FLORIDA POWER & LIGHT COMPANY

TURKEY POINT, FLORIDA

GROUND WATER MONITORING AND INTERCEPTOR DITCH OPERATION PROCEDURES REVISED JULY, 1983

1.0 INTRODUCTION

This procedures manual applies to field work presently being conducted at Turkey Point for the Ground water Monitoring Program west of the Cooling Canal System and Interceptor Ditch Operation.

The procedures presented in this Revised Operations Manual reflect new agreements between Florida Power & Light Company and South Florida Water Management District. Reference is also made to the 1983 Turkey Point Agreement between the above mentioned parties, dated July 15, 1983.

2.0 KEY PARTICIPANTS

The following tabulation gives the key parties involved in this project for Florida Power & Light Company and their relative responsibilities:

Company	Responsibility
Florida Power & Light Co.	
Environmental Affairs Department P. O. Box 14000 700 Universe Boulevard Juno Beach, Florida 33408 Phone: (305) 863-3624	Overall Program Direction and Contact
Land Utilization Department P. O. Box 1565 Homestead, Florida 33030 Phone: (305) 248-4740	Program Operations Data Processing
Consultant	
Dames & Moore 301 W. Camino Gardens Blvd. Plaza 6, Suite 201 Boca Raton, Florida 33432 Phone: (305) 392-9070	Data Verification and Review

3.0 GROUND WATER MONITORING PROGRAM

3.1 Monitoring Locations

The following wells shall be monitored during this program: L-3 and L-5; G-21 and G-28. G-6, G-27 and G-35 shall not be monitored, but shall be capped and maintained in a ready condition. These wells are located as shown on Figures 1 and 2.

3.2 Monitoring Frequency

The wells specified in Section 3.1 shall be monitored 4 times a year during the months of October, January, April, and July.

3.3 Parameters

The following data shall be collected at each well at the times specified in the preceding section:

a. Ground water Elevation (ft.) - Measured inside the casing from top of casing. Elevation of top of casing is known.

b. Surface Water Elevation (ft.) - Measured outside the casing from top of casing.

c. Conductivity (umhos/cm) - Measured at one (1) foot intervals for the total well depth.

d. Temperature (^{o}C) - Measured the same as conductivity.

e. Water Sample Collection - Two water samples per well will be obtained for laboratory titration of chloride ion content. Depth of sample collection is not constant, but approximately half the water samples should be obtained from within the first twenty feet of the water column in the well. Generally, this portion of the water column contains the transition from water of low chlorinity to water of higher chlorinity. These samples, in combination with water samples from deeper depths, should provide chloride data which generally spans the entire spectrum of chloride ion encountered.

3.4 Monitoring Procedure

The following procedure shall be followed in collection of field data:

a. Calibrate the Conductivity-Temperature Meter prior to each day of the monitoring using two standard saline solutions of 15,000 umhos/cm and 90,000 umhos/cm. The instrument will be calibrated in accordance with the procedures established in Section 3.7, Equipment Calibration.

b. Measure both surface water elevation and ground-water surface elevation at each well by measuring from top of well casing.

c. Insert probe to a depth of one (1) foot below water level in well; when meter needle stabilizes, read and record conductivity and temperature.

d. Repeat procedure in Step c. at intervals of one (1) foot to bottom of well.

e. Obtain water sample for chloride ion titration in accordance with recommendations in Section 3.3e. Water samples are obtained with a Masterflex Pump or equivalent system. When taking a sample with the pump, a minimum of 1000 ml of water from the desired sampling depth shall be pumped through the line to insure the sample is representative and not contaminated by water left in the line from a previous sampling station. Sample water will be pumped directly into clean, dry bottles which will be tightly capped to prevent contamination of the sample.

f. After every well is monitored, calibration of the field monitoring unit will be checked with the 90,000 umhos/cm standard saline solution in accordance with procedures described in Section 3.7. Note, however, that the instrument shall not be adjusted at this time.

g. After each day of monitoring, the conductivity of the 90,000 umhos/cm standard solution and the calibration of the field monitoring unit will be checked in accordance with procedures in Section 3.7.

