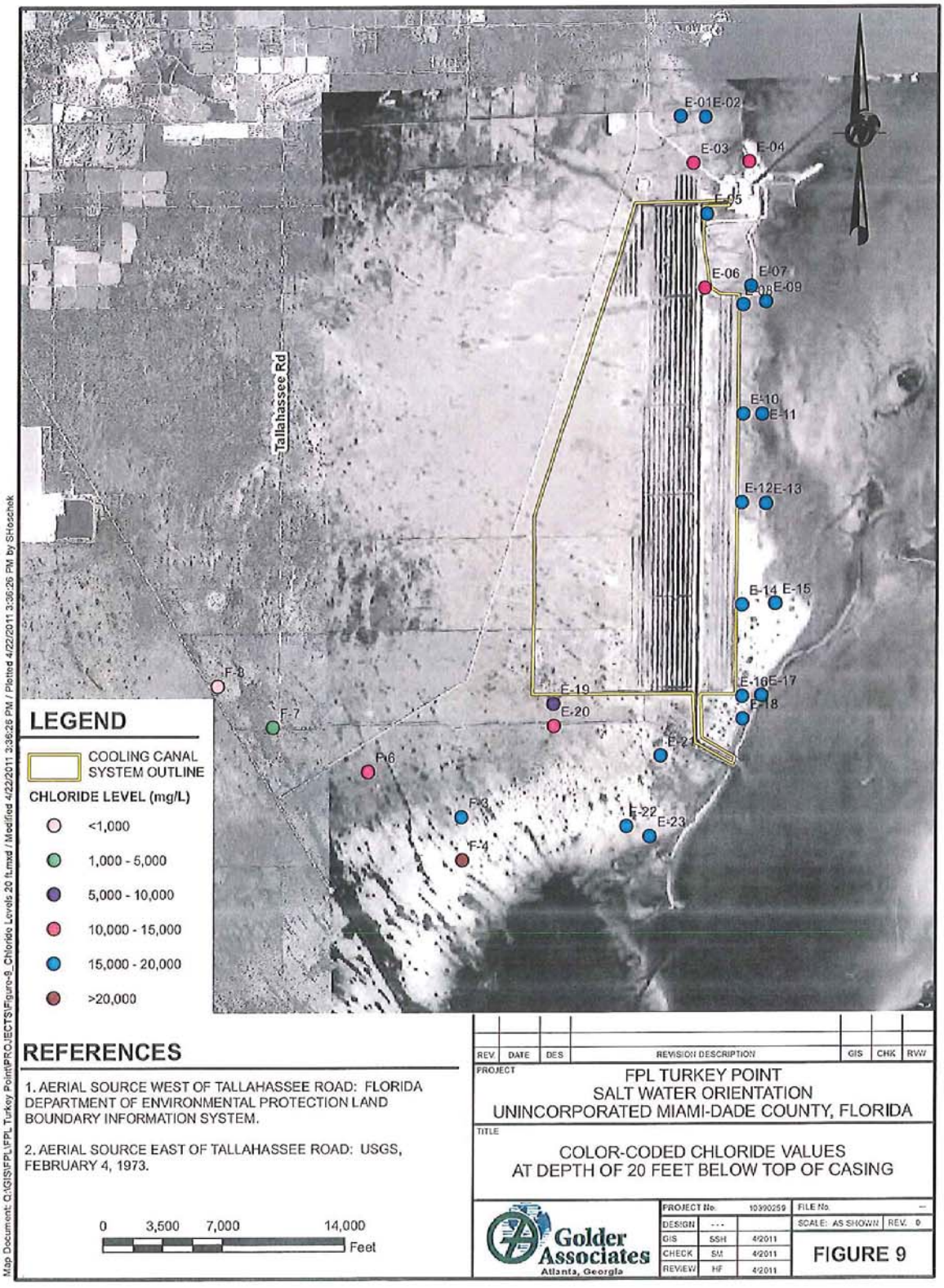

Tallahassee Rd
F7
F2
F9
F6
F8
LEGEND
COOLING CANAL SYSTEM OUTLINE
WELL
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
F WELL LOCATIONS
Golder Associates
Atlanta, Georgia
PROJECT No. 10350259
FILE No. ---
DESIGN --- SCALE: AS SHOWN REV. 0
GIS BDJ 12/2010
CHECK HF 12/2010
REVIEW HF 12/2010
FIGURE 4
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-4_F Well Locations.mxd / Modified 12/13/2010 1:59:58 PM / Plotted 12/13/2010 1:59:58 PM by BJefferson

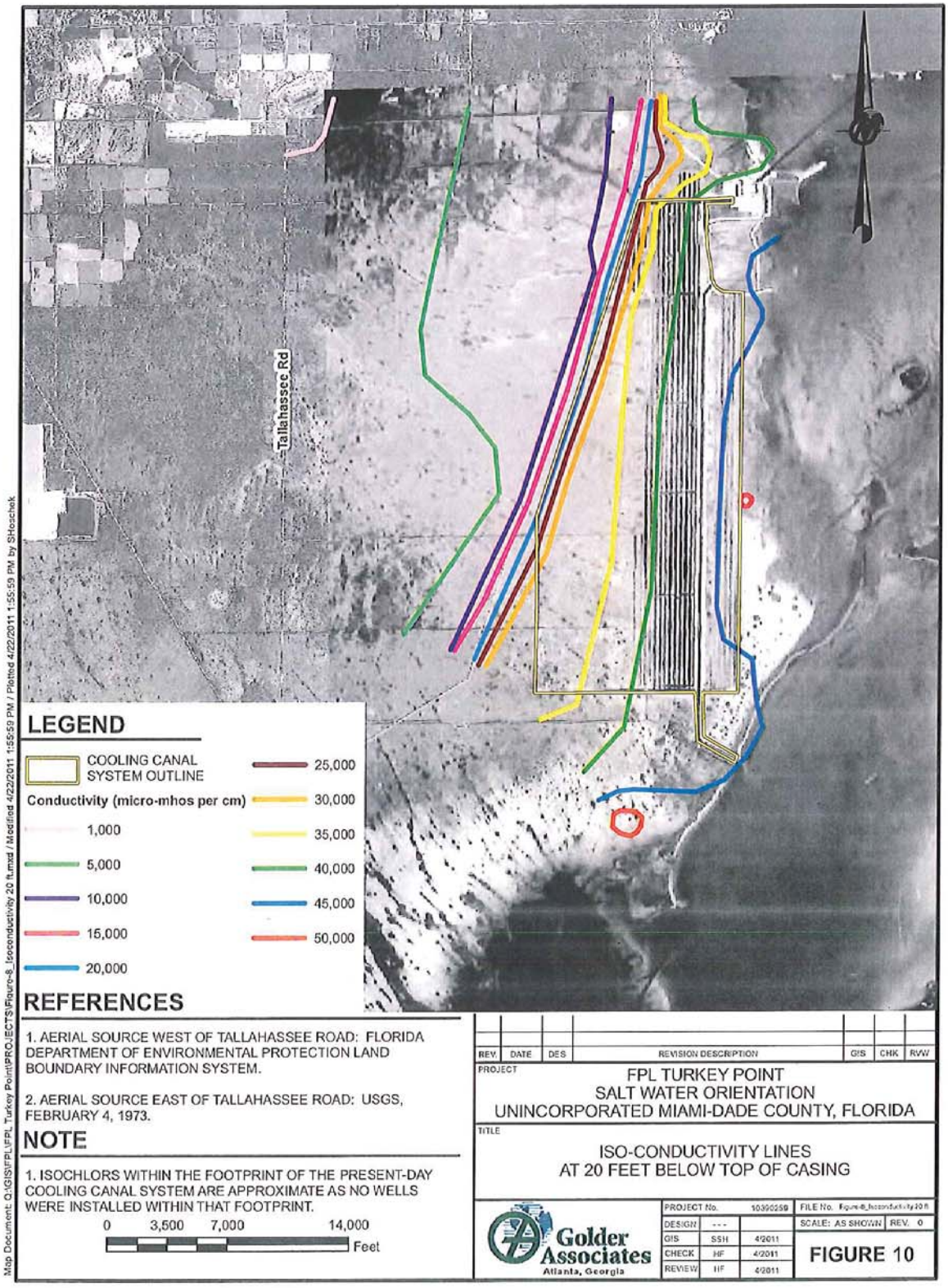

Tallahassee Rd
G-07
G-14
G-21
G-35
G-28
G-34
G-27
G-26
G-24
G-23
G-20
G-18
G-17
G-16
G-13
G-12
G-10
G-09
G-06
G-05
G-02
G-03
E-01
E-02
E-03
E-04
E-05
E-06
E-07
E-08
E-09
E-10
E-11
E-12
E-13
E-14
E-15
E-16
E-17
E-18
E-19
E-20
E-21
E-22
E-23
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
< 1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 20,000
20,000 - 25,000
25,000 - 30,000
30,000 - 35,000
35,000 - 40,000
40,000 - 45,000
45,000 - 50,000
>50,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
COLOR-CODED CONDUCTIVITY VALUES
AT DEPTH OF 20 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10300259
FILE No.
DESIGN --- SCALE: AS SHOWN REV. 0
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
FIGURE 5
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-5_Conductivity Levels 20 ft.mxd / Modified 4/22/2011 3:48:42 PM / Plotted 4/22/2011 3:48:42 PM by SHoschek

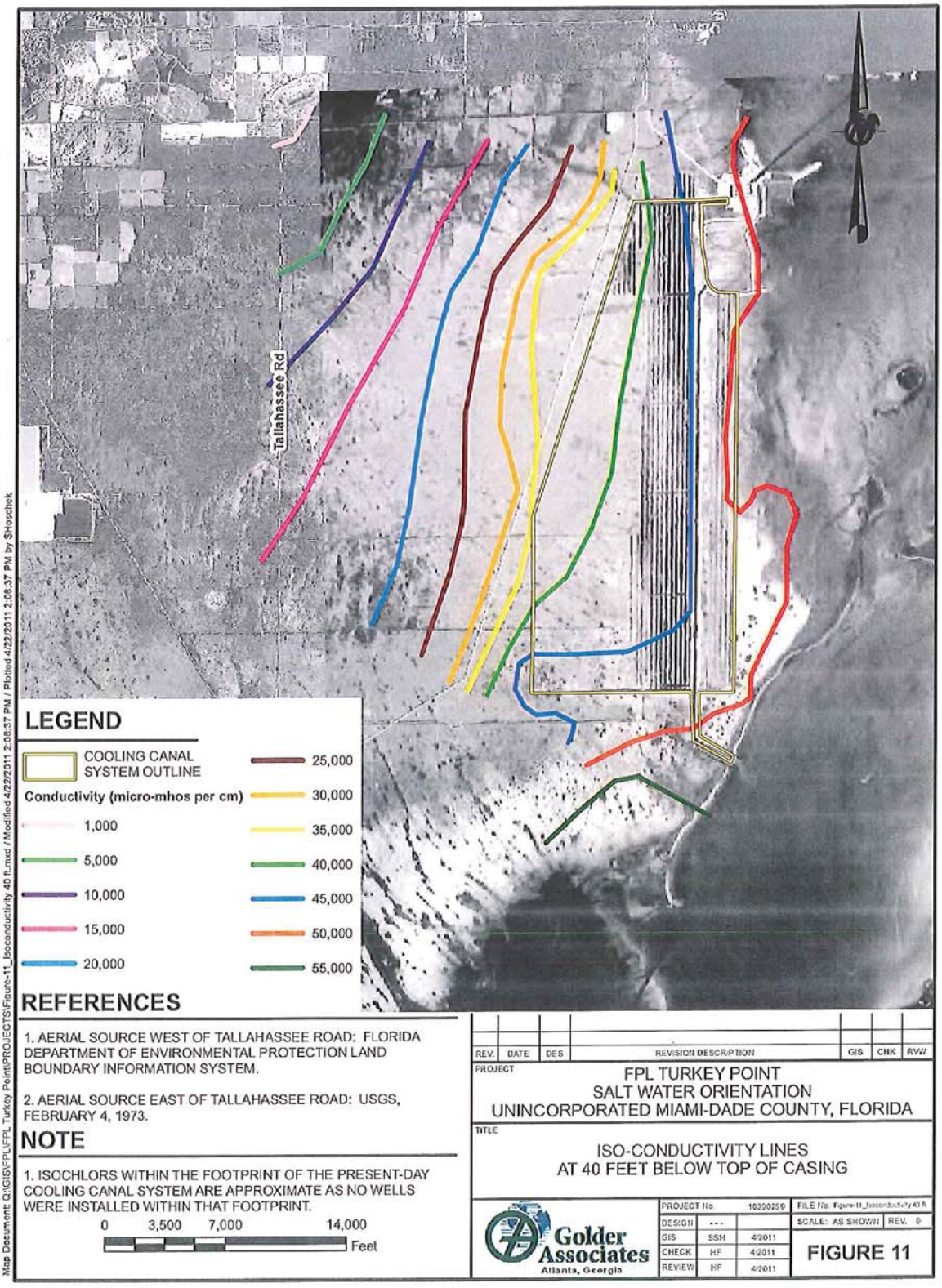

G-07
G-14
G-21
G-06
G-13
G-20
G-27
G-35
G-28
G-34A
G-34
Tallahassee Rd
E-01
E-02
E-03
E-04
E-05
E-06
E-07
E-08
E-09
E-10
E-11
E-12
E-13
E-14
E-15
E-16
E-17
E-18
E-19
E-20
E-21
E-22
E-23
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
< 1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 20,000
20,000 - 25,000
25,000 - 30,000
30,000 - 35,000
35,000 - 40,000
40,000 - 45,000
45,000 - 50,000
>50,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
COLOR-CODED CONDUCTIVITY VALUES
AT DEPTH OF 40 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
FILE No. —
DESIGN --- ---
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 6
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-6_Conductivity Levels 40 ft.mxd / Modified 4/22/2011 11:15:38 AM / Plotted 4/22/2011 2:32:56 PM by Shoschek

