



FPL®

Consent Agreement 2016 Annual Report



November 10, 2016

Executive Summary

The Cooling Canal System (CCS) is an integral part of the Turkey Point Plant site that has safely generated affordable, reliable and emission free power to FPL customers for over 40 years. The CCS was uniquely designed to minimize environmental impacts to adjacent Biscayne Bay. As it is unlined, CCS water has communicated with the underlying ground water. Over the past six years, FPL has been working with state and local agencies to assess the extent to which hypersaline water has moved into the surficial aquifer. As that information has been collected, analyzed and better understood, FPL has worked with the agencies to develop strategies for addressing the hypersaline water migration. These strategies are based on the concepts of abatement, remediation and monitoring. The Consent Agreement adopts these strategies.

FPL's progress in achieving the objectives of the Consent Agreement in its first year has been notable. The objective of the Consent Agreement is to demonstrate a statistically valid reduction in the salt mass and volumetric extent of hypersaline water (as represented by chloride concentrations above 19,000 mg/L) in groundwater west and north of FPL's property without creating adverse environmental impacts. A further objective of the Consent Agreement is to reduce the rate of, and, as an ultimate goal, arrest migration of hypersaline groundwater north and west of the CCS. In general, the progress made during this first reporting period is three fold. First, FPL has taken concrete steps to begin the abatement activity that helps arrest the migration of hypersaline water. Secondly, FPL has begun the process that will reduce the salt mass in the groundwater. Finally, FPL has developed a Site Assessment Plan which will address ammonia exceedances in adjacent artificially deep canals.

Specifically, positive progress was made in the following areas during this first reporting period.

- All compliance targets were achieved as required by the Consent Agreement.
- Abatement activities reduced salinity in the CCS and limited the increase in the dry season.
- FPL developed a full time Floridan aquifer water resource of 14 MGD which is now providing makeup flow to the CCS.
- FPL has not needed to use excess stormwater or marine ground water to freshen the CCS.
- FPL has developed a detailed three dimensional, variable density groundwater solute transport model, calibrated and reviewed by multiple agencies to support the design of a Recovery Well System (RWS).
- FPL submitted alternative configurations for the RWS to Dade County, which were reviewed, and a design was proposed and approved.
- FPL completed and submitted permit applications needed to implement the RWS. The applications are now being reviewed by the regulatory agencies.
- Approximately 15 million gallons per day of hypersaline water is being removed from the groundwater below the CCS and is being disposed of safely in a deep, non-drinking water aquifer.
- Activities prescribed in the Consent Agreement have been undertaken to provide regional hydrologic benefits and improve coordination with regional water managers.
- Monitoring requirements identified in the Consent Agreement have been initiated.
- FPL developed a Site Assessment Plan, required by Amendment 1 to the Consent Agreement, submitted the plan for MDC DERM review.

Background

FPL submits this Consent Agreement Annual Report in compliance with the requirements of Section 17.d.v of the October 7, 2015 Consent Agreement, which states:

“FPL shall submit annual reports providing an evaluation of progress in achieving the objectives of this Consent Agreement, status of implementing projects identified above, and the results of monitoring to determine the impacts of these activities. Recommendations for refinements to the activities will be included in the annual report. This may include deletions of monitoring that is demonstrated to no longer be needed, or additional monitoring that is warranted based on observations.”

The Consent Agreement was executed on October 7, 2015, and amended on August 15, 2016. The substantive sections of the Consent Agreement include paragraph 17.a – d, and Amendment paragraph 34. This Annual Report is organized consistent with the substantive sections of the Consent Agreement, and it covers the period October 2015 through September 2016.