3.5 Data Verification

In order to check the validity of the conductivity data, the relationship of conductivity versus chloride will be determined for each monitoring period by regression analysis. This analysis requires the use of an independent variable (true variable) and a dependent variable. Chloride content determined by laboratory titration will be used as the true variable and the conductivity variable will be adjusted to the line of best fit by the method of least squares.

In order to reduce the possibility of error, the raw titration data and raw conductivity data will be immediately plotted on the historical conductivity-chloride relationship as shown on Figure 3. The majority (75 percent) of the plotted raw data points should fall within the variance shown for the historical relationships. The remaining 25 percent of the points should be reasonably close to the historical relationship. For conductivities less than 10,000 umhos/cm, the historical relationships are less definitive. For those conductivities, the ratio of the raw titration value (parts per thousand) to the corresponding raw conductivity value (umhos/cm) should be reasonably close to the following historical ratios:

Conductivity umhos/cm	Ratio
Less than 2000	0.100
2000-6000	0.237
6000-10000	0.314

In addition to these two check methods, the raw points will be inspected for direct proportionality. In other words, the chloride content increases with increasing conductivity. Any two relative data points which reverse this relationship will be checked for probable error.

If, at any time, data are suspected to be in error, the following steps shall be taken:

a. Retitrate the suspect water sample to determine chloride content. Replot the titration data versus the corresponding conductivity data and reinspect for direct proportionality.

b. If data are still suspected to be in error after the retitration, then the well(s) in which the suspect data occur shall be remonitored in accordance with the procedures set forth in Section 3.4.

The conductivity, temperature, water level and titration data will be transmitted to FPL's consultant. The consultant will recheck the titration data for proportionality and variance from the historical relationship in accordance with methods presented in previous paragraphs. The water level, temperature and conductivity data will be compared with historical data from periods of similar seasonal conditions. (Water level fluctuations, precipitation and air temperature are among the factors to be considered when choosing times of similar seasonal conditions.) If any water level, temperature and/or conductivity data exhibit abnormal changes, the wells in which these changes occur will be remonitored in accordance with procedures set forth in Section 3.4. Suspect wells will be remonitored and checked until the consultant is satisfied that the data represent actual ground-water conditions. At this time, the data will be processed in accordance with Section 3.6.

The initiation of the monitoring each quarter will allow sufficient time for checking suspect field data. Therefore, the monitoring should be initiated at least five working days prior to the 1st of each quarterly month.

3.6. Data Processing

The raw field data shall be entered on standard forms (Figure 4).

Distribution of the data shall be in accordance with the following:

a. Original - To FPL Environmental Affairs Department

b. One Copy - Retained on file at Land Utilization Department at Turkey Point

c. One Copy - Forwarded to FPL's consultant.

3.7 Equipment Calibration

The following calibration procedures apply to the Conductivity-Temperature Meter.

Conductivity Calibration - Prior to each day of monitoring, the instrument shall be calibrated in accordance with the following procedures and the appropriate information entered on the Calibration Log (Figure 5) in the space designated "Before Monitoring".

The calibration of the conductivity meter is accomplished by the use of two potassium chloride (KCl) solutions prepared in accordance with ASTM D1125-64, Standard Methods of Test for Electrical Conductivity of Water.

The procedure is as follows:

a. Prepare one solution of approximately 90,000 umhos/cm conductivity.

1. Dissolve approximately 60.0 g of KCl to 1 liter of Category III Water.
2. Determine the conductivity of the KCl solution using a conductivity bridge and certified cell to determine the "true" conductivity of the solution.
3. Calibrate the upper end of the field units conductivity range using the KCl conductivity standard as prepared above.

b. Prepare one solution of approximately 15,000 umhos/cm conductivity.

1. Dissolve approximately 7.50 g of KCl to 1 liter of Category III Water.
2. Determine the conductivity of the KCl solution using a conductivity bridge and certified cell to determine the "true" conductivity of the solution.
3. Read conductivity of solution using the field unit.

If the reading obtained with the field unit differs from the reading for the low conductivity solution more than 1,000 umhos/cm, the conductivity of the 90,000

umhos/cm solution will be rechecked with the conductivity bridge and the procedure repeated. Calibrating the field unit with a solution of high conductivity reduces the percent error introduced when calibrating the instrument at the lower end of the conductivity range. The 15,000 umhos/cm solution serves as a check on the accuracy of calibration at 90,000 umhos/cm.