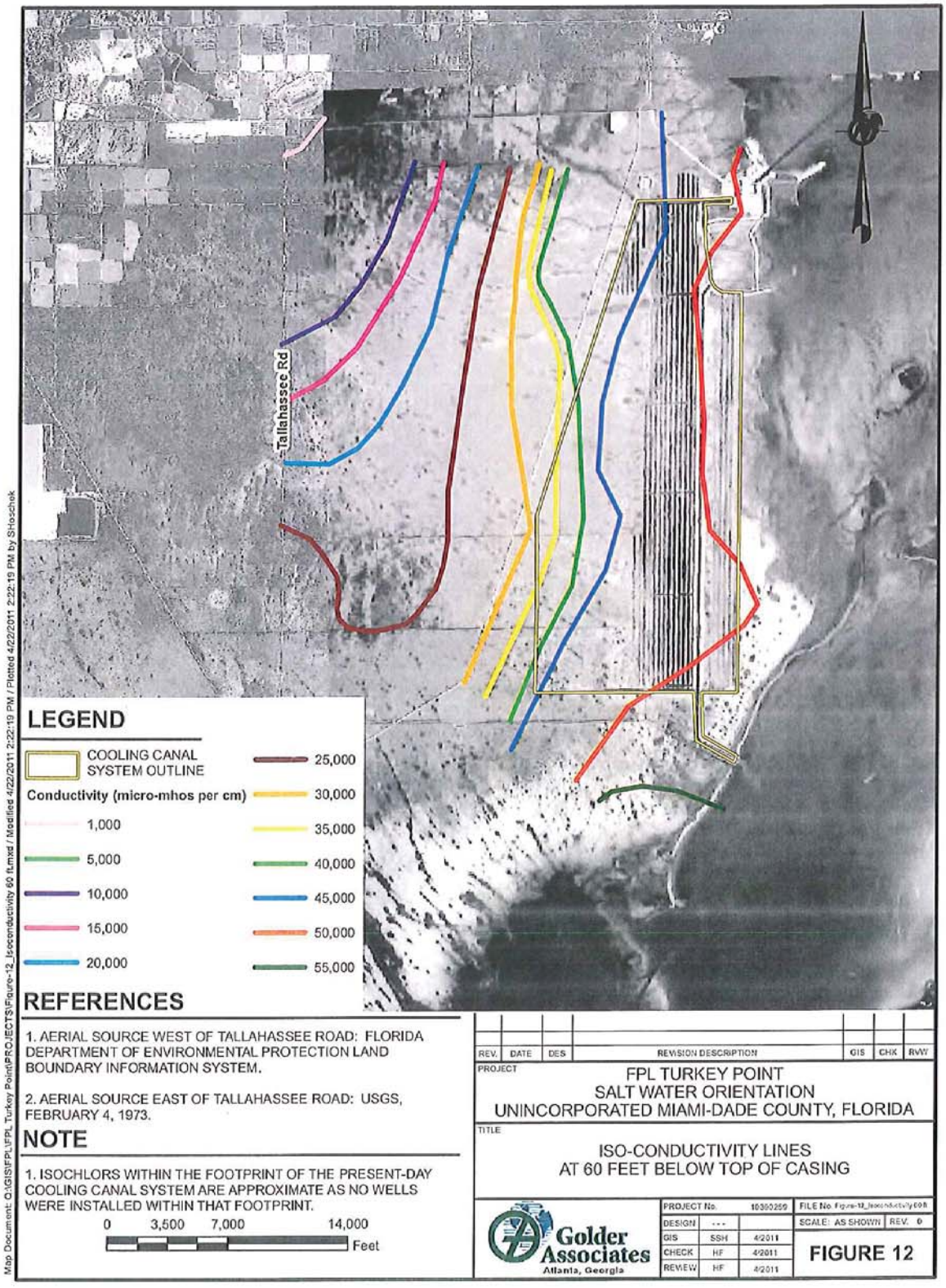

G-07
G-14
G-21
G-06
G-13
G-20
G-27
G-35
G-28
G-34X
G-34
Tallahassee Rd
E-01
E-02
E-03
E-04
E-05
E-06
E-07
E-08
E-09
E-10
E-11
E-12
E-13
E-14
E-15
E-16
E-17
E-18
E-19
E-20
E-21
E-22
E-23
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
< 1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 20,000
20,000 - 25,000
25,000 - 30,000
30,000 - 35,000
35,000 - 40,000
40,000 - 45,000
45,000 - 50,000
>50,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
COLOR-CODED CONDUCTIVITY VALUES
AT DEPTH OF 60 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10360259
DESIGN --- 4/2011
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
FILE No. --
SCALE: AS SHOWN REV. 0
FIGURE 7
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-7_Conductivity Levels 60 ft.mxd / Modified 4/22/2011 4:24:39 PM / Plotted 4/22/2011 4:24:39 PM by SHoschek

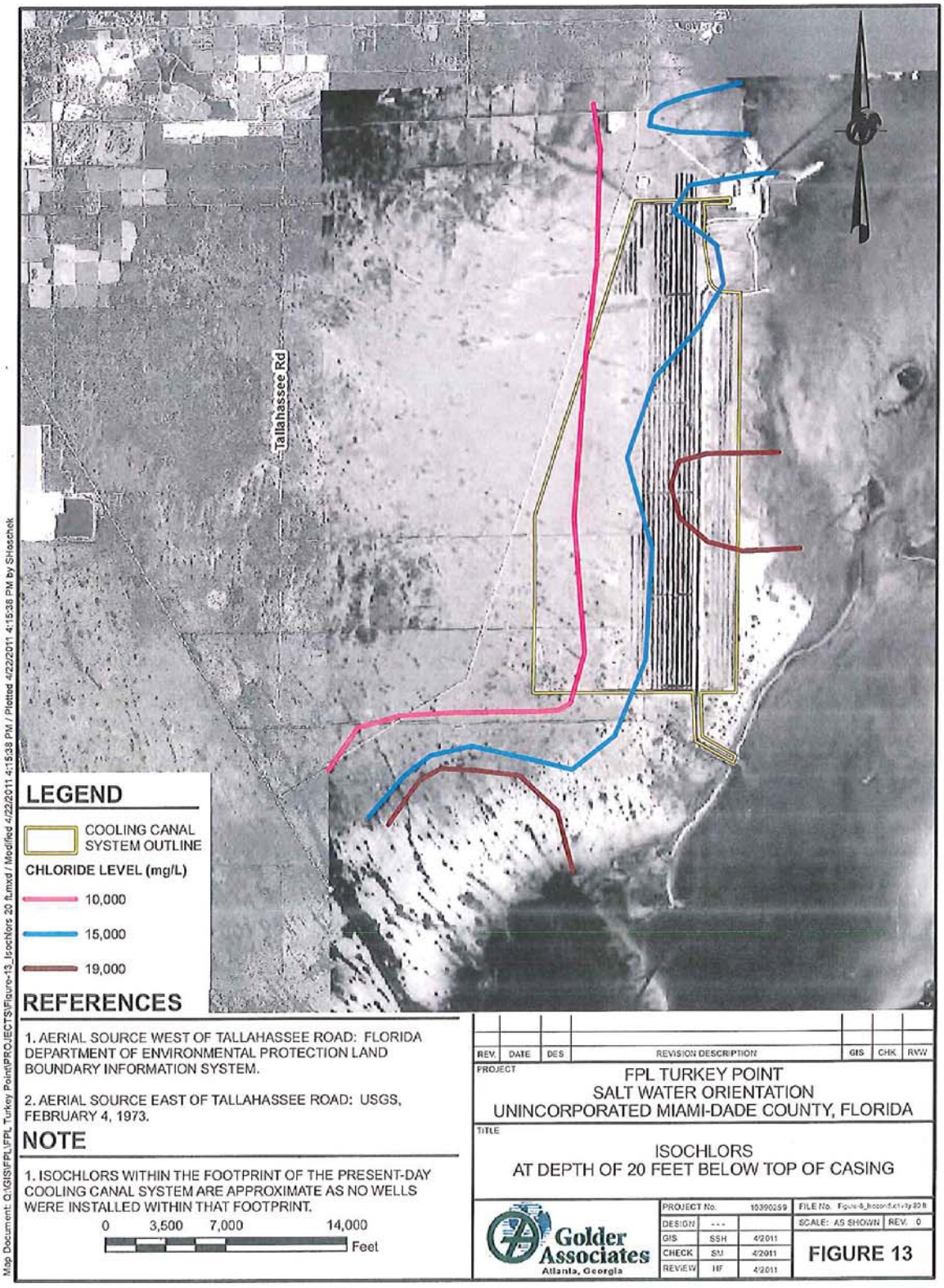

G-05
G-02
G-03
G-12
G-10
G-09
G-11
G-17
G-16
G-26
G-24
G-23
G-33
G-34
G-3
Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
< 1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 20,000
20,000 - 25,000
25,000 - 30,000
30,000 - 35,000
35,000 - 40,000
40,000 - 45,000
45,000 - 50,000
>50,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
COLOR-CODED CONDUCTIVITY VALUES
AT DEPTH OF 50 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10300259
FILE No. —
DESIGN --- SCALE: AS SHOWN REV. 0
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
FIGURE 8
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-8_Conductivity Levels 50 ft.mxd / Modified 4/22/2011 2:48:12 PM / Plotted 4/22/2011 2:48:12 PM by SHoschek

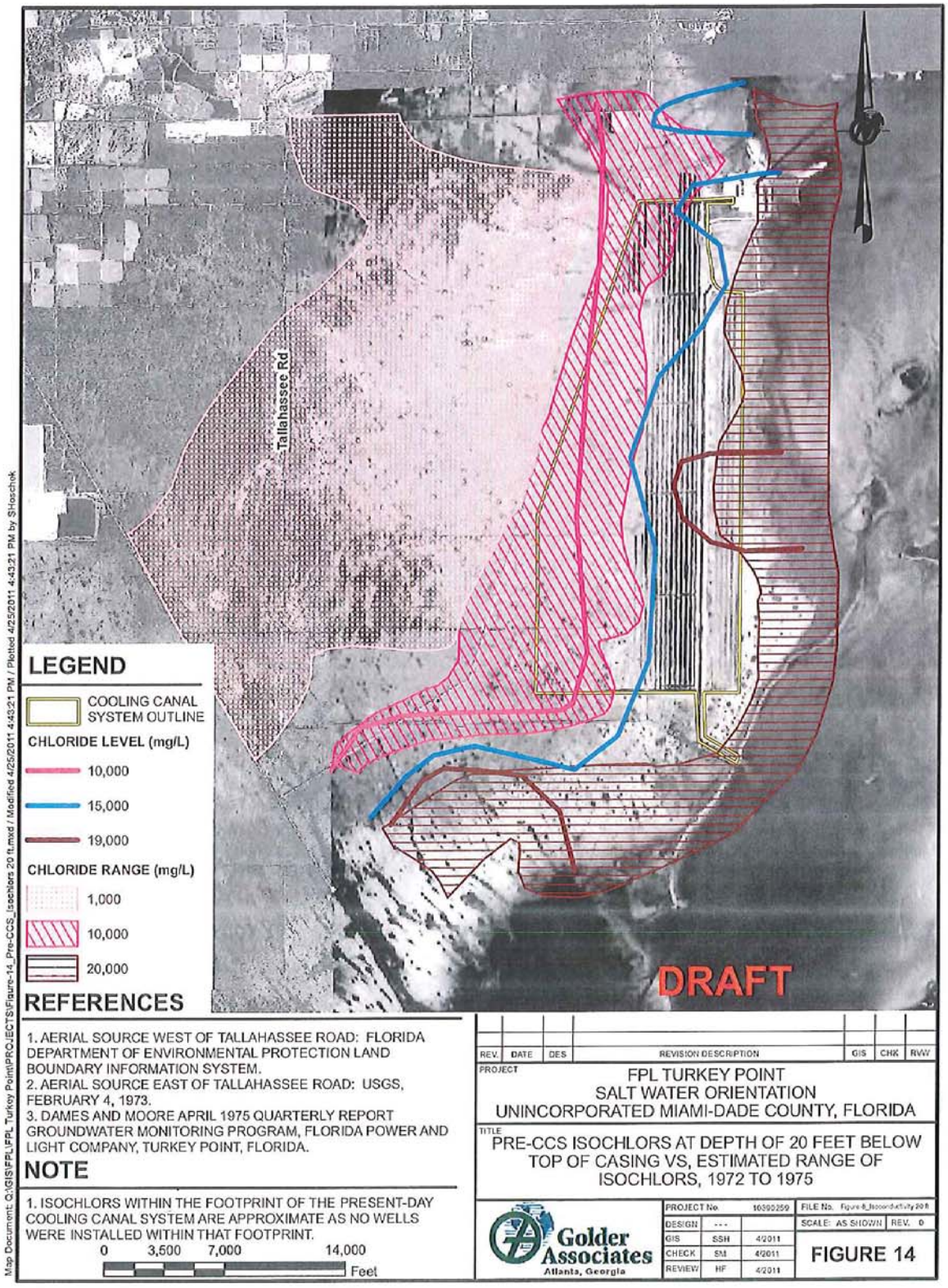

E-01
E-02
E-03
E-04
E-05
E-06
E-07
E-08
E-09
E-10
E-11
E-12
E-13
E-14
E-15
E-16
E-17
E-18
E-19
E-20
E-21
E-22
E-23
F-3
F-4
F-6
F-7
F-8
Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
CHLORIDE LEVEL (mg/L)
<1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 20,000
>20,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
COLOR-CODED CHLORIDE VALUES
AT DEPTH OF 20 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
FILE No. --
DESIGN ---
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 9
Map Document: C:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-9_Chloride Levels 20 ft.mxd / Modified 4/22/2011 3:36:26 PM / Plotted 4/22/2011 3:36:26 PM by SHoschek

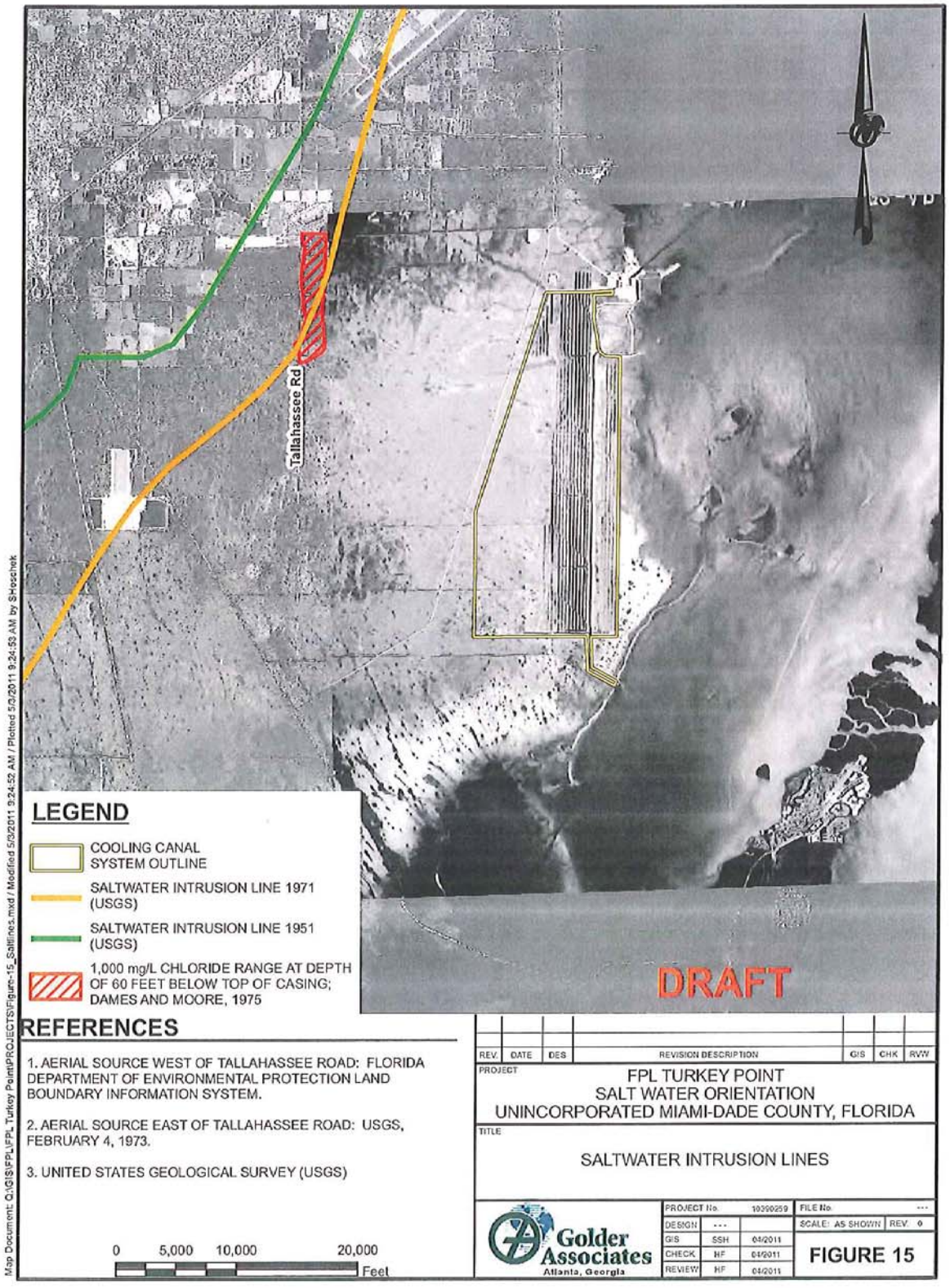

Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
1,000
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
NOTE
1. ISOCHLORS WITHIN THE FOOTPRINT OF THE PRESENT-DAY COOLING CANAL SYSTEM ARE APPROXIMATE AS NO WELLS WERE INSTALLED WITHIN THAT FOOTPRINT.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
ISO-CONDUCTIVITY LINES
AT 20 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 1030025B
DESIGN --- 4/2011
GIS SSH 4/2011
CHECK HF 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 10
Map Document: O:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-8_Isoconductivity 20 ft.mxd / Modified 4/22/2011 1:55:59 PM / Plotted 4/22/2011 1:55:59 PM by SHoschek


Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
1,000
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
55,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
NOTE
1. ISOCHLORS WITHIN THE FOOTPRINT OF THE PRESENT-DAY COOLING CANAL SYSTEM ARE APPROXIMATE AS NO WELLS WERE INSTALLED WITHIN THAT FOOTPRINT.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
ISO-CONDUCTIVITY LINES
AT 40 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No 10300259
DESIGN --- 4/2011
GIS SSH 4/2011
CHECK HF 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 11
Map Documents:Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-11_Isoconductivity 40 ft.mxd / Modified 4/22/2011 2:08:37 PM / Plotted 4/22/2011 2:08:37 PM by Shoschek


Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
Conductivity (micro-mhos per cm)
1,000
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
55,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
NOTE
1. ISOCHLORS WITHIN THE FOOTPRINT OF THE PRESENT-DAY COOLING CANAL SYSTEM ARE APPROXIMATE AS NO WELLS WERE INSTALLED WITHIN THAT FOOTPRINT.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
ISO-CONDUCTIVITY LINES
AT 60 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 18390259
DESIGN ---
GIS SSH 4/2011
CHECK HF 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 12
Map Document: O:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-12_Isoconductivity 60 ft.mxd / Modified 4/22/2011 2:22:19 PM / Plotted 4/22/2011 2:22:19 PM by Shoschek


Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
CHLORIDE LEVEL (mg/L)
10,000
15,000
19,000
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
NOTE
1. ISOCHLORS WITHIN THE FOOTPRINT OF THE PRESENT-DAY COOLING CANAL SYSTEM ARE APPROXIMATE AS NO WELLS WERE INSTALLED WITHIN THAT FOOTPRINT.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
ISOCHLORS
AT DEPTH OF 20 FEET BELOW TOP OF CASING
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
DESIGN --- 4/2011
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
SCALE: AS SHOWN REV. 0
FIGURE 13
Map Document: C:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-13_Isochlors 20 ft.mxd / Modified 4/22/2011 4:15:38 PM / Plotted 4/22/2011 4:15:38 PM by Shloschek


Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
CHLORIDE LEVEL (mg/L)
10,000
15,000
19,000
CHLORIDE RANGE (mg/L)
1,000
10,000
20,000
DRAFT
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
3. DAMES AND MOORE APRIL 1975 QUARTERLY REPORT GROUNDWATER MONITORING PROGRAM, FLORIDA POWER AND LIGHT COMPANY, TURKEY POINT, FLORIDA.
NOTE
1. ISOCHLORS WITHIN THE FOOTPRINT OF THE PRESENT-DAY COOLING CANAL SYSTEM ARE APPROXIMATE AS NO WELLS WERE INSTALLED WITHIN THAT FOOTPRINT.
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
PRE-CCS ISOCHLORS AT DEPTH OF 20 FEET BELOW TOP OF CASING VS, ESTIMATED RANGE OF ISOCHLORS, 1972 TO 1975
Golder Associates
Atlanta, Georgia
PROJECT No. 16390259
DESIGN ---
GIS SSH 4/2011
CHECK SM 4/2011
REVIEW HF 4/2011
FILE No. Figure 8_Isoconductivity 20 ft
SCALE: AS SHOWN REV. 0
FIGURE 14
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-14_Pre-CCS_Isochlors 20 ft.mxd / Modified 4/25/2011 4:43:21 PM / Plotted 4/25/2011 4:43:21 PM by Shoichok


Tallahassee Rd
LEGEND
COOLING CANAL SYSTEM OUTLINE
SALTWATER INTRUSION LINE 1971 (USGS)
SALTWATER INTRUSION LINE 1951 (USGS)
1,000 mg/L CHLORIDE RANGE AT DEPTH OF 60 FEET BELOW TOP OF CASING; DAMES AND MOORE, 1975
DRAFT
REFERENCES
1. AERIAL SOURCE WEST OF TALLAHASSEE ROAD: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEM.
2. AERIAL SOURCE EAST OF TALLAHASSEE ROAD: USGS, FEBRUARY 4, 1973.
3. UNITED STATES GEOLOGICAL SURVEY (USGS)
0 5,000 10,000 20,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
SALTWATER INTRUSION LINES
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
FILE No. ---
DESIGN --- SCALE: AS SHOWN REV. 0
GIS SSH 04/2011
CHECK HF 04/2011
REVIEW HF 04/2011
FIGURE 15
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Figure-15_Saltlines.mxd / Modified 5/3/2011 9:24:52 AM / Plotted 5/3/2011 9:24:53 AM by SHoschek

APPENDIX A

FLORIDA POWER AND LIGHT -- TURKEY POINT SALT ORIENTATION--10390308-- INDEX OF CALCULATIONS		
Calculation Number	Subject	Date
1	Cataloging of References	October 8, 2010
2	Chlorinity Values in Wells	October 8, 2010
3	Plotting Isochlor Lines	October 21, 2010
4	Inputting Dames & Moore Ranges into GIS	May 3, 2011
5	Average Values in Wells from April 1, 1972 through January 31, 1973	April 5, 2011
6	Total Dissolved Solids and Chloride Data for E-Wells for 10/72, 11/72, and 12/72	April 7, 2011

Golder Associates

SUBJECT Cataloging of References		
Job No. 10390308 Ref. Calc 001 FPL TP Salt Orientation	Made By: H. Frediani Checked S. Major Reviewed	Date 10/8/2010 Sheet 1 of 1

The first task is to review the references received during the Uprate Project and distributed to the agencies during the completeness phase of that project. These are in the folder "from FPL" in the Uprate/Turkey Point folder. Start a spreadsheet called "References.xlsx" to document file name, title, and relevant sections of the document that address the extent of the salt water in the Biscayne Aquifer in the plant vicinity. As each reference is reviewed and its information added to the data base, its file is copied to a folder called "References" in the Calc 1 folder. For the purpose of this study, the date at which the salt water orientation is desired is assumed to be between Sept 10, 1971 (date of the final Consent Order ordering construction of the cooling canal system [CCS]) , and February 18, 1973 (date the CCS was closed off from Biscayne Bay and Card Sound). The reference for these dates is "CASE STUDY: THE TURKEY POINT COOLING CANAL SYSTEM", by Charles D. Henderson, FPL, May 11, 1977.

Table

Ref. No.	File Name	Document Title	Relevant Section	Relevance
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figure 1	locations of E, F, and G wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figure 2	locations of L, G, S, and ID wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Section 2	history of monitoring wells installation and purpose
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figures 25 - 43	Chlorinity Profiles-1976-ID, L, & G-6,7,21,27,28,35, and X wells
1	1-77 semi annual report gw mon.prog2.pdf	January 1977 Semi-Annual Report , GWMP	Figures 44 - 48	10 PPT Cl Cross Sections Lines A-E
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	GROUNDWATER SALINITIES	description of groundwater salinities 1975
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	Plates 5, 6, and 7	Isochlor lines - 1, 10, 20 PPT - 4/72 to 1/75
2	4-75 quart.rep.ground.pdf	April 1975 Quarterly Report GWMP	Plates 8 and 9	5 PPT @ 20 ft, and 15 PPT @ 50 ft, isochlors near Line D - 7/72 to 6/73
3	Dames and Moore 3-final.pdf	Summary Report GWMP E-Series Wells	Figures 4, 5, and 6	12/72 - 20 PPT Isochlor @ 20 ft, 40 ft, and 60 ft depth
3	Dames and Moore 3-final.pdf	Summary Report GWMP E-Series Wells	Figures in Appendix A	Time/History Plots for E wells, starting May 1972, 20, 40, and 60 ft depth
4	Dames and Moore 5 final.pdf	GWMP G-Series Wells	Appendix	Time/History Plots for S-1 and G wells, starting 9/1/73 - 20, 40, and 60 ft depth
4	Dames and Moore 5 final.pdf	GWMP G-Series Wells	Plates 3.3.4.R through 3.3.4.Y	Isochlor maps - Figures missing from pdf file
5	data summary f-series wells.pdf	Data Summary, F-Series Wells GWMP	Figures 4, 5, and 6	Isochlor maps - 1, 10, and 20 PPT @ depths of 20, 40, and 60 feet
6	engineering design reservoir.pdf	The Engineering Design of the Turkey Point Cooling Reservoir	VII. , page VII-1 thru VII-5	Narrative discussion of salt water intrusion
6	engineering design reservoir.pdf	The Engineering Design of the Turkey Point Cooling Reservoir	VIII. , page VIII-1 thru VIII-3	Narrative discussion of surface water usage
7	fpl reservior sect 2.pdf	Florida Power & Light Company, Reservoir Concept - Appendix A:Geohydrological Conditions Related to the Construction of Cooling Ponds	Plate 1	Plate 1 shows 1,000 ppm isochlor at base of aquifer
7	fpl reservior sect 2.pdf	Florida Power & Light Company, Reservoir Concept - Appendix A:Geohydrological Conditions Related to the Construction of Cooling Ponds	Table 1	Table 1 shows chloride in L-31E borrow canal ranged from 520 to 650 ppm during November, 1970.
8	intensive mon.prog..pdf	Intensive Monitoring Program, Turkey Point Site	Table 3	Table 3 shows chloride values in some E- and G- wells, including G-28, at 20, 40, and 60 feet during Nov/Dec 1972
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figures 3 - 7	Time-History Plots of Cl in ID wells, @ depth of 20, 40, and 60 feet below top of casing--11/73 through 5/82 (pp. 12-16 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figure 1	Location of wells X-1 and X-2 (p. 10 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Figure 8	Estimated Levels of Cl in wells G-21, G-13, E-8, and E-9 with cooling canals(p. 17 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	Table 1	Weekly Salinity in cooling canals, 1981 (p. 20 of 96)
9	letter to der.pdf	Letter from FDER to W.J. Barrow, dated 9/6/83	un-numbered table	Salinity in cooling canals, Sept-Nov, 1982 (p. 23 of 96)
10	NPDES DIS. MON. REP 95-98.pdf	NPDES DMRs	1995,1996, 1997, & 1998 sampling reports	Salinity in cooling canals, 1995-1998
11	REPORT JULY 1978 SEMI ANNUAL REPORT GROUND WATER MONITORING PROGRAM TURKEY POINT FLORIDA FLORIDA POWER AND LIGHT COMPANY.pdf	Report, July 1978, Semi-Annual Report, GWMP	pages 169 and 170	Time-History Plots Wells X-1 and X-2 April, 1974--June, 1978
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter VII Salinity and Table VII-1	Salinities in CCS and Biscayne Bay/Card Sound 5/73 - 11/73
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter X	Narrative description of Salinity in E wells
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter XI	Biscayne Aquifer under CCS was normally saline prior to construction of CCS;ID design was to "intercept any cooling canal seepage and prevent it from flowing to the west."
12	summary report of cool sys..pdf	A Summary Report of the Turkey Point Cooling Canal System	Chapter XI	G-wells consist of 11 composite wells and 30 piezometers at 26 locations. Piezometers are co-located two to a location
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figures 2 - 4	Cl values for pairs of wells east, west, and south of CCS at 40 ft depth
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	page 2	Natural sea water intrusion has occurred throughout the area

Table .

Ref. No.	File Name	Document Title	Relevant Section	Relevance
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figure 6	Fresh Water - Salt Water Interface Under Original Ground Water Conditions
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Figure 7	Fresh Water - Salt Water Interface Under Projected Ground Water Conditions - shows brackish water in L-31E Canal
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Text of report	Discussion of causes of salt water intrusion in this area.
13	SUMMARY SALINITY EVALUATIONS TURNKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY.pdf	SUMMARY SALINITY EVALUATIONS TURKEY POINT PLANT FLORIDA POWER AND LIGHT COMPANY	Last page entitled "Figures"	Mentions that this summary is based on a more detailed report dated 12/15/77
14	therm perf cool sys 1988.pdf	Thermal Performance of the Turkey Point Cooling Canal System In 1988	Figure 4	Infrared Photograph of CCS
14	therm perf cool sys 1988.pdf	Thermal Performance of the Turkey Point Cooling Canal System In 1988	Figure 5	Flow rates in individual Canals
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Ground Water Salinity pp 12-14 of 122	description of groundwater salinities 1974
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Plates 5, 6, and 7 pp 24 - 26	Isochlor lines - 1, 10, 20 PPT - 4/72 to 10/74
15	1-75 quart. rep.pdf	January 1975 Quarterly Report , GWMP	Plates 8 and 9 pp 27 - 28	5 PPT @ 20 ft, and 15 PPT @ 50 ft, isochlors near Line D - 7/72 to 6/73
16	1-79 semi annual report gw mon. prog.pdf	January, 1979 Semi-Annual Report GWMP	pages 173-177	Time-History Plots Wells F-3, F-4, F-6, F-7, and F-8
17	NPDES DISCHARGE 91-94.pdf	DMRs for 1/91 through 6/94	monthly DMR salinity tables	max, average, and min monthly salinities in CCS 1/91 through 6/94
18	EPA Turkey Point Wells.pdf	Storet LDC--Detailed Data Report	all	Specific conductance for E-Wells for 7/31/72 at 20', 40' and 60' depths
19	E-Series_Wells-Dec-11-1972.pdf	Groundwater Monitoring Data--Report Sequence #6	all	Specific conductance for E-Wells for 12/5/72 and 12/6/72 at 20', 40' and 60' depths
20	E-Series_Wells-Jan-8-1973.pdf	Groundwater Monitoring Data--Report Sequence #7	all	Specific conductance for E-Wells for 1/2/73 and 1/4/73 at 20', 40' and 60' depths
21	E-Series_WQ-Oct-18_1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 10/72 at 20' and 40' (E-1 only) depth
22	E-Series_WQ-Nov-14-1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 11/72 at 20' depth
23	E-Series_WQ-Dec-18-1972.pdf	Groundwater Monitoring Data--Water Sample Analyses	all	TDS and Chlorides for E-Wells for 12/72 at 20' depth

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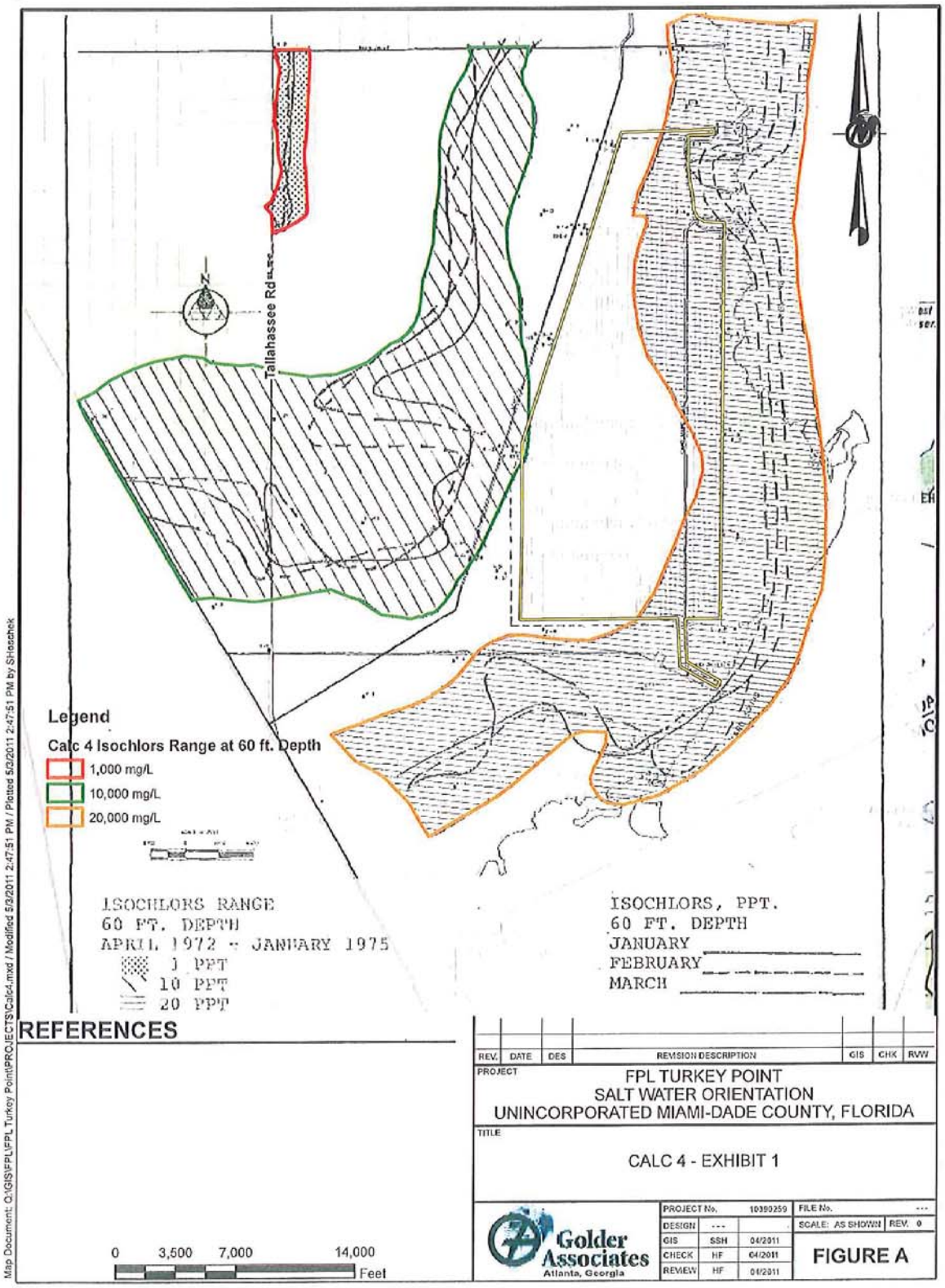
SUBJECT	Inputting Dames & Moore Ranges into GIS	
Job No. 10390308 Ref. Calc 004 FPL TP Salt Orientation	Made By: S. Hoschek Checked: H. Frediani Reviewed	Date 5/3/2011 Sheet 1 of 1

References 2 and 15 include maps prepared by Dames & Moore of the location of the 1,000; 10,000; and 20,000 mg/L isochlors in the Biscayne Aquifer, at the 20, 40, and 60-foot depths between the period April, 1972, and January, 1975. In order to compare the Dames & Moore results with our present-day results, it was decided to create a GIS shape file which would locate the areas Dames & Moore designated as containing the isochlor ranges at the 60-foot depth. It should be noted that the Dames & Moore data covers a period which extends after the Cooling Canal System (CCS) became operational. Plate 7 of the two references afore-mentioned shows the isochlor ranges at the 60-foot depth as areas, and indicates that these ranges cover the period from April, 1972, through January, 1975.

