FPL.

December 14, 2016

John J. Truitt
Compliance & Strategy Director
Florida Department of Environmental Protection
3900 Commonwealth Blvd
Tallahassee, FL 32399-3001

RE: Florida Power & Light Company Turkey Point Consent Order OGC File No. 16-0241: Thermal Efficiency Plan Submittal

Dear Mr. Truitt:

Pursuant to Paragraph 20.b., of Consent Order OGC File No. 16-0241, Florida Power & Light Company (FPL) is pleased to submit our Turkey Point Cooling Canal System Thermal Efficiency Plan for achieving a minimum of 70 percent thermal efficiency for the Cooling Canal System. The Plan is comprised of six components, to be conducted over near term and long term time horizons. The components include:

- Performance Objectives – identifies primary and secondary performance metrics to be monitored and will be used to guide corrective actions.
- Sediment Management – bulk sediment monitoring, removal and storage to maintain adequate working surface area of the system, promoting heat transfer from the western canals.
- Flow Management – monitoring and adjustment of individual canal throttle structures to influence the distribution of flow, complementing sediment management activities.
- Water Stage Management – monitoring and actions to influence stage levels when they approach the limits of historic ranges.
- Vegetation Management – actions to manage the extent and condition of terrestrial and aquatic vegetation to promote thermal efficiency, minimize berm erosion and stabilize water quality.
- Upset Recovery – monitoring of system performance data to identify out of normal conditions and implement actions to reverse negative trends.

Should you have any questions or would like additional information, please contact me at your convenience.

Sincerely,

Matthew J. Raffenberg
Senior Director, Environmental Licensing and Permitting

CC: John Coates, FDEP
Elsa Potts, FDEP

FPL®

Turkey Point Cooling Canal System Thermal Efficiency Plan

December 14, 2016

Executive Summary

Background

Florida Power & Light Company (FPL) and the Florida Department of Environmental Protection (FDEP) entered into Consent Order OGC No. 16-0241 (Consent Order) on June 20, 2016 to address certain issues related to the Turkey Point Power Plant (Plant) Cooling Canal System ("CCS" or "system"). Paragraph 20.b of the Consent Order requires FPL to submit a Thermal Efficiency Plan (TEP), within 180 days of execution of the Order (i.e., December 17, 2016), that includes "a detailed description for the CCS to achieve a minimum of 70 percent thermal efficiency. This efficiency plan shall address water stage management, vegetation control, dredging, chemical additives to the CCS for facility operation, and upset recovery."

FPL submits this Thermal Efficiency Plan in compliance with the requirements of Paragraph 20.b of the Consent Order.

Introduction

In addition to being a specific requirement under Paragraph 20.b, the TEP supports the first objective of the Consent Order, which includes "... undertaking freshening activities as authorized in the Turkey Point site certification, by eliminating the CCS contribution to the hypersaline plume, by maintaining the average annual salinity of the CCS at or below 34 Practical Salinity Units ("PSU")...". Maintaining the thermal efficiency of the CCS is critical to meeting the first objective because an efficient CCS minimizes the rate at which CCS water evaporates and leaves the system. Evaporation is the largest single outflow from the CCS, principally affecting the rate at which salinity changes within the system.

The TEP is comprised of six components, over two time horizons: near term and long term. The components include:

- Performance Objectives – identifies primary and secondary performance metrics to be monitored and will be used to guide corrective actions.
- Sediment Management – bulk sediment monitoring, removal and storage to maintain adequate working surface area of the system, promoting heat transfer from the western canals.
- Flow Management – monitoring and adjustment of individual canal throttle structures to influence the distribution of flow, complementing sediment management activities.
- Water Stage Management – monitoring and actions to influence stage levels when they approach the limits of historic ranges.
- Vegetation Management – actions to manage the extent and condition of terrestrial and aquatic vegetation to promote thermal efficiency, minimize berm erosion and stabilize water quality.
- Upset Recovery – monitoring of system performance data to identify out of normal conditions and implement actions to reverse negative trends.

Management of system thermal efficiency is inter-related to management of the system water quality, as discussed in the Turkey Point CCS Nutrient Management Plan submitted to FDEP on September 16, 2016.

System Description

The CCS serves multiple functions, and is subject to a range of environmental, thermal and hydraulic influences. The interaction of many factors creates a dynamic system that can result in both gradual and rapid thermal performance and water quality changes. The CCS covers a 5,900 acre area with an average design depth of the western canals of approximately 4 feet, resulting in a reservoir of nominally 5 billion gallons. The system is closed to external surface water influences. As a large heat exchanger, the CCS is subject to thermal input from Units 3 & 4 (Units 1 and 2 have been decommissioned), and several modes of heat rejection including evaporative heat loss, convective heat loss and long wave radiation. The system's performance is impacted by ambient weather phenomena, groundwater inflows and outflows, and the movement of sediment within the system that affects flow distribution directly, and thermal efficiency indirectly.

A basic familiarity with the system layout, functions and interactions will assist in understanding the components of the TEP.

Hydraulic Operation: Hydraulic circulation is accomplished by large Circulating Water (CW) pumps that draw water from the intake channels in the northeastern corner of the CCS. The CW pumps push water through heat exchangers in the power plant to remove excess heat, and discharge warm water to the west of the power plants along the northern extent of the CCS. The head created by the CW pumps results in a difference in water elevation (stage level), with the maximum stage at the discharge and the minimum stage at the intake.

Thermal and Fluid Balance: Thermal input into the system comes in two forms: heat input from the operating nuclear generating units and solar irradiation. Thermal release from the system is accomplished through evaporative and convective heat transfer, and long wave radiation. Evaporative heat transfer also removes water volume from the system resulting in increasing salinity of the CCS surface water. The primary flow into the system is seasonal precipitation. However, a secondary and important inflow is provided by saline groundwater, driven by low stage levels at the intake that induce inflow through the eastern CCS peripheral levees adjacent to Biscayne Bay.

Flow and Sediment Management: Similar to a riverine system, increased flow velocity and turbulence maintain sediments suspended, while reduced flow velocity and laminar flow allow for deposition of sediments from the flow. Sediment from berm erosion combines with organic material in the CCS to create sediments that are entrained in the flow as it returns north to the plant along the eastern canals. The sediments preferentially deposit in the upper sections of the CCS, as the flow velocities drop significantly upon beginning the southern leg of the journey. Throttles (small earthen berms that control the flow volume into each individual canal) are sized to distribute the flow equally from east to west, to provide an even distribution and resulting maximum heat transfer capability. When sediment builds up in the northern sections over time, the flow subtly shifts away from an optimal distribution and reduces the capacity and efficiency of the CCS.

Vegetation Management: Maintaining low vegetation on the berm tops serves several functions. Principally, maintaining vegetation trimmed to a low level promotes convective and evaporative heat transfer contributing to system thermal efficiency. Tree lines or significant shrubbery can interfere with cooling winds blowing across the system. Large trees and shrubs can also be destructive to the berm integrity and promote soil erosion into the CCS during rainfall events. Similarly, proper selection of ground cover can enhance berm integrity and minimize erosion. Normal vegetation lifecycles add organic material into the CCS, and certain species can release floating debris that can clog intake strainers and require cleaning and debris removal actions.

The objective of the TEP is to describe how each of the above factors are managed to maximize heat rejection capability of the CCS resulting in the lowest average system temperature achievable. This will naturally minimize the evaporative losses from the system and support reaching and maintaining the lowest salinity possible.

Part A: Near Term System Management (Next 5 years)

A.1 Performance Objectives

The principal performance metric is the calculated thermal efficiency, E, of the CCS. The formula for the calculation of the thermal efficiency is provided below.

$$Thermal\ Efficiency\ (E,\%) = \frac{T\ in - T\ out}{T\ in - T\ amb}\ x\ 100$$

Where:

T in = Temperature into CCS from Power Plant discharge

T out = Temperature leaving CCS at Power Plant intake

T amb = Temperature of ambient water in vicinity unaffected by Plant

Historic thermal efficiency measurements have confirmed that optimal thermal operation of the CCS is achieved when thermal efficiency is maintained in a band between 75% and 85%, subject to ambient and operational (flow) conditions.

Measurements must be conducted under generally stable and repeatable conditions, so calculation intervals may vary. Thermal efficiency is affected by seasonal factors: average stage level, air temperature, relative humidity, wind speed and direction. Favorable conditions include increased stage levels in concert with dry, cool conditions, prevailing winds from the southeast. Favorable conditions are most commonly experienced during winter (December through March). Less favorable conditions include lower stage levels, hot, humid, and still conditions occur during the summer peak months. This results in an observed seasonal variation of 5 to 7%. Flow conditions in the system also affect overall transit time between discharge and intake. Table 1 provides relative flow and observed efficiency for different flow configurations. FPL will take actions that will allow the thermal efficiency of the CCS to be maintained within the target range of 75% to 85%, with an annual average above 70%.

Table 1. Observed Thermal Efficiency for different operating conditions

Operating Condition	Flow Rate (cfs)	Thermal Efficiency
Units 1, 2, 3 and 4	4,200	77.5%
Units 1, 3 and 4	3,550	82.5%
Units 3 and 4	2,900	85.5%

A secondary performance metric is the temperature differential observed over key sections of the CCS. Heat rejection is predominantly accomplished in the upper three sections of the western shallow canals. Over 70% of cooling occurs prior to the midpoint of section 3, and over 90% of cooling occurs during the north to south transit in sections 1 through 5. Monitoring differential temperatures between key stations on the circulation path allows plant staff to assess the performance of the system in real-time. Additionally, the differential temperature between the plant intake (lowest temperature in the system) and the ambient water environment (lowest theoretically achievable temperature) is monitored as a means of estimating CCS system health. The optimal intake – ambient differential temperature is approximately 2.5 F degrees. Figure 1 identifies the CCS sections and illustrative temperature differentials across key sections.

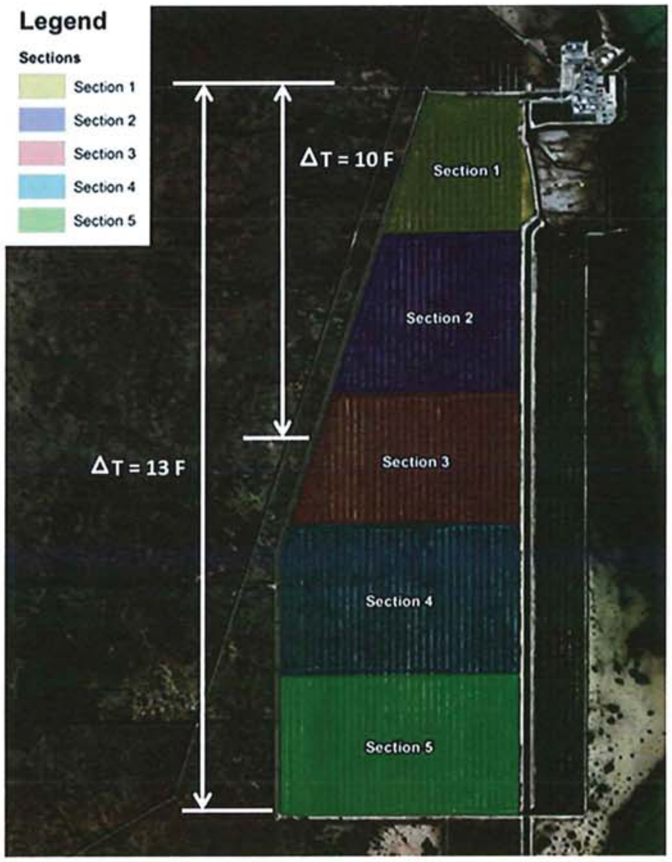

Figure 1. Turkey Point CCS Sections with illustrative temperature differentials for four unit operation.

A.2 Sediment Management

FPL has conducted sediment management activities as required to maintain satisfactory system performance. In 2013, CCS thermal efficiency began showing degraded performance from its historic range that could not be attributed to seasonal variations or measurement uncertainty. FPL undertook a limited mechanical dredging campaign in 2015 that restored CCS efficiency to the low end of the historic range. (See Figure 2). The forward plan for sediment management will build on the experience of this first campaign, recent thermal and hydraulic engineering analyses and nutrient management planning.

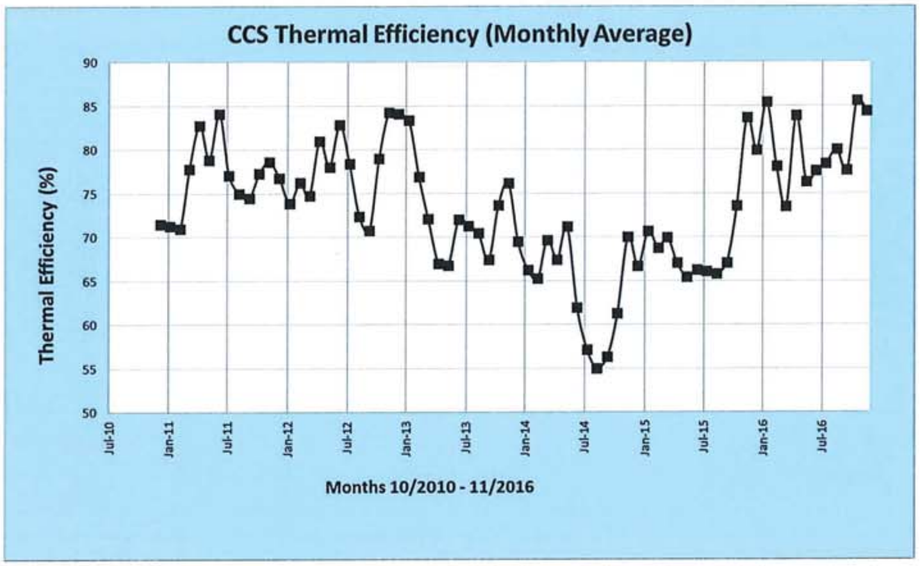

Figure 2. Historic and recent CCS thermal efficiency

A.2.1 Sediment Management Methods

There are two methods for bulk removal of submerged sediments in the CCS; mechanical dredging and hydraulic dredging. Each method has benefits and limitations.

Mechanical dredging can be conducted by tracked or floating excavators of various sizes. Benefits of mechanical dredging include a high level of control and simple equipment requirements and operations. Excavated sediment from the CCS can be placed directly on the berm tops and therefore provides for a fairly self-contained storage of spoils. A principal limitation is that of scope. The physical reach limitation of land based excavators is approximately 40 feet, whereas the canals average up to 200 feet in width. This means that mechanical dredging can provide for an efficient removal of sediment via mechanical means for approximately 40% of the sediment within any given canal, but cannot address the canal centers or the east-west running canals between sections.

Hydraulic dredging allows removal of sediment from the bottom of the canals from floating barges through a sluice-type pumping arrangement. It is equipment and land intensive, requiring significant specialized equipment and piping to remove and pump the sediment to a holding area where the slurry is allowed to dewater, and the remaining sediment is then managed for long term storage. Benefits include the ability to reach any location in the CCS, including the canal centers and the east-west canals. Challenges include maintaining production rates to minimize cost and having sufficient land area to handle the slurry efficiently.

Any dredging activity requires management of solids that are suspended in the water column by the agitation that occurs during dredging. These actions prevent downstream impacts of silting or resuspension of nutrients that are concentrated in the sediment. FPL addresses suspended solids by closing off canals under active dredging until water quality parameters are re-established.

A.2.3 Forward Sediment Management Plan

Table 2 provides a breakdown of the CCS sediment condition prior to initiation of the most recent dredging activity.

Table 2. Sediment Depth prior to recent Sediment Management Campaign

CCS Section	Average Sediment (ft)	Maximum Sediment (ft)	Remarks
1	1.9	2.8	Most heavily silted in northwest, forcing flow back to the eastern canals
2	1.4	3 @ S2-C17	Moderate silting in west, forcing flow back to the eastern canals
3	1.3	2.2 @ S3-C4,5,&9	Moderate silting in west, forcing flow back to the eastern canals
4	1.5	3	Moderate silting, more evenly distributed
5	1.4	3	Moderate silting, more evenly distributed

Phase I of the current sediment campaign employed mechanical dredging from land based excavators and an extensive flow management component to re-establish balanced flow upon completion of the dredging activity. Although limited in scope, the response of the CCS thermal efficiency to the 2015 dredge campaign was positive and provided a quick return to the low end of the historic operating range for thermal efficiency. Retirement of Unit 1 in October 2016, and the corresponding decrease in flow, is responsible for approximately 5% increase in measured efficiency. Further monitoring will be needed to determine the performance of the CCS at the lowered flow condition of 2,900 cfs, particularly during low stage periods in early summer.

Future phases will be conducted as necessary to achieve and maintain the objective and requirements of the Consent Order. Phases II and III are designed, if necessary, to focus on extending the coverage of the more economical mechanical dredging to address the current sediment distribution in the northern sections (Section 2 and 3) of the system. Sections 4 and 5 play a lesser role in heat rejection, and have a more even sediment distribution. Therefore, the future phases are not directed at dredging in Sections 4 and 5. An added benefit of minimizing work in sections 4 and 5 is that it will limit impacts to the crocodile population and retain undisturbed sea grass seeding areas that may aid future rejuvenation efforts. Phase IV of the plan provides for optional hydraulic dredging if the prior mechanical dredging activity does not demonstrate sufficient margin has been achieved.

It is anticipated that the Phase I work, coupled with expansion into Phases II – IV as necessary, will establish a base condition that will allow for continued operation through the remainder of the Unit 3 and 4 NRC license periods (i.e., 2032 and 2033) without further sediment management.

Table 3 and Figure 3 provide a description of each planned phase of the sediment management campaign.

Table 3. Outline of 2015 - 2019 Planned Sediment Management Campaign

Phase/Activity	CCS Section – (Canals)	Estimated Spoils Volume (cyds)	Incremental (Cumulative) Coverage*
Phase I			
Mechanical	1 – (2 – 17)	380,000	3.8% (3.8%)
Mechanical	3 – (14 – 24)	300,000	2.6% (6.4%)
Phase II			
Mechanical	2 – (4 – 21)	440,000	4.2% (10.6%)
Phase III			
Mechanical	3 – (4 – 13)	250,000	2.1% (12.7%)
Phase IV			
Hydraulic	E-W & Perimeter canals	390,000	3.3% (16.0%)

* Coverage is an illustrative estimate based on 168 total canal miles, not by sediment volume.

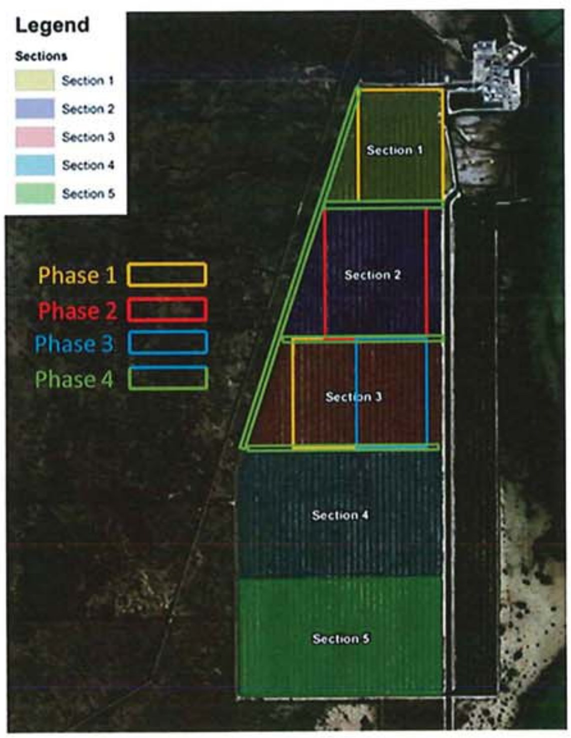

Figure 3. Illustration of 2015 - 2019 Phased Sediment Management Campaign

As FPL did following the Phase I work, FPL will monitor for proper flow balancing and thermal performance following any additional work under Phases II - IV. All activities will be consistent with the November 2014 Enercon Sediment Management Plan, and the Enercon Engