
REPORT
GROUND WATER MONITORING AND INTERCEPTOR
DITCH PROGRAMS
TURKEY POINT, FLORIDA
FOR FLORIDA POWER & LIGHT COMPANY

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REPORT
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HISTORY OF PROGRAMS

In April of 1972, Florida Power & Light Company (FP&L) initiated the Turkey Point Ground Water Monitoring and Interceptor Ditch Programs in compliance with a legal Agreement between FP&L and the South Florida Water Management District (SFWMD) dated February 2, 1972. The programs consist of two separate but related projects. These are:

1. The Ground Water Monitoring Program, and;
2. The Interceptor Ditch System Program.

The purpose of the Ground Water Monitoring Program was to monitor the impacts of the cooling canal system on the underlying aquifer and water resources in the area and on the SFWMD's facilities and operations. The Interceptor Ditch Program was established to control inland seepage of cooling canal water.

The original ground water monitoring program consisted of 38 monitoring wells installed at 23 separate locations west of the cooling canal system, designated as the G-Series wells. Two piezometers, one 50 feet and one 20 feet deep, were installed at 15 of the 23 locations. The 20 feet deep piezometer was located approximately 10 feet north of the 50 feet piezometer. The remaining G-Series wells consisted of 60 foot deep fully screened wells.

Surface water and ground water elevations, ground water temperature and conductivity were measured in each of these wells near the beginning of each month. For the 15 pairs of piezometers, ground water temperature



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and conductivity were measured at the bottom of the casing; in the composite wells, these parameters were measured at depths of 20, 40, and 60 feet below the top of the well casing. In addition, water samples were obtained to verify and to correlate the water conductivity data by titration for chlorinity. A regression analysis of these data established the monthly relationship between conductivity and chlorinity; this relationship then being used to convert conductivity to chlorinity.

A revised ground water monitoring program was implemented in November of 1976 following ratification of the third supplemental agreement between FP & L and SFWMD in September, 1976. The revised program included the monitoring of additional wells designated the ID-Series, L-Series, and X-Series wells. The five ID wells are located along the western edge of the Interceptor Ditch. The six L wells are located just east of Levee 31E Borrow Canal, while the two X wells are located north of the Feeder Canal. Each of these wells are composite wells approximately 70 feet deep. The revised program also deleted the 15 pairs of G-Series well piezometers. Instead, Wells G-6, G-7 (later replaced by G-14), G-21, G-27, G-28, and G-35 were monitored. Monitoring consists of measuring surface water and ground water elevation and ground water conductivity and temperature. Temperature and conductivity are measured at one-foot intervals for the entire well depth. One water sample is obtained from each well for analysis of the chlorinity.

Beginning in April 1972, the F-Series wells located south of the cooling canal system were monitored. The installation of the F-Series wells was initiated by FP & L for the purpose of monitoring ground water changes due solely to natural causes in an area that was hydrogeologically similar to the area now occupied by the cooling canal system. Changes in the measured ground water parameters observed in the G-Series wells could be compared with data from the F-wells, enabling FP & L to differentiate between that part of the change that was attributable to natural causes and that part which could be attributed to the existence of the cooling canal system.



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These wells are composite wells and extend to a depth of about 70 feet below the ground surface. Between April 1972 and December 1976, monitoring of the F-wells consisted of measuring the water level and taking measurements of temperature and conductivity of depths of 20, 40 and 60 feet below the top of the well casing. One water sample was obtained from each well at a depth of 20 feet below the top of the well casing and returned to the laboratory for chemical analysis of the chlorinity.

In the November 19, 1976 F-well summary report all the data collected from the F-wells since initiation of the monitoring program in April 1972 was reviewed, indicating that ground water conditions in the vicinity of the F-wells had remained essentially constant since April 1972. The recommended revision of the F-well monitoring program was accepted by FP & L and was implemented for the January 1977 monitoring period. Since that time, wells F-3, F-4, F-6, F-7 and F-8 have been monitored on the first of January, March, May and November of each year. Conductivity and temperature measurements are made at two-foot intervals for the total depth of each well. Two water samples are obtained from each well for chemical analysis of the chlorinity. These data have been included in the Annual Ground Water Monitoring Program reports.