In order to do this, a scanned image of the Dames & Moore Plate 7 was added to an .mxd file in ArcMap 9.3. The Dames & Moore Plate 7 image was georeferenced to a base map using the locations of road intersections. The base map consisted of United States Geological Survey (USGS) 1:24,000 scale quad maps accessed through ESRI ArcGIS Online services. Once the image was georeferenced to an acceptable level, the isochlor ranges were digitized into a polygon shape file called isochlors_range_all.shp.

Figure A, Calc 4 - Exhibit 1 shows a transparent version of the Dames & Moore Plate 7 image, the USGS quad base map, and the shape file with the digitized 1, 10, and 20 parts per thousand (PPT) isochlor ranges corresponding to the 1,000, 10,000, and 20,000 mg/L lines. The digitized 60-foot depth isochlor range for 1,000 mg/L was used in Figure 15.

This technique was also used for Dames & Moore Plate 5 from the above references to digitize the isochlor ranges at the 20-foot depth. The digitized 20-foot depth isochlor ranges for 1,000, 10,000 and 20,000 mg/L were used in Figure 14.


Tallahassee Rd
Legend
Calc 4 Isochlors Range at 60 ft. Depth
1,000 mg/L
10,000 mg/L
20,000 mg/L
ISOCHLORS RANGE
60 FT. DEPTH
APRIL 1972 - JANUARY 1975
1 PPT
10 PPT
20 PPT
ISOCHLORS, PPT.
60 FT. DEPTH
JANUARY
FEBRUARY
MARCH
REFERENCES
0 3,500 7,000 14,000
Feet
REV. DATE DES REVISION DESCRIPTION GIS CHK RVW
PROJECT
FPL TURKEY POINT
SALT WATER ORIENTATION
UNINCORPORATED MIAMI-DADE COUNTY, FLORIDA
TITLE
CALC 4 - EXHIBIT 1
Golder Associates
Atlanta, Georgia
PROJECT No. 10390259
FILE No. ---
DESIGN --- SCALE: AS SHOWN REV. 0
GIS SSH 04/2011
CHECK HF 04/2011
REVIEW HF 04/2011
FIGURE A
Map Document: Q:\GIS\FPL\FPL Turkey Point\PROJECTS\Calc4.mxd / Modified 5/3/2011 2:47:51 PM / Plotted 5/3/2011 2:47:51 PM by Shiesznek

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SUBJECT	Average Values in Wells from April 1, 1972 through January 31, 1973	
Job No. 10390308 Ref. Calc 005 FPL TP Salt Orientation	Made By: S. Major Checked H. Frediani Reviewed	Date 4/5/2011 Sheet 1 of 1

The purpose of this calculation is to tabulate the conductivity values of the E-Wells and G-Wells, and the chlorinity of F-Wells, from April 1, 1972 through January 31, 1973, and to obtain the average values. These values were put into a spreadsheet entitled Values By Date.xls.

The References identified in Calc 1 were used, as follows:

For the E-Wells, Reference 3—Dames and Moore 3-final.pdf—Appendix A—Plates 1 through 69.

For the G-Wells, Reference 4—Dames and Moore 5 final.pdf—Appendix—Plates 2 through 62 (with the exception of Plates 6, 13, 18, 25, 30, 37, 42, 49, and 54, which are Surface Water monitoring locations).

For the F-Wells, Reference 16—1-79 semi annual report gw mon. prog.pdf—pp. 173-177.

Note that some of the G-Wells are designated as A and B. These are a set of piezometers, one 50 feet and one 20 feet deep. At each location, the two piezomenters are approximately 10 feet apart in a north-south direction, with the 20-foot piezometer being the northernmost in each case. The 50-ft. piezometer is designated as "A" and the 20-ft as "B". (Ref. 4, p. 2.0-1)

Units for conductivity for the E- and G-Wells are micromhos/cm X1000, and units for chlorinity for the F-Wells are in ppt.

Note that on the plot for Well F-3, at 60' depth, the scale jumps from 21 to 26. This appears to be an error, and the 26 should actually read "22". Values above 21 reflect the corrected scale.

Next, compare this spreadsheet with information obtained in an email from FPL.

The email from Stacy Foster, dated April 5, 2011, (E-Series Well Data.msg) had several attachments containing additional conductivity data.

These are:

EPA Turkey Point Wells.pdf

E-Series_Wells-Dec-11-1972.pdf

E-Series_Wells-Jan-8-1973.pdf

These documents were added to Calculation 1, file "references.xls" as Reference Numbers 18, 19, and 20 respectively.

The values from these documents were copied into the spreadsheet and compared to the data readings from the plots for the nearest date, i.e. the values from E-Series_Wells-Dec-11-1972.pdf were compared to the points from 12/1/72, E-Series_Wells-Jan-8-1973.pdf were compared to points from 1/1/73, and EPA Turkey Point Wells.pdf, which were taken on 7/31/72, were compared to 8/1/72.

Where discrepancies occurred, the values from References 18, 19, and 20, took precedence over the plots, and the plot readings were replaced. The resultant spreadsheet is called "Corrected Values.xls".

The values were averaged over time for each well, and tabulated in Corrected Values.xls.

	4/1/1972	5/1/1972	5/15/1972	6/1/1972	6/15/1972	7/1/1972	7/31/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	12/5/1972	12/6/1972	1/1/1973	1/2/1973	1/4/1973	2/1/1973	Reference #	Value	Units
E-1	35	35				42	39	39	45	35	39	40	40		41	41		40	3	Conductivity	micromhos/cm (x1000)
E-2	38	39				44	43	43	48	39	43	42	42		42	42		43.5	3	Conductivity	micromhos/cm (x1000)
E-3	28	29				32	31	31	37	31	30	29	29		31	31		31	3	Conductivity	micromhos/cm (x1000)
E-4	34	30				41	41.5	41.5	42.8	42	39	37.5	37		33	38		37.5	3	Conductivity	micromhos/cm (x1000)
E-5		37				46.5	45	45	43	43	46	41	41		43	43		44	3	Conductivity	micromhos/cm (x1000)
E-6	41	38				48	44.5	44	44	45	34	42	42		39	39		43	3	Conductivity	micromhos/cm (x1000)
E-7				36.5		53	49.5	49	51	47	51	46		46	49		49	48	3	Conductivity	micromhos/cm (x1000)
E-8			40	34		52.5	38.5	38	46	46	45	44		44	47		47	48	3	Conductivity	micromhos/cm (x1000)
E-9						53	49	49	50	47	51	45		45	47		47	47	3	Conductivity	micromhos/cm (x1000)
E-10				32		51	49.5	49.5	52.5	50	51	50		50	52.5		52.5	50.5	3	Conductivity	micromhos/cm (x1000)
E-11				34		51.5	49	49	50	48	51	50		50	51		51	49.5	3	Conductivity	micromhos/cm (x1000)
E-12				36.5		53	50.5	50.5	55	50	51	51		51	53		53	52	3	Conductivity	micromhos/cm (x1000)
E-13				34		54	51.5	51.5	53	50	47	53		53	53		53	51	3	Conductivity	micromhos/cm (x1000)
E-14				28.5		50	48.5	48.5	53	49	49	47		47	47		47	50	3	Conductivity	micromhos/cm (x1000)
E-15				29.5		48	45.5	46	49	48	47	46		46	47		47	45	3	Conductivity	micromhos/cm (x1000)
E-16				31		44	46	46	37	39	47	42		42	42		42	43	3	Conductivity	micromhos/cm (x1000)
E-17				29		48	51	46	51	49	49	46		46	47		47	46.5	3	Conductivity	micromhos/cm (x1000)
E-18			39	28		46.5	46	46	50	52	45	42		42	42		42	43	3	Conductivity	micromhos/cm (x1000)
E-19						37.5	35.5	35.5	38	40	31	28		28	27		27	25	3	Conductivity	micromhos/cm (x1000)
E-20				27		41	43	43	39	36	36	32		32	32		32	30	3	Conductivity	micromhos/cm (x1000)
E-21			39	34		50.5	48	48	50	42	47	45		45	44		44	45	3	Conductivity	micromhos/cm (x1000)
E-22			42	38		55	54.5	54	56	58	49	50		50	47		47	50.5	3	Conductivity	micromhos/cm (x1000)
E-23			40	39		55	53.5	53.5	56	55	51	50		50	49		49	50	3	Conductivity	micromhos/cm (x1000)
G-2B	24	24	25		27	25		23	30	25	26	25			25			25	4	Conductivity	micromhos/cm (x1000)
G-3B	22	23				28		31	27	38	25	27			25			24	4	Conductivity	micromhos/cm (x1000)
G-5B	6	6	24		25	21.5		17	19	14	14	9.5			9.5			11.5	4	Conductivity	micromhos/cm (x1000)
G-6	3	6	10.5			7.5		14	9	6	6.5	7.8			7.8			7.8	4	Conductivity	micromhos/cm (x1000)
G-7	0.5	0.5				0.5		1	1	0.8	1	1			1.2			1.2	4	Conductivity	micromhos/cm (x1000)
G-9B	23	24	23		30	29.5		28	34	26	31	28			28			30	4	Conductivity	micromhos/cm (x1000)
G-10B	22	20	12		26	24		20	29	18	21	9.5			13			10	4	Conductivity	micromhos/cm (x1000)
G-12B	6		9		5.5	7.5		5.5	8.5	6.5	8.5	7.5			9			9.5	4	Conductivity	micromhos/cm (x1000)
G-13	5.5	7				7		5.5	6.5	6	4.5	5.5			6			5.8	4	Conductivity	micromhos/cm (x1000)
G-14						0.9		1.5	0.9	1	0.9	1			1			1	4	Conductivity	micromhos/cm (x1000)
G-16B	16	15				18		21.5	20	16	17	17			17			17.5	4	Conductivity	micromhos/cm (x1000)
G-17B	12	10						14		17	16	17			20			15	4	Conductivity	micromhos/cm (x1000)
G-19B	4	2				4.5		10	7	6	6	6.8			7.2			7.5	4	Conductivity	micromhos/cm (x1000)
G-20	12	4				6				4	4.8	5			5.7			5.8	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.8				1		1.8	2.3	1	0.8	1			1.2			1.2	4	Conductivity	micromhos/cm (x1000)
G-23B	21	18				19		17	25	14	18	16			23			24	4	Conductivity	micromhos/cm (x1000)
G-24B	22	22				19		22	21	13	17	16			24			22	4	Conductivity	micromhos/cm (x1000)
G-26B	18	15				5		6.5	5.5	3.5	4	4			4			4.5	4	Conductivity	micromhos/cm (x1000)
G-27	5	2				4		4	3.8	3	3	2.5			3.5			4	4	Conductivity	micromhos/cm (x1000)
G-28	5	3				3		3.5	4	2	1.8	2.5			2.6			2.5	4	Conductivity	micromhos/cm (x1000)
G-30B	26	25				31.5		34.5	35	29	34	30			31			31.5	4	Conductivity	micromhos/cm (x1000)
G-31B	26	26				31		38	37	29	34	30			32			29.5	4	Conductivity	micromhos/cm (x1000)
G-33B	22	20				15		17	23	14	15	17			20			22.5	4	Conductivity	micromhos/cm (x1000)
G-34	6	5				7		11	8	5	5.5	4			7			6	4	Conductivity	micromhos/cm (x1000)
G-34X	3.5	3.4				5		5.2	5.6	4.5	4.1	4.8			5.5			5	4	Conductivity	micromhos/cm (x1000)
G-35	0.7	0.7						1	1	0.8	0.8	1.1			1.6			2	4	Conductivity	micromhos/cm (x1000)
F-3						23			18	19.8	20.4	20.6			18.3			18.25	16	Chlorinity, ppt	
F-4						23.6									21.8			20.2	16	Chlorinity, ppt	
F-6											15	13.1			13.1			13.1	16	Chlorinity, ppt	
F-7												1.4			1.3			1.6	16	Chlorinity, ppt	
F-8												0.7			0.75			1	16	Chlorinity, ppt	