In order to insure that the instrument maintains calibration throughout each day of monitoring, the 90,000 umhos/cm standard saline solution used in the initial calibration will be carried to the field and the solution will be read after monitoring every well. The reading given by the instrument will be recorded in the Calibration Log in spaces designated "During Monitoring". However, the instrument SHALL NOT be adjusted in the field to the reading given by the standard solution.

Upon returning to the laboratory after each day of monitoring the conductivity of the 90,000 umhos/cm solution will be checked with the conductivity bridge to assure that the conductivity of the standard solution has not changed throughout the day. The standard solution shall then be read with the field unit. This calibration sequence will be entered on the Calibration Log in the space labeled "After Monitoring".

The Calibration Log can be used to develop "drift curves" in order to correct "instrument drift". If the "After Monitoring" calibration sequence yields a reading deviation exceeding five (5) percent of the total reading, the data shall be corrected using the drift curve. In summary, the maximum allowable reading deviation for a 90,000 umhos/cm solution would be $\pm$4,500 umhos/cm.

Temperature Calibration - Calibrate the field unit using the following procedure or equivalent:

a. Turn the instrument to "temperature zero" and adjust to read -5 degrees C.

b. Turn the instrument to "temperature calibrate" and adjust to read 45 degrees C.

c. Prepare two H_2O solutions at temperatures of approximately 20 degrees C and 30 degrees C respectively.

d. Compare the temperatures measured with the field unit to those obtained with a highly accurate laboratory thermometer.

e. If the field unit and the thermometer agree within 0.5 degrees C, the temperature meter is considered calibrated.

f. If the two do not agree, use the following procedure:

1. Adjust the field unit to read the results given by the thermometer in the 20 degrees C solution.

2. Read the 30 degrees C solution with the field unit and thermometer. If the readings differ, adjust the field unit to read the same as the thermometer.

3. Again read the 20 degrees C solution with both instruments. If there is a difference, adjust the field unit to equal the thermometer reading.

4. Repeat this alternating procedure until the field unit will read both solutions within 0.5 degrees C.

4.0 INTERCEPTOR DITCH OPERATION

4.1 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 is necessary to artificially generate a seaward gradient east of 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.

4.2 Monitoring Locations

Surface water elevations shall be monitored at staff gages located in the West Feeder Canal of the Canal System, Levee 31 Borrow Canal and the Interceptor Ditch at five locations relative to Lines A, B, C, D and E, as shown on the inset, Figure 2. 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 on Figure 2.

4.3 Monitoring Frequency

Water elevation data shall be collected at the fifteen locations twice a month during non-pumping periods. These elevations will be measured on or about the 1st of each month and again near the middle of the month. Non-pumping periods reflect the wet season high water levels i.e., June through November.

During the 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 being pumped will be recorded in the Interceptor Ditch Pump Operation Log (Figure 9).

4.4 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.

Seaward Gradient - A natural seaward gradient exists when the Levee 31 water surface elevation (ft.,MSL) minus the West Feeder Canal water surface elevation

(ft.,MSL) is greater than 0.20 ft.

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

Landward 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 (ft.,MSL) in the Interceptor Ditch is maintained on the order of 0.30 feet lower than the water surface elevation (ft.,MSL) in Levee 31. Pumping can be terminated when the criteria for a natural seaward gradient is met.

The flow chart on Figure 6 depicts the requirements for pump operation. This chart should be referred to each time water elevation data are obtained in order to more easily determine when pumping is or is not required.

As can be seen on Figure 2 the pump stations divide the Interceptor Ditch into three segments. Each segment is evaluated separately with respect to the operating criteria. One segment, therefore, might require pumping while another might not. Pumping shall be initiated when any of the lines of staff gages governing that segment fails to meet the specified criteria for a seaward gradient. Adjustable intake gates (stop-logs) in each pump intake basin allow for various pump combinations to drawdown specific Interceptor Ditch segments.

4.6 Data Processing

Data shall be compiled on the forms provided (Figures 7-9). Field data will be kept for 24 months. Field data shall be distributed as follows:

a. Original- FPL Environmental Affairs Department.

b. One Copy- Retain on file at FPL Land Utilization Department at Turkey Point.

c. One Copy- Forwarded to FPL's Consultant.