Status of Activities and Evaluation of Progress

Abatement Activities (Section 17.a.i of the Consent Agreement)

Salinity in the CCS peaked during the summer of 2015 at approximately 95 psu. Abatement activities that were underway at the beginning of the reporting period were successful in reducing salinity to 40 psu by the end of 2015. As the dry season returned, and no further water sources were provided to the CCS, salinity rose to approximately 65 psu in May 2016. Sporadic rainfall events and increased heat exchange efficiency helped to maintain salinity between 55 and 65 psu through the summer of 2016. Initiation of Floridan Aquifer flow on July 27, 2016 combined with average rainfall to maintain CCS salinity in this range during the summer months when CCS temperature (and evaporation) is at its annual peak. Cooler weather in late September and early October assisted in maintaining and reducing CCS salinity. It is anticipated that continued seasonal rainfall, and the Floridan well flow, will reduce salinity through the balance of this year.

Construction and operation of the Floridan aquifer wells, applied for in 2014, had been delayed due to litigation. That litigation was resolved in FPL's favor in March 2016. On March 29, 2016 FPL received final authorization to add Floridan Aquifer wells allowing up to 14 MGD of low salinity water to flow into the CCS. The wells were progressed in stages, allowing the initial well development flow to begin on July 27, 2016. Full surface feature completion is expected by the end of November 2016.

In October and November 2015, FPL pumped approximately 1.26 billion gallons of excess stormwater from the L-31E canal to the CCS (approximately 2.6 billion gallons was pumped from July – November 2015). Based on the success of the 2015 actions (freshening sources provided, an average rainfall year, and the improved efficiency resulting from sediment maintenance) FPL did not pursue additional authorizations that would be required to access the L-31 excess stormwater in 2016.

It is noted that no other water sources, including the Marine wells, were utilized during the reporting period.

Water Source Reviews (Sections 17.a.ii- iv of the Consent Agreement)

FPL conducted an evaluation of alternative sources for reducing CCS salinity and submitted its report on March 31, 2016. The evaluation concluded that the Floridan Aquifer offered the best overall source of freshening water when all factors are considered. Reclaimed water from the South District Waste Water Treatment Plant was considered, however, there were challenges to its use, even under significant treatment, due to constituents that remain in the water. Many of these limitations, such as the presence of microconstituents, were noted in prior pilot projects conducted by Miami-Dade County that explored the potential use of reclaimed water for wetland hydration in the region.

Further, FPL completed the evaluation of the Interceptor Ditch (ID) operations using the Turkey Point variable density solute transport model operating in conjunction with Recovery Well System (RWS) Alt-3D and a report was provided to MDC DERM on May 16, 2016. The evaluation concluded that there were no immediate indications that ID operating procedures should be revised; however, as the RWS is

made operational, further reviews are warranted. In concept, the RWS provides a similar function as the ID, but the RWS achieves that function through water withdrawal at the base of the aquifer as opposed to an induced hydraulic gradient in the upper portion of the aquifer.

Remediation Activities – Phase 1 (Section 17.b.i of the Consent Agreement)

Phase 1 of the remediation activities in the Consent Agreement is related to modeling, engineering and regulatory activities needed to support a Recovery Well System (RWS). FPL performed an aquifer performance test in early 2016 that was subsequently used to inform the development of a variable density solute transport model. The model was completed and documented in a report presented to MDC on May 16, 2016. Submittal beyond the envisioned 180 day window was authorized by MDC DERM due to the complexity of the groundwater model and delays beyond FPL's control encountered during the construction of the Aquifer Performance Test. The model was employed to support the design and estimate the efficacy of the RWS submitted to MDC on the same date. In subsequent meetings with FPL, agency representatives from FDEP, SFWMD and MDC DERM provided recommendations for modification of the groundwater model (boundary conditions, parameter estimation/optimization conducted (PEST), variable hydraulic conductivity layering and associated PEST recalibration) which have been implemented by FPL. Application for all permits and authorizations required for construction and operation of the RWS were filed on or before September 16, 2016. The regulatory and permitting process to support the RWS is still underway as of the date of this report.

Despite regulatory delays, FPL investigated ways that it could move forward with initiating the withdrawal of hypersaline water from below the CCS. As a part of the permitting process for the UIC well, FPL conducted a flow test using four groundwater wells (installed for the purpose) in the center of the CCS. Identifying an opportunity, FPL applied to DEP for and was authorized extended operational testing of the UIC well. This allows FPL to pump up to 15 MGD from these wells. The extended test period began on September 29, 2016 and is extracting groundwater with an average salinity of 61.5 psu. The volume of water withdrawn from the test wells results in the removal of an estimated 7.9 million pounds of salt from the Biscayne Aquifer on a daily basis.

Regional Hydrologic Improvement Projects (Section 17.c of the Consent Agreement)

In accordance with CA section 17.c.i, FPL raised culvert weir elevations in Everglades Mitigation Bank on October 22, 2015. The objectives of CA section 17.c.ii, remediation of the Model Lands North Canal, were accomplished within the reporting period. Specifically, permit applications were filed within 30 days, and all permits/approvals were acquired and project implementation was completed May 19, 2016. In accordance with CA section 17.c.iii, meetings were held with SFWMD regarding the S-20 structure control. A discussion regarding flowage easements is ongoing.

Monitoring and Reporting (Section 17.d of the Consent Agreement)

In accordance with CA section 17.d.i&ii, FPL has facilitated DERM access to all data from continuous electronically monitored stations and continues to provide monthly and quarterly reports substantially consistent with those required in M-D Class I permit CLI-2014-0312.

A Continuous Surface Electromagnetic Mapping (CSEM) survey was conducted and a summary report of findings was submitted May 16, 2016. The technique provides a significant improvement in characterizing the spatial extent and relative chloride concentration of the hypersaline plume in regions north and west of the CCS. In general, the hypersaline plume (> 19,000 mg/L chloride) extends to the west within the Biscayne Aquifer an average 1.25 miles at -18 meters below ground surface (bgs). The plume is less extensive (i.e., closer to the CCS) above and below this depth, with no hypersalinity detected in the upper extent (between 0 and -7m bgs) of the aquifer west of the Interceptor Ditch. The CSEM data was used to inform the Turkey Point groundwater model required by CA section 17.b.i.

In compliance with CS section 17.d.iv, a monitoring well location and design proposal was submitted to MDC DERM on May 16, 2016. FPL received verbal approval of the sites from MDC DERM on September 6, 2016. Permit applications for construction were submitted to USCOE, FDEP, City of Homestead, and MDC DERM on September 16, 2016.

MDC DERM approved the RWS in a letter dated September 29, 2016. The letter also identified additional modeling, monitoring and reporting actions in association with the approval. FPL notes that most of these action items are contemplated in the Consent Agreement. FPL will work with MDC DERM to address the items identified in the letter, with a focus on continuing to comply with the requirements of the Consent Agreement.

Addendum 1

In accordance with CA section 34.a (Amendment 1), a Site Assessment Plan SAP was submitted to MDC DERM on September 14, 2016. The SAP identifies sampling locations, constituents and frequencies to assist in developing a Site Assessment Report and potential Corrective Action to address exceedances of Ammonia in artificial remnant canals adjacent to the CCS. FPL will proceed with implementation of the SAP upon approval by MDC.

References

- FPL Turkey Point Power Plant CCS Freshening Effectiveness Report, January 2016, Ecology and Environment.
- Water Supply Alternatives Analysis, March 2016, Golder Associates, Inc.
- Variable Density Ground Water Model Analysis and Results (Model use, design, calibration and description of alternatives), May 16, 2016, TetraTech
- Variable Density Ground Water Model Analysis and Results (Modification to the Interceptor Ditch Operations Plan (IDOP)), May 16, 2016, TetraTech
- Variable Density Ground Water Model Analysis and Results (Remedial Alternatives Modeling Evaluations and Selected Alternative), May 16, 2016, TetraTech
- A Groundwater Flow and Salt Transport Model of the Biscayne Aquifer, June 2016, TetraTech