From EPA_Turkey_Point_wells1.pdf
From E-Series_Wells-Jan-8-1973.pdf
From E-Series_Wells-Dec-11-72.pdf

	4/1/1972	5/1/1972	5/15/1972	6/1/1972	7/1/1972	7/31/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	12/5/1972	12/6/1972	1/1/1973	1/2/1973	1/4/1973	2/1/1973	Reference #	Value	Units
E-1	42	43			50	48.5	48	51	42	49	46	46		47	47		47.5	3	Conductivity	micromhos/cm (x1000)
E-2	42	44			51	49	49	52.5	43	46	47	47		47	47		47.5	3	Conductivity	micromhos/cm (x1000)
E-3	40	41.5			51.5	51	51	54	50	50	49	49		48	48		47	3	Conductivity	micromhos/cm (x1000)
E-4	46	40			55	53.5	53	51	52	54	49	49		50	50		50	3	Conductivity	micromhos/cm (x1000)
E-5		42			50	48	48	49	49	49	44.5	44		47	47		48	3	Conductivity	micromhos/cm (x1000)
E-6	44	42			52	51	51	48	50	52	49	49		49	49		50	3	Conductivity	micromhos/cm (x1000)
E-7				39	54	52	52	47	54	53	51		51	50		50	49	3	Conductivity	micromhos/cm (x1000)
E-8			43.5	37	58	46	46	51	52	51	50		50	51		51	49	3	Conductivity	micromhos/cm (x1000)
E-9					59	55	55	52	55	53	52		52	56		56	51	3	Conductivity	micromhos/cm (x1000)
E-10				35	55	53	53	51	52	54	53		53	54		54	52	3	Conductivity	micromhos/cm (x1000)
E-11				35	55	53	53	53	52	54	53		53	54		54	51.5	3	Conductivity	micromhos/cm (x1000)
E-12				31	54	51.5	51.5	54	51	53	52		52	54		54	52	3	Conductivity	micromhos/cm (x1000)
E-13				35	55	52	52	50	51	48	53		53	54		54	51	3	Conductivity	micromhos/cm (x1000)
E-14				31	52	50	50	51.5	50	50.5	51		51	50		50	52	3	Conductivity	micromhos/cm (x1000)
E-15				31.5	52.5	49	49	51	55	52	50		50	52		52	51.5	3	Conductivity	micromhos/cm (x1000)
E-16				33	54	51	51	53	44	53	51		51	51		51	51	3	Conductivity	micromhos/cm (x1000)
E-17				32	55	46	51	54	56	54	51		51	53		53	52	3	Conductivity	micromhos/cm (x1000)
E-18			43	31.5	54	53	53	55	58	52	50		50	51		51	52	3	Conductivity	micromhos/cm (x1000)
E-19					49	47	48	45	44	48	46		46	45		45	42.5	3	Conductivity	micromhos/cm (x1000)
E-20				32	49	50	50	44	44	47	46		46	46		46	43	3	Conductivity	micromhos/cm (x1000)
E-21			43	39	59	57	57	59	54	56	55		55	54		54	54.5	3	Conductivity	micromhos/cm (x1000)
E-22			45	41	61	60	60	61	65	58	55		55	54		54	56	3	Conductivity	micromhos/cm (x1000)
E-23			45	42	61	59	59	61	62	59	56		56	56		56	56	3	Conductivity	micromhos/cm (x1000)
G-2																				
G-3																				
G-5																				
G-6	26	23		25.5	31		36	30	25	28	30			30			30	4	Conductivity	micromhos/cm (x1000)
G-7	0.5	0.5			0.5		1	1	0.8	1	1			1.5			1.2	4	Conductivity	micromhos/cm (x1000)
G-9																				
G-10																				
G-12																				
G-13	37	35			34		33	40	38	40	40			41			39.5	4	Conductivity	micromhos/cm (x1000)
G-14					1		1.9	0.8	1	0.9	1			1			1	4	Conductivity	micromhos/cm (x1000)
G-16																				
G-17																				
G-19																				
G-20	28	28							30	32	30			32			31	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.8			0.8		1.9	2	0.7	0.7	0.9			1			1.2	4	Conductivity	micromhos/cm (x1000)
G-23																				
G-24																				
G-26																				
G-27	24	22			27		27	32	24	28	25			27			25.5	4	Conductivity	micromhos/cm (x1000)
G-28	17	15			17		24	28	14	15	10			13			13	4	Conductivity	micromhos/cm (x1000)
G-30																				
G-31																				
G-33																				
G-34	26	25			30.5		34	31	28	32	30			30			28.5	4	Conductivity	micromhos/cm (x1000)
G-34X	15	15			17		23	24	14	17	11			18			16	4	Conductivity	micromhos/cm (x1000)
G-35	5	6					4.5	2.5	3.5	3.5	4			4.8			5.5	4	Conductivity	micromhos/cm (x1000)
F-3					22.7			18.3	20.3	21.3	20.8			20.1			19.2	16	Chlorinity, ppt	
F-4					22.8									21.6			20.6	16	Chlorinity, ppt	
F-6										17.8	17			17			16.9	16	Chlorinity, ppt	
F-7											13.3			13.5			14.1	16	Chlorinity, ppt	
F-8											10.1			9.9			10.2	16	Chlorinity, ppt	

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	4/1/1972	5/1/1972	5/15/1972	6/15/1972	7/1/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	1/1/1973	2/1/1973	Reference #	Value	Units
E-1															
E-2															
E-3															
E-4															
E-5															
E-6															
E-7															
E-8															
E-9															
E-10															
E-11															
E-12															
E-13															
E-14															
E-15															
E-16															
E-17															
E-18															
E-19															
E-20															
E-21															
E-22															
E-23															
G-2A	39	35	38	48	48	38	51	42	46	44	44	44.5	4	Conductivity	micromhos/cm (x1000)
G-3A	39	39	39	49.5	44	44	48	42	42	43.5	43	44.5	4	Conductivity	micromhos/cm (x1000)
G-5A	39	41	39	47	48	44.5	45.5	37	44	43	43	42	4	Conductivity	micromhos/cm (x1000)
G-6															
G-7															
G-9A	38	42	38	44	47.5	44.5	54	41	47	44	44	42.5	4	Conductivity	micromhos/cm (x1000)
G-10A	39	42	37	46	47	45	53	43	49	45.5	46	47.5	4	Conductivity	micromhos/cm (x1000)
G-12A	38	40.8	36	44	46.5	43	48	40	45	43.5	44	44	4	Conductivity	micromhos/cm (x1000)
G-13															
G-14															
G-16A	35	41			46	44	51	39	44	42	44	42	4	Conductivity	micromhos/cm (x1000)
G-17A	31	36			45	44	49	39	42	41	42	40	4	Conductivity	micromhos/cm (x1000)
G-19A	34	34			36	42	43	33	39	38	38	38.5	4	Conductivity	micromhos/cm (x1000)
G-20															
G-21															
G-23A	27	26			30	33	38	30	34	30	32	35	4	Conductivity	micromhos/cm (x1000)
G-24A	27	28			32.5	36	42	30	33	31	33	33	4	Conductivity	micromhos/cm (x1000)
G-26A	26	25.5			29.5	32	38	27	30	28	30	29	4	Conductivity	micromhos/cm (x1000)
G-27															
G-28															
G-30A	32	25			44.5	47	47	39	44	41	42	40	4	Conductivity	micromhos/cm (x1000)
G-31A	32	34			40.5	43	48	38	42	39	40	36	4	Conductivity	micromhos/cm (x1000)
G-33A	31	31			37.5	43	44	33	37	34	35	32.5	4	Conductivity	micromhos/cm (x1000)
G-34															
G-34X															
G-35															
F-3															
F-4															
F-6															
F-7															
F-8															

	4/1/1972	5/1/1972	5/15/1972	6/1/1972	6/15/1972	7/1/1972	7/31/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	12/5/1972	12/6/1972	1/1/1973	1/2/1973	1/4/1973	2/1/1973	Reference #	Value	Units
E-1	43	44				50	49	49	52	43	51	50	50		48	48		47.5	3	Conductivity	micromhos/cm (x1000)
E-2	43	45				51	50.5	50.5	53.5	43	47	49	49		48	48		48.5	3	Conductivity	micromhos/cm (x1000)
E-3	42	45				53	52	52	52	51	52	49	49		48	48		47	3	Conductivity	micromhos/cm (x1000)
E-4	47	42				57.5	55	55	54	55	57	52	52		54	54		53.5	3	Conductivity	micromhos/cm (x1000)
E-5		42				53.5	49	49	49	52	54.5	46	46		49	49		49	3	Conductivity	micromhos/cm (x1000)
E-6	47	43.5				55	53	53	51	52	56	52	52		53	53		53	3	Conductivity	micromhos/cm (x1000)
E-7				39		57	54	54	51	55	55	53		53	54		54	52	3	Conductivity	micromhos/cm (x1000)
E-8			45	37		59	51	51	52	55	54	53		53.5	55		55	53	3	Conductivity	micromhos/cm (x1000)
E-9						59.5	51	57	53	55	55	55		55	57		57	52	3	Conductivity	micromhos/cm (x1000)
E-10				36		58	55	55	52	56	56	54		54	56		56	53	3	Conductivity	micromhos/cm (x1000)
E-11				36		57	53.5	54	52	53	56	55		55	55.8		56	53.5	3	Conductivity	micromhos/cm (x1000)
E-12				32		55	53	53	55	53	55	54		54	55		55	53	3	Conductivity	micromhos/cm (x1000)
E-13				35		55	52	52	51	51	49	54		54	55		55	52	3	Conductivity	micromhos/cm (x1000)
E-14				32		54	51	51	52	50	52	51		51	51		51	52	3	Conductivity	micromhos/cm (x1000)
E-15				33		54	51	51	53	57	54	50		50	53		53	51.5	3	Conductivity	micromhos/cm (x1000)
E-16				33		55	51	51	54	49	54	51		51	52		52	52	3	Conductivity	micromhos/cm (x1000)
E-17				34		55.5	51	51	54	57	55	52		52	53		53	52	3	Conductivity	micromhos/cm (x1000)
E-18			49	31.5		54	54	54	55	58	54	51		51	52		52	52	3	Conductivity	micromhos/cm (x1000)
E-19						49	48	48	46	46	50	46		46	46		46	43	3	Conductivity	micromhos/cm (x1000)
E-20				33.5		51	51	51	45	46	49	48		48	47		47	45	3	Conductivity	micromhos/cm (x1000)
E-21			45	40		60	58.5	58.5	60	55	58	55		55	55		55	55.5	3	Conductivity	micromhos/cm (x1000)
E-22			46	42		62	60.5	61	61	65	59	56		56	56		56	56.5	3	Conductivity	micromhos/cm (x1000)
E-23			45	43.5		61	59	59	60	64	60	56		56	57		57	56	3	Conductivity	micromhos/cm (x1000)
G-2																					
G-3																					
G-5																					
G-6	36	33		39		44		48	41	40	41	41			41			41	4	Conductivity	micromhos/cm (x1000)
G-7	0.7	0.7		0.8		0.8		1	1	1.1	0.8	1			1.5			1	4	Conductivity	micromhos/cm (x1000)
G-9																					
G-10																					
G-12																					
G-13	39	37				42.5		39.5	43	40	44	42			43			42.5	4	Conductivity	micromhos/cm (x1000)
G-14	0.8					0.9		1.5	0.9	1	0.8	1			1			1	4	Conductivity	micromhos/cm (x1000)
G-16																					
G-17																					
G-19																					
G-20	28	28								32	32.5	32			35			31	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.9				1		1.8	1.9	1	1.6	1			2			1.3	4	Conductivity	micromhos/cm (x1000)
G-23																					
G-24																					
G-26																					
G-27	23.5	21		27		27.5		32	24	29	25	27			25.5			26	4	Conductivity	micromhos/cm (x1000)
G-28	24	24				26.5		32.5	34	24	26	22			25			25	4	Conductivity	micromhos/cm (x1000)
G-30																					
G-31																					
G-33																					
G-34	26	26				30.5		33	31	29	32	30			30			28.5	4	Conductivity	micromhos/cm (x1000)
G-34X	21	21			22.5			28	26	19	24	19			23			22	4	Conductivity	micromhos/cm (x1000)
G-35	27	28						31	35	26	26	24			24			28	4	Conductivity	micromhos/cm (x1000)
F-3						24			18.6	20.5	22.2	21.1			20.9			21.5	16	Chlorinity, ppt	
F-4						24						21.8			21.8			21.1	16	Chlorinity, ppt	
F-6											18.2	17.6			17.5			16.9	16	Chlorinity, ppt	
F-7												15			15.2			15.4	16	Chlorinity, ppt	
F-8												11.1			10.8			10.8	16	Chlorinity, ppt	

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	4/1/1972	5/1/1972	5/15/1972	6/1/1972	6/15/1972	7/1/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	1/1/1973	2/1/1973	Average	Reference #	Value	Units
E-1	35	35				42	39	45	35	39	40	41	40	39.1	3	Conductivity	micromhos/cm (x1000)
E-2	38	39				44	43	48	39	43	42	42	43.5	42.2	3	Conductivity	micromhos/cm (x1000)
E-3	28	29				32	31	37	31	30	29	31	31	30.9	3	Conductivity	micromhos/cm (x1000)
E-4	34	30				41	41.5	42.8	42	39	37	33	37.5	37.8	3	Conductivity	micromhos/cm (x1000)
E-5		37				46.5	45	43	43	46	41	43	44	43.2	3	Conductivity	micromhos/cm (x1000)
E-6	41	38				48	44.5	44	45	34	42	39	43	41.9	3	Conductivity	micromhos/cm (x1000)
E-7				36.5		53	49.5	51	47	51	46	49	48	47.9	3	Conductivity	micromhos/cm (x1000)
E-8			40	34		52.5	38.5	46	46	45	44	47	48	44.1	3	Conductivity	micromhos/cm (x1000)
E-9						53	49	50	47	51	45	47	47	48.6	3	Conductivity	micromhos/cm (x1000)
E-10				32		51	49.5	52.5	50	51	50	52.5	50.5	48.8	3	Conductivity	micromhos/cm (x1000)
E-11				34		51.5	49	50	48	51	50	51	49.5	48.2	3	Conductivity	micromhos/cm (x1000)
E-12				36.5		53	50.5	55	50	51	51	53	52	50.2	3	Conductivity	micromhos/cm (x1000)
E-13				34		54	51.5	53	50	47	53	53	51	49.6	3	Conductivity	micromhos/cm (x1000)
E-14				28.5		50	48.5	53	49	49	47	47	50	46.9	3	Conductivity	micromhos/cm (x1000)
E-15				29.5		48	45.5	49	48	47	46	47	45	45.0	3	Conductivity	micromhos/cm (x1000)
E-16				31		44	46	37	39	47	42	42	43	41.2	3	Conductivity	micromhos/cm (x1000)
E-17				29		48	46	51	49	49	46	47	46.5	45.7	3	Conductivity	micromhos/cm (x1000)
E-18			39	28		46.5	46	50	52	45	42	42	43	43.4	3	Conductivity	micromhos/cm (x1000)
E-19						37.5	35.5	38	40	31	28	27	25	32.8	3	Conductivity	micromhos/cm (x1000)
E-20				27		41	43	39	36	36	32	32	30	35.1	3	Conductivity	micromhos/cm (x1000)
E-21			39	34		50.5	48	50	42	47	45	44	45	44.5	3	Conductivity	micromhos/cm (x1000)
E-22			42	38		55	54.5	56	58	49	50	47	50.5	50.0	3	Conductivity	micromhos/cm (x1000)
E-23			40	39		55	53.5	56	55	51	50	49	50	49.9	3	Conductivity	micromhos/cm (x1000)
G-2B	24	24	25		27	25	23	30	25	26	25	25	25	25.3	4	Conductivity	micromhos/cm (x1000)
G-3B	22	23				28	31	27	38	25	27	25	24	27.0	4	Conductivity	micromhos/cm (x1000)
G-5B	6	6	24		25	21.5	17	19	14	14	9.5	9.5	11.5	14.8	4	Conductivity	micromhos/cm (x1000)
G-6	3	6	10.5			7.5	14	9	6	6.5	7.8	7.8	7.8	7.8	4	Conductivity	micromhos/cm (x1000)
G-7	0.5	0.5				0.5	1	1	0.8	1	1	1.2	1.2	0.9	4	Conductivity	micromhos/cm (x1000)
G-9B	23	24	23		30	29.5	28	34	26	31	28	28	30	27.9	4	Conductivity	micromhos/cm (x1000)
G-10B	22	20	12		26	24	20	29	18	21	9.5	13	10	18.7	4	Conductivity	micromhos/cm (x1000)
G-12B	6		9		5.5	7.5	5.5	8.5	6.5	8.5	7.5	9	9.5	7.5	4	Conductivity	micromhos/cm (x1000)
G-13	5.5	7				7	5.5	6.5	6	4.5	5.5	6	5.8	5.9	4	Conductivity	micromhos/cm (x1000)
G-14						0.9	1.5	0.9	1	0.9	1	1	1	1.0	4	Conductivity	micromhos/cm (x1000)
G-16B	16	15				18	21.5	20	16	17	17	17	17.5	17.5	4	Conductivity	micromhos/cm (x1000)
G-17B	12	10					14		17	16	17	20	15	15.1	4	Conductivity	micromhos/cm (x1000)
G-19B	4	2				4.5	10	7	6	6	6.8	7.2	7.5	6.1	4	Conductivity	micromhos/cm (x1000)
G-20	12	4				6			4	4.8	5	5.7	5.8	5.9	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.8				1	1.8	2.3	1	0.8	1	1.2	1.2	1.2	4	Conductivity	micromhos/cm (x1000)
G-23B	21	18				19	17	25	14	18	16	23	24	19.5	4	Conductivity	micromhos/cm (x1000)
G-24B	22	22				19	22	21	13	17	16	24	22	19.8	4	Conductivity	micromhos/cm (x1000)
G-26B	18	15				5	6.5	5.5	3.5	4	4	4	4.5	7.0	4	Conductivity	micromhos/cm (x1000)
G-27	5	2				4	4	3.8	3	3	2.5	3.5	4	3.5	4	Conductivity	micromhos/cm (x1000)
G-28	5	3				3	3.5	4	2	1.8	2.5	2.6	2.5	3.0	4	Conductivity	micromhos/cm (x1000)
G-30B	26	25				31.5	34.5	35	29	34	30	31	31.5	30.8	4	Conductivity	micromhos/cm (x1000)
G-31B	26	26				31	38	37	29	34	30	32	29.5	31.3	4	Conductivity	micromhos/cm (x1000)
G-33B	22	20				15	17	23	14	15	17	20	22.5	18.6	4	Conductivity	micromhos/cm (x1000)
G-34	6	5				7	11	8	5	5.5	4	7	6	6.5	4	Conductivity	micromhos/cm (x1000)
G-34X	3.5	3.4				5	5.2	5.6	4.5	4.1	4.8	5.5	5	4.7	4	Conductivity	micromhos/cm (x1000)
G-35	0.7	0.7					1	1	0.8	0.8	1.1	1.6	2	1.1	4	Conductivity	micromhos/cm (x1000)
F-3						23		18	19.8	20.4	20.6	18.3	18.25	19.8	16	Chlorinity, ppt	
F-4						23.6						21.8	20.2	21.9	16	Chlorinity, ppt	
F-6										15	13.1	13.1	13.1	13.6	16	Chlorinity, ppt	
F-7											1.4	1.3	1.6	1.4	16	Chlorinity, ppt	
F-8											0.7	0.75	1	0.8	16	Chlorinity, ppt	

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	4/1/1972	5/1/1972	5/15/1972	6/1/1972	7/1/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	1/1/1973	2/1/1973	Average	Reference #	Value	Units
E-1	42	43			50	48.5	51	42	49	46	47	47.5	46.6	3	Conductivity	micromhos/cm (x1000)
E-2	42	44			51	49	52.5	43	46	47	47	47.5	46.9	3	Conductivity	micromhos/cm (x1000)
E-3	40	41.5			51.5	51	54	50	.50	49	48	47	48.2	3	Conductivity	micromhos/cm (x1000)
E-4	46	40			55	53.5	51	52	54	49	50	50	50.1	3	Conductivity	micromhos/cm (x1000)
E-5		42			50	48	49	49	49	44	47	48	47.3	3	Conductivity	micromhos/cm (x1000)
E-6	44	42			52	51	48	50	52	49	49	50	48.7	3	Conductivity	micromhos/cm (x1000)
E-7				39	54	52	47	54	53	51	50	49	49.9	3	Conductivity	micromhos/cm (x1000)
E-8			43.5	37	58	46	51	52	51	50	51	49	48.9	3	Conductivity	micromhos/cm (x1000)
E-9					59	55	52	55	53	52	56	51	54.1	3	Conductivity	micromhos/cm (x1000)
E-10				35	55	53	51	52	54	53	54	52	51.0	3	Conductivity	micromhos/cm (x1000)
E-11				35	55	53	53	52	54	53	54	51.5	51.2	3	Conductivity	micromhos/cm (x1000)
E-12				31	54	51.5	54	51	53	52	54	52	50.3	3	Conductivity	micromhos/cm (x1000)
E-13				35	55	52	50	51	48	53	54	51	49.9	3	Conductivity	micromhos/cm (x1000)
E-14				31	52	50	51.5	50	50.5	51	50	52	48.7	3	Conductivity	micromhos/cm (x1000)
E-15				31.5	52.5	49	51	55	52	50	52	51.5	49.4	3	Conductivity	micromhos/cm (x1000)
E-16				33	54	51	53	44	53	51	51	51	49.0	3	Conductivity	micromhos/cm (x1000)
E-17				32	55	51	54	56	54	51	53	52	50.9	3	Conductivity	micromhos/cm (x1000)
E-18			43	31.5	54	53	55	58	52	50	51	52	50.0	3	Conductivity	micromhos/cm (x1000)
E-19					49	47	45	44	48	46	45	42.5	45.8	3	Conductivity	micromhos/cm (x1000)
E-20				32	49	50	44	44	47	46	46	43	44.6	3	Conductivity	micromhos/cm (x1000)
E-21			43	39	59	57	59	54	56	55	54	54.5	53.1	3	Conductivity	micromhos/cm (x1000)
E-22			45	41	61	60	61	65	58	55	54	56	55.6	3	Conductivity	micromhos/cm (x1000)
E-23			45	42	61	59	61	62	59	56	56	56	55.7	3	Conductivity	micromhos/cm (x1000)
G-2																
G-3																
G-5																
G-6	26	23		25.5	31	36	30	25	28	30	30	30	28.6	4	Conductivity	micromhos/cm (x1000)
G-7	0.5	0.5			0.5	1	1	0.8	1	1	1.5	1.2	0.9	4	Conductivity	micromhos/cm (x1000)
G-9																
G-10																
G-12																
G-13	37	35			34	33	40	38	40	40	41	39.5	37.8	4	Conductivity	micromhos/cm (x1000)
G-14					1	1.9	0.8	1	0.9	1	1	1	1.1	4	Conductivity	micromhos/cm (x1000)
G-16																
G-17																
G-19																
G-20	28	28						30	32	30	32	31	30.1	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.8			0.8	1.9	2	0.7	0.7	0.9	1	1.2	1.1	4	Conductivity	micromhos/cm (x1000)
G-23																
G-24																
G-26																
G-27	24	22			27	27	32	24	28	25	27	25.5	26.2	4	Conductivity	micromhos/cm (x1000)
G-28	17	15			17	24	28	14	15	10	13	13	16.6	4	Conductivity	micromhos/cm (x1000)
G-30																
G-31																
G-33																
G-34	26	25			30.5	34	31	28	32	30	30	28.5	29.5	4	Conductivity	micromhos/cm (x1000)
G-34X	15	15			17	23	24	14	17	11	18	16	17.0	4	Conductivity	micromhos/cm (x1000)
G-35	5	6				4.5	2.5	3.5	3.5	4	4.8	5.5	4.4	4	Conductivity	micromhos/cm (x1000)
F-3					22.7		18.3	20.3	21.3	20.8	20.1	19.2	20.4	16	Chlorinity, ppt	
F-4					22.8						21.6	20.6	21.7	16	Chlorinity, ppt	
F-6									17.8	17	17	16.9	17.2	16	Chlorinity, ppt	
F-7										13.3	13.5	14.1	13.6	16	Chlorinity, ppt	
F-8										10.1	9.9	10.2	10.1	16	Chlorinity, ppt	

From EPA_Turkey_Point_wells1.pdf
From E-Series_Wells-Dec-11-72.pdf

	4/1/1972	5/1/1972	5/15/1972	6/1/1972	6/15/1972	7/1/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	1/1/1973	2/1/1973	Average	Reference #	Value	Units
E-1	43	44				50	49	52	43	51	50	48	47.5	47.8	3	Conductivity	micromhos/cm (x1000)
E-2	43	45				51	50.5	53.5	43	47	49	48	48.5	47.9	3	Conductivity	micromhos/cm (x1000)
E-3	42	45				53	52	52	51	52	49	48	47	49.1	3	Conductivity	micromhos/cm (x1000)
E-4	47	42				57.5	55	54	55	57	52	54	53.5	52.7	3	Conductivity	micromhos/cm (x1000)
E-5		42				53.5	49	49	52	54.5	46	49	49	49.3	3	Conductivity	micromhos/cm (x1000)
E-6	47	43.5				55	53	51	52	56	52	53	53	51.6	3	Conductivity	micromhos/cm (x1000)
E-7				39		57	54	51	55	55	53	54	52	52.2	3	Conductivity	micromhos/cm (x1000)
E-8			45	37		59	51	52	55	54	53.5	55	53	51.5	3	Conductivity	micromhos/cm (x1000)
E-9						59.5	51	53	55	55	55	57	52	54.7	3	Conductivity	micromhos/cm (x1000)
E-10				36		58	55	52	56	56	54	56	53	52.9	3	Conductivity	micromhos/cm (x1000)
E-11				36		57	53.5	52	53	56	55	56	53.5	52.4	3	Conductivity	micromhos/cm (x1000)
E-12				32		55	53	55	53	55	54	55	53	51.7	3	Conductivity	micromhos/cm (x1000)
E-13				35		55	52	51	51	49	54	55	52	50.4	3	Conductivity	micromhos/cm (x1000)
E-14				32		54	51	52	50	52	51	51	52	49.4	3	Conductivity	micromhos/cm (x1000)
E-15				33		54	51	53	57	54	50	53	51.5	50.7	3	Conductivity	micromhos/cm (x1000)
E-16				33		55	51	54	49	54	51	52	52	50.1	3	Conductivity	micromhos/cm (x1000)
E-17				34		55.5	51	54	57	55	52	53	52	51.5	3	Conductivity	micromhos/cm (x1000)
E-18			49	31.5		54	54	55	58	54	51	52	52	51.1	3	Conductivity	micromhos/cm (x1000)
E-19						49	48	46	46	50	46	46	43	46.8	3	Conductivity	micromhos/cm (x1000)
E-20				33.5		51	51	45	46	49	48	47	45	46.2	3	Conductivity	micromhos/cm (x1000)
E-21			45	40		60	58.5	60	55	58	55	55	55.5	54.2	3	Conductivity	micromhos/cm (x1000)
E-22			46	42		62	60.5	61	65	59	56	56	56.5	56.4	3	Conductivity	micromhos/cm (x1000)
E-23			45	43.5		61	59	60	64	60	56	57	56	56.2	3	Conductivity	micromhos/cm (x1000)
G-2																	
G-3																	
G-5																	
G-6	36	33		39		44	48	41	40	41	41	41	41	40.5	4	Conductivity	micromhos/cm (x1000)
G-7	0.7	0.7		0.8		0.8	1	1	1.1	0.8	1	1.5	1	0.9	4	Conductivity	micromhos/cm (x1000)
G-9																	
G-10																	
G-12																	
G-13	39	37				42.5	39.5	43	40	44	42	43	42.5	41.3	4	Conductivity	micromhos/cm (x1000)
G-14	0.8					0.9	1.5	0.9	1	0.8	1	1	1	1.0	4	Conductivity	micromhos/cm (x1000)
G-16																	
G-17																	
G-19																	
G-20	28	28							32	32.5	32	35	31	31.2	4	Conductivity	micromhos/cm (x1000)
G-21	0.8	0.9				1	1.8	1.9	1	1.6	1	2	1.3	1.3	4	Conductivity	micromhos/cm (x1000)
G-23																	
G-24																	
G-26																	
G-27	23.5	21		27		27.5	32	24	29	25	27	25.5	26	26.1	4	Conductivity	micromhos/cm (x1000)
G-28	24	24				26.5	32.5	34	24	26	22	25	25	26.3	4	Conductivity	micromhos/cm (x1000)
G-30																	
G-31																	
G-33																	
G-34	26	26				30.5	33	31	29	32	30	30	28.5	29.6	4	Conductivity	micromhos/cm (x1000)
G-34X	21	21			22.5		28	26	19	24	19	23	22	22.6	4	Conductivity	micromhos/cm (x1000)
G-35	27	28					31	35	26	26	24	24	28	27.7	4	Conductivity	micromhos/cm (x1000)
F-3						24		18.6	20.5	22.2	21.1	20.9	21.5	21.3	16	Chlorinity, ppt	
F-4						24					21.8	21.8	21.1	22.2	16	Chlorinity, ppt	
F-6										18.2	17.6	17.5	16.9	17.6	16	Chlorinity, ppt	
F-7											15	15.2	15.4	15.2	16	Chlorinity, ppt	
F-8											11.1	10.8	10.8	10.9	16	Chlorinity, ppt	

From EPA_Turkey_Point_wells1.pdf
From E-Series_Wells-Jan-8-1973.pdf
From E-Series_Wells-Dec-11-72.pdf

	4/1/1972	5/1/1972	5/15/1972	6/15/1972	7/1/1972	8/1/1972	9/1/1972	10/1/1972	11/1/1972	12/1/1972	1/1/1973	2/1/1973	Average	Reference #	Value	Units
E-1																
E-2																
E-3																
E-4																
E-5																
E-6																
E-7																
E-8																
E-9																
E-10																
E-11																
E-12																
E-13																
E-14																
E-15																
E-16																
E-17																
E-18																
E-19																
E-20																
E-21																
E-22																
E-23																
G-2A	39	35	38	48	48	38	51	42	46	44	44	44.5	43.1	4	Conductivity	micromhos/cm (x1000)
G-3A	39	39	39	49.5	44	44	48	42	42	43.5	43	44.5	43.1	4	Conductivity	micromhos/cm (x1000)
G-5A	39	41	39	47	48	44.5	45.5	37	44	43	43	42	42.8	4	Conductivity	micromhos/cm (x1000)
G-6																
G-7																
G-9A	38	42	38	44	47.5	44.5	54	41	47	44	44	42.5	43.9	4	Conductivity	micromhos/cm (x1000)
G-10A	39	42	37	46	47	45	53	43	49	45.5	46	47.5	45.0	4	Conductivity	micromhos/cm (x1000)
G-12A	38	40.8	36	44	46.5	43	48	40	45	43.5	44	44	42.7	4	Conductivity	micromhos/cm (x1000)
G-13																
G-14																
G-16A	35	41			46	44	51	39	44	42	44	42	42.8	4	Conductivity	micromhos/cm (x1000)
G-17A	31	36			45	44	49	39	42	41	42	40	40.9	4	Conductivity	micromhos/cm (x1000)
G-19A	34	34			36	42	43	33	39	38	38	38.5	37.6	4	Conductivity	micromhos/cm (x1000)
G-20																
G-21																
G-23A	27	26			30	33	38	30	34	30	32	35	31.5	4	Conductivity	micromhos/cm (x1000)
G-24A	27	28			32.5	36	42	30	33	31	33	33	32.6	4	Conductivity	micromhos/cm (x1000)
G-26A	26	25.5			29.5	32	38	27	30	28	30	29	29.5	4	Conductivity	micromhos/cm (x1000)
G-27																
G-28																
G-30A	32	25			44.5	47	47	39	44	41	42	40	40.2	4	Conductivity	micromhos/cm (x1000)
G-31A	32	34			40.5	43	48	38	42	39	40	36	39.3	4	Conductivity	micromhos/cm (x1000)
G-33A	31	31			37.5	43	44	33	37	34	35	32.5	35.8	4	Conductivity	micromhos/cm (x1000)
G-34																
G-34X																
G-35																
F-3																
F-4																
F-6																
F-7																
F-8																

Golder Associates

SUBJECT	Total Dissolved Solids and Chloride Data for E-Wells for 10/72, 11/72, and 12/72	
Job No. 10390308 Ref. Calc 006 FPL TP Salt Orientation	Made By: S. Major Checked H. Frediani Reviewed	Date 4/7/2011 Sheet 1 of 1

The purpose of this calculation is to create a new spreadsheet with information obtained via email from FPL.

The email from Stacy Foster, dated April 5, 2011, (E-Series Well Data.msg) had several attachments containing Total Dissolved Solids (TDS) and Chlorides data for the E-Wells.

These are:

E-Series_WQ-Oct-18_1972.pdf

E-Series_WQ-Nov-14-1972.pdf

E-Series_WQ-Dec-18-1972.pdf

These documents were added to Calculation 1, file "references.xls" as Reference Numbers 21, 22, and 23, respectively.

These values were tabulated into a workbook called "TDS_and_Chlorides_E_Wells.xlsx", with one spreadsheet for. TDS and one spreadsheet for Chlorides.

All values were for 20' depth, with the exception of Well E-1 on 10/4/72, where the value for 40' depth was listed.

Average values were calculated for 20' and 40' depths.

	Total Dissolved Solids (ppm) @ 20' Depth (except where noted)								TDS (ppm)	TDS (ppm)
	10/2/1972	10/4/1972	10/6/1972	10/31/1972	11/1/1972	11/2/1972	12/5/1972	12/6/1972	Average at 20 feet	Average at 40 feet
E-1		32100		25500			28300		26,900	32,100
E-2		28500		29400			30300		29,400	
E-3			20000	20700			22400		21,033	
E-4			25500	27000			27300		26,600	
E-5			28400	28200			31000		29,200	
E-6			31740	10500			34100		25,447	
E-7	30300				33300			35000	32,867	
E-8	29700				31800			33800	31,767	
E-9	32100				31000			34800	32,633	
E-10	34100				38500			37200	36,600	
E-11	33400				32700			34300	33,467	
E-12	36000				33600			37500	35,700	
E-13	35000				35400			36100	35,500	
E-14	32500				31700			33300	32,500	
E-15	30900					30600		32400	31,300	
E-16	23700					28500		27900	26,700	
E-17	29800					31700		33300	31,600	
E-18	29700					37900		30400	32,667	
E-19	18700					18400		18500	18,533	
E-20			24400			20400		21000	21,933	
E-21			27400			31000		33000	30,467	
E-22	33300					34400		35300	34,333	
E-23	34700					33100		37000	34,933	

40' Depth

	Chloride (ppm) @ 20' Depth (except where noted)								Chloride (ppm)	Chloride (ppm)
	10/2/1972	10/4/1972	10/6/1972	10/31/1972	11/1/1972	11/2/1972	12/5/1972	12/6/1972	Average at 20 feet	Average at 40 feet
E-1		17250		15000			15250		15,125	17,250
E-2		16250		15250			15750		15,750	
E-3			11250	10000			10750		10,667	
E-4			14750	13500			14000		14,083	
E-5			15000	14750			15750		15,167	
E-6			16750	5500			16000		12,750	
E-7	15750				18750			17750	17,417	
E-8	15750				16000			17250	16,333	
E-9	17250				16500			17500	17,083	
E-10	18750				18750			19250	18,917	
E-11	18500				18250			18750	18,500	
E-12	18250				19250			19750	19,083	
E-13	18500				18750			20000	19,083	
E-14	17250				17750			17750	17,583	
E-15	15500					17000		17500	16,667	
E-16	15250					15750		15500	15,500	
E-17	16750					17000		17500	17,083	
E-18	15750					16000		15500	15,750	
E-19	10250					9750		9750	9,917	
E-20			14500			12750		11000	12,750	
E-21			17250			16500		16500	16,750	
E-22	18500					19000		18750	18,750	
E-23	18000					18250		19250	18,500	

40' Depth