4.7 Annual Report

An Annual Summary Report covering the preceding year's monitoring and operations data will be compiled and subsequently submitted to the South Florida Water Management District by the end of August of each year.

These reports, to be retained for the life of the Interceptor Ditch Program, will consist of the following elements:

a. a description of any operational or structural changes made to the Interceptor Ditch System,

b. a description of climatological conditions, including any unusual events,

c. a description of the results of the previous year's monitoring program,

d. updated time-history plots for all wells and parameters monitored and,

e. time-history plots for each Interceptor Ditch pumping station.

Distribution shall be in accordance with the following:

One Copy - Forward to South Florida Water Management District

4.8 Equipment Maintenance

Occasional cleaning of the staff gages is required when algae and other marine growths inhibit reading of the staff gages. Care must be taken when cleaning to prevent damage to or movement of the staff gages.

FIGURES

1. Groundwater Monitoring Program well locations.
2. Interceptor Ditch, Levee-31 Well and Pump Locations.
3. Historical conductivity-chloride relationship.
4. Raw Data Forms.
5. Calibration Log.
6. Interceptor Ditch Program Operational Flow Diagram.
7. Interceptor Ditch, Levee-31, Canal 32 Water Level Data.
8. Interceptor Ditch, Levee-31, Canal 32 Water Level Data.
9. Interceptor Ditch Pump Operation Log.

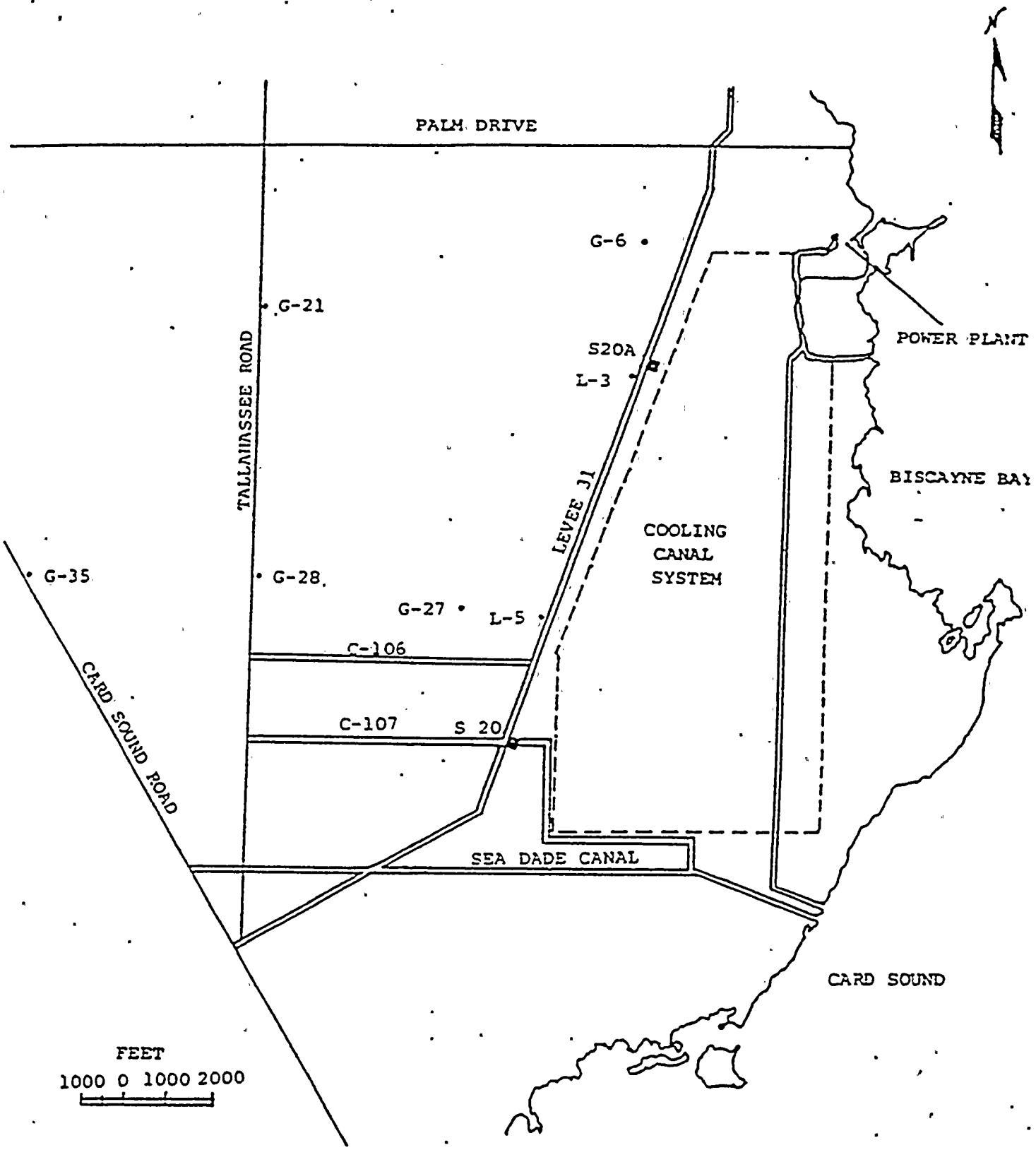

Figure 1. Groundwater Monitoring Program Well Locations

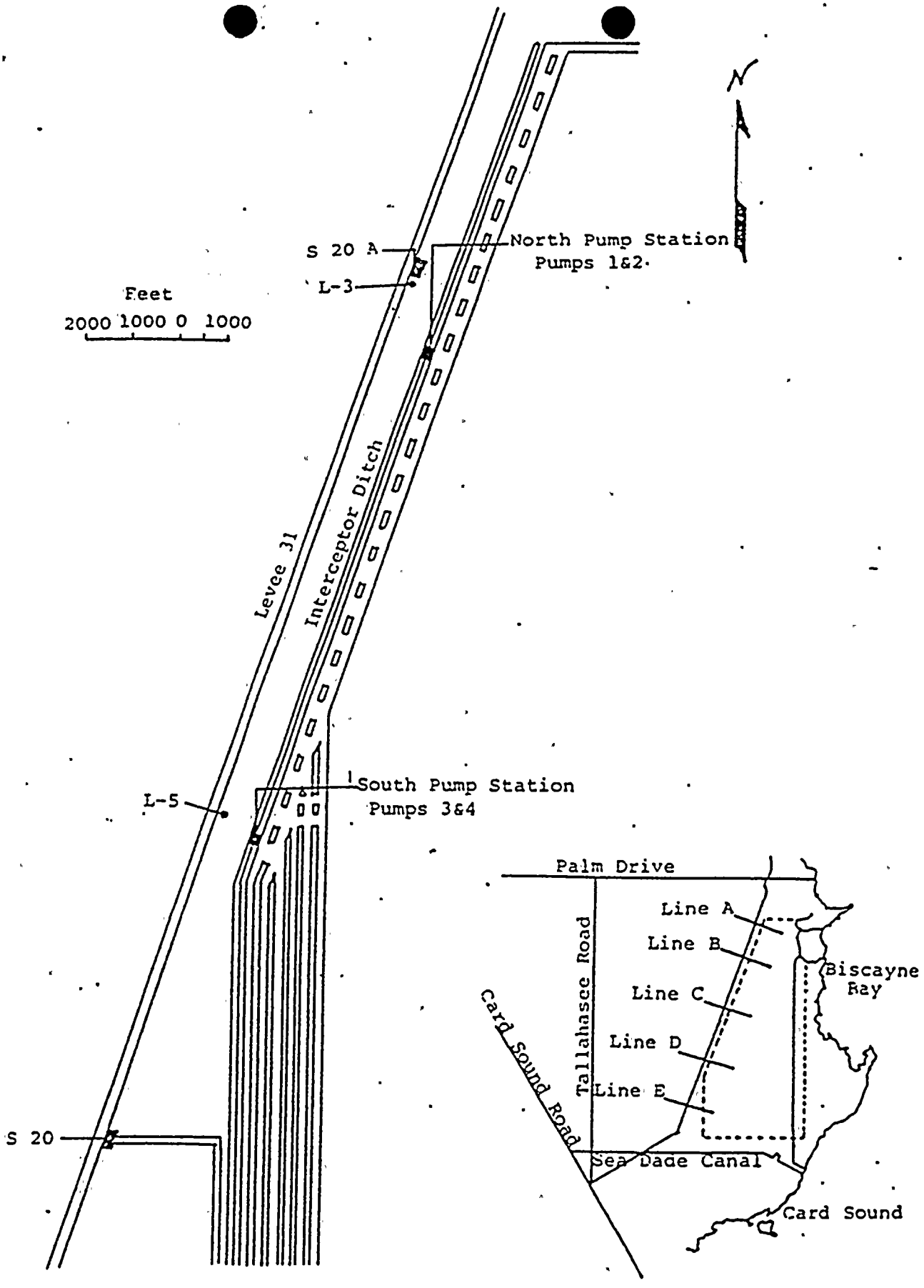

Figure 2. Interceptor Ditch, Levee-31, Well and Pump Locations

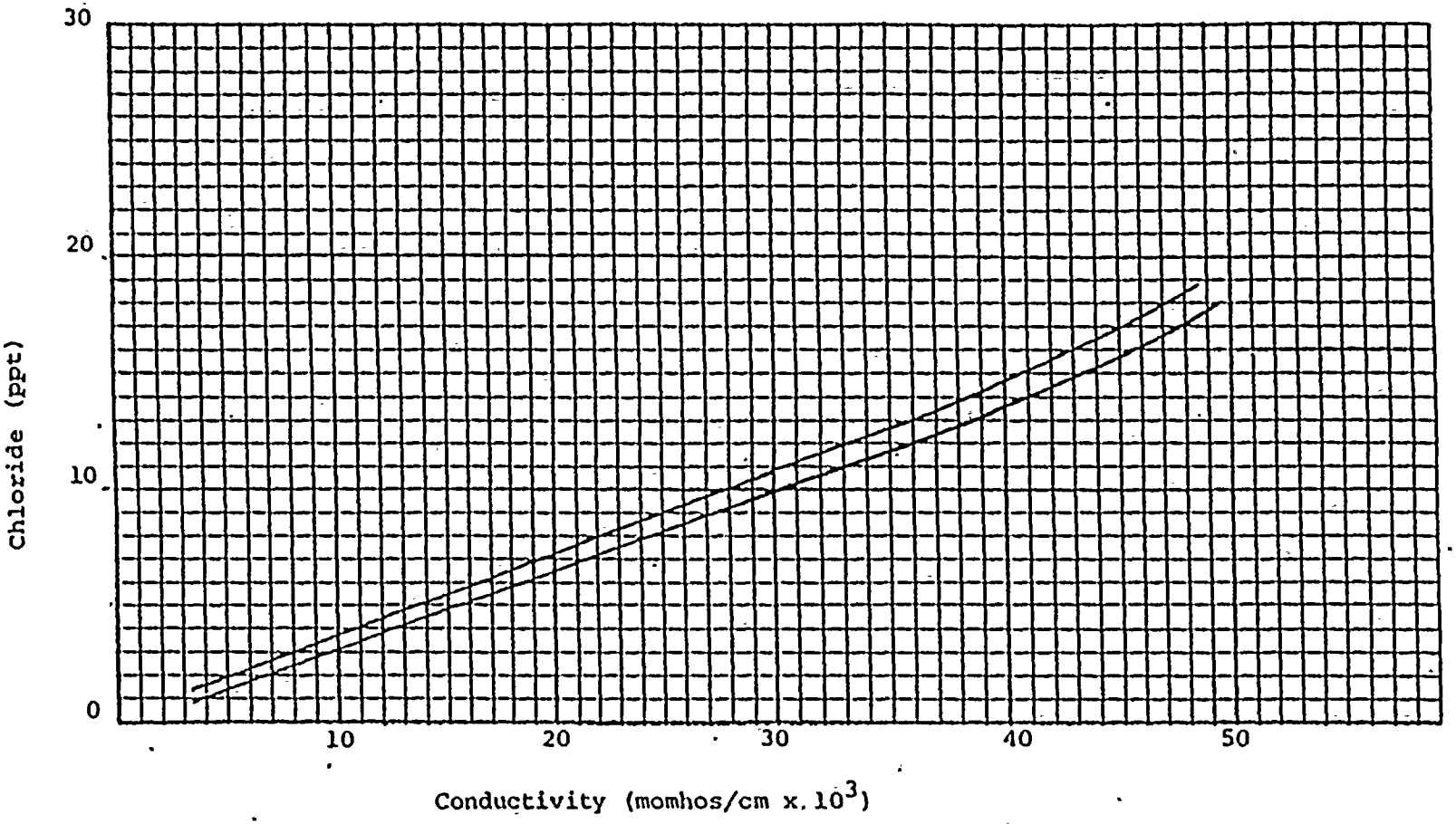

Figure 3. Conductivity-Chloride relationship, G-Wells.

GROUND WATER MONITORING PROGRAM
FCD WELL SERIES
TURKEY POINT, FLORIDA

WELL ID (1-4)

DATE (MN/DD/YY) (10-17)

CHECKED BY _____

CASING ELEVATION. (FT.MSL) _____

TIME (20-23)

RECORDER (25-27)

WATER LEVELS (FT) (DEPTH BELOW CASING)

GROUND (30-33)

SURFACE (35-38)

CHARACTERISTIC DATE

MONTH-YY (40-46)

WATER ELEVATION (FT) GROUND _____ SURFACE _____

DEPTH BELOW CASING (FT)	COND. (UMHOS/CM)	TEMP. (°C)	DEPTH BELOW CASING (FT)	COND. (UMHOS/CM)	TEMP. (°C)	DEPTH BELOW CASING (FT)	COND. (UMHOS/CM)	TEMP. (°C)

CALIBRATION LOG

Instrument: _____

Date/Time: _____

Technician: _____

Checked By: _____

	Conductivity	Temperature
1. Before Monitoring (Laboratory)		
Calibration Standard		
Meter Reading		
Meter Adjusted to Read		
2. During Monitoring		
A.		
B.		
C.		
D.		
E.		
3. After Monitoring (Laboratory)		
Calibration Standard		
Meter Reading		
Deviation		

Correction Applied (Explain): _____

_____

_____

_____

INTERCEPTOR DITCH PROGRAM
OPERATIONAL FLOW DIAGRAM

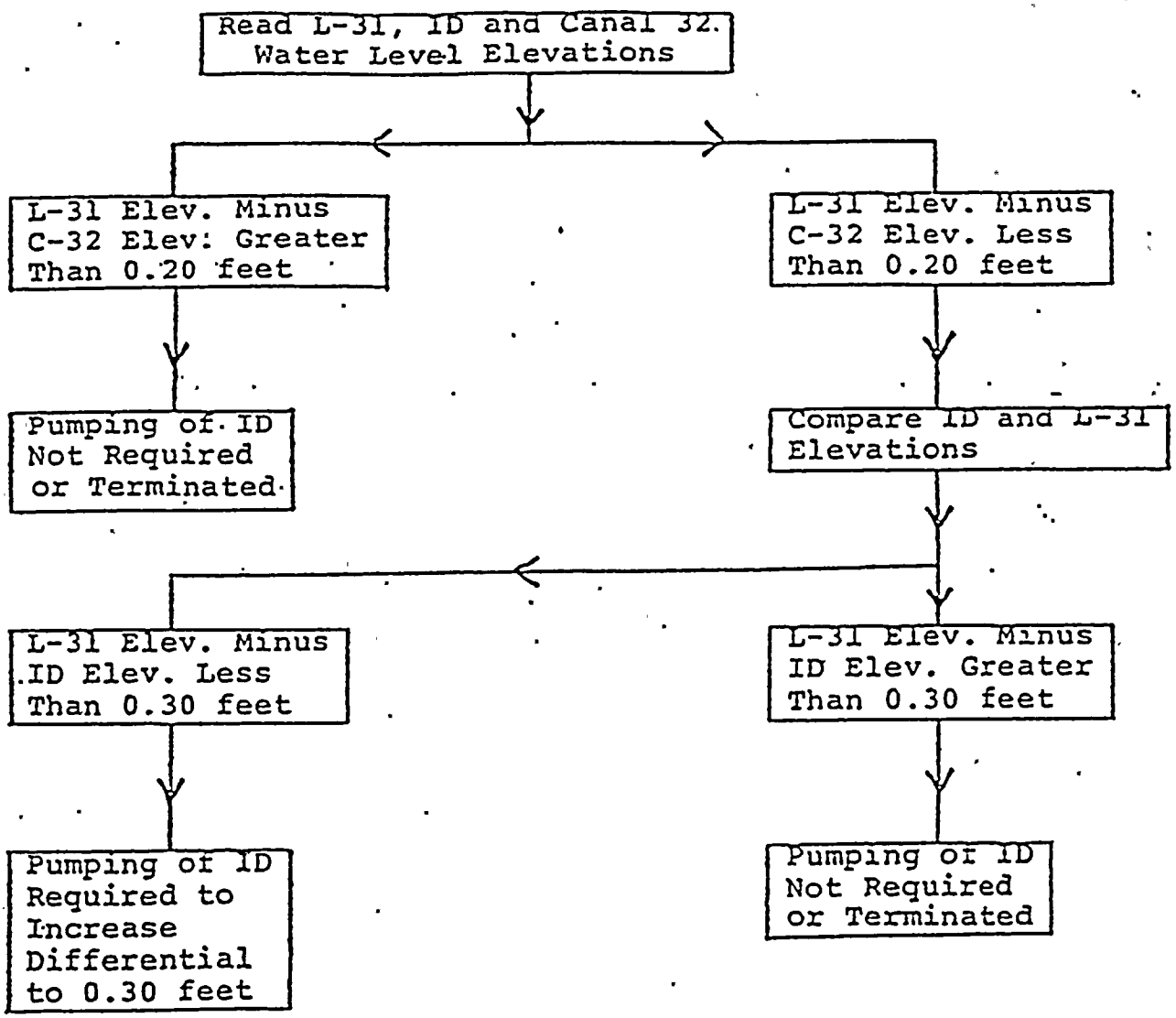

Figure 6.

WATER LEVELS-LEVEE 31, CANAL 32, INTERCEPTOR DITCH

INTERCEPTOR DITCH PROGRAM

MONTH/YEAR______

LINE A						LINE B						LINE C						LINE D						LINE E						
L-31 FT, MSL	ID FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS ID, FT	L-31 FT, MSL	ID FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS ID, FT	L-31 FT, MSL	ID FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS ID, FT	L-31 FT, MSL	ID FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS ID, FT	L-31 FT, MSL	ID FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS ID, FT	[illegible] YEA[illegible]

* IF L-31 MINUS C-32 IS LESS THAN 0.2 FEET, THEN COMPLETE NEXT TWO COLUMNS

Figure 7

WATER LEVELS-LEVEE 31, CANAL 32, INTERCEPTOR DITCH

INTERCEPTOR DITCH PROGRAM

MONTH/YEAR______

	LINE A						LINE B						LINE C						LINE D						LINE E						
DAY	L-31 FT, MSL	10 FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS 10, FT	L-31 FT, MSL	10 FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS 10, FT	L-31 FT, MSL	10 FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS 10, FT	L-31 FT, MSL	10 FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS 10, FT	L-31 FT, MSL	10 FT, MSL	C-32 FT, MSL	L-31 MINUS C-32, FT *	PUMPING REQ'D	L-31 MINUS 10, FT	OBSERVER
17																															
18																															
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* IF L-31 MINUS C-32 IS LESS THAN 0.2 FEET, THEN COMPLETE NEXT TWO COLUMNS

Figure 8

INTERCEPTOR DITCH PUMP OPERATION

MONTH / YEAR _____

		PUMP NO. 1		PUMP NO. 2			PUMP NO. 3		PUMP NO. 4		
DAY OF MONTH	TIME	STAFF GAGE READING	I.D. SECTION BEING PUMPED	STAFF GAGE READING	I.D. SECTION BEING PUMPED	TIME	STAFF GAGE READING	I.D. SECTION BEING PUMPED	STAFF GAGE READING	I.D. SECTION BEING PUMPED	CONDITION
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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Figure 9.

ATTACHMENT C

No Significant Hazards Determination

The proposed ground water monitoring deletion would not change any current limitations related to the operation of the plants. Since no operational limitations are being changed, this proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of a new or different accident from any accident previously evaluated and does not involve a significant reduction in a margin of safety. Therefore, it is determined that this amendment does not involve a significant hazards consideration.