The Interceptor Ditch Program consisted of construction of a ditch along the western edge of the cooling canal system and the installation of pumping facilities. The ditch and associated structures were established to control inland seepage of cooling canal water. This is accomplished by pumping water from the ditch during periods when a natural seaward ground water gradient does not exist. Operational procedures for the pumping stations and requirements for pumping are presented in the Ground Water Monitoring and Interceptor Ditch Operation Procedures Manual dated May 6, 1976.

Surface water elevations are monitored at staff gages located in the Levee 31E Borrow Canal, Cooling Canal 32, and the Interceptor Ditch. These staff gages are located at five positions in each of these canals relative to Lines A, B, C, D and E. Water elevations are recorded twice a month during non-pumping periods (usually June through November) and once a



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week during potential pumping periods (December through May), except when the pumps are operating. When pumping occurs, water elevations are recorded at least twice a week.

REVISED PROGRAMS

On July 15, 1983, FP & L and SFWMD entered into a new Agreement which revises the Ground Water Monitoring Program. This revised program consists of monitoring wells L-3, L-5, G-21, and G-28 on a quarterly basis (October, January, April, and July). In addition, wells G-27 and G-35 are to be capped and maintained in a ready condition for monitoring. According to that agreement ground water and surface water elevations are to be measured at each of the four well locations. Conductivity and temperature are to be measured at one foot intervals for the total well depth. Two water samples are to be collected from each well for laboratory titration of the chloride ion content. These titration data are then used to develop a mathematical conductivity - chlorinity relationship. The results of the Ground Water Monitoring and Interceptor Ditch Programs will be compiled and submitted in a report on an annual basis to SFWMD. Copies of this report will also be forwarded to the Nuclear Regulatory Commission.

MONITORING RESULTS

The ground water monitoring program results collected over the past eleven years have shown two significant features:

1. Construction and operation of the cooling canal system has not resulted in any significant landward migration of the saltwater wedge into the potable sections of the Biscayne aquifer.
2. Operation of the Interceptor Ditch has served to protect the potable section of the Biscayne aquifer from saltwater intrusion.

The general conclusion has been that construction of the cooling canal system has had the localized effect of moving the shoreline of Biscayne Bay to the western edge of the system. Thus, the top of the saltwater wedge has moved to the western edge of the cooling canal system. Some

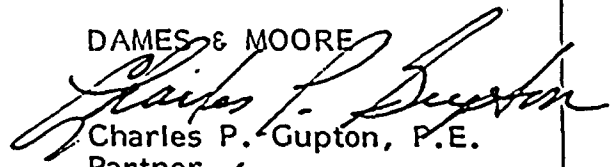
slight landward movement of the toe of the saltwater wedge has been observed through the brackish sections of the aquifer. However, water quality of the potable zone has not been affected. Saltwater wedge movement has been seasonal in response to variations in rainfall and water levels.


With the relocation of the top of the wedge to the western edge of the canal system, the Interceptor Ditch operation has prevented any seasonal inland movement of saltwater into the upper, potable portion of the Biscayne aquifer. The saline ground water is intercepted by the ditch and returned to the cooling canal system during the dry season when natural freshwater hydraulic gradients are low and the potential for some intrusion exists. In summary, the ground water monitoring program results have shown over the past eleven years that the cooling canal system has not caused any significant saltwater intrusion. The seasonal potential for saltwater intrusion is effectively controlled by the Interceptor Ditch operation.

The revised ground water monitoring program is designed to allow a continued monitoring of the saltwater wedge. Well pairs L-3/G-21 and L-5/G-28 lie along two lines oriented perpendicular to the western edge of the cooling canal system. These lines are therefore perpendicular to the saltwater wedge and can effectively monitor any significant inland movement of the wedge. Based on the past eleven years of monitoring experience, however, it is expected that the revised monitoring program will continue to show the normal, seasonal variations of the saltwater wedge.

Respectfully submitted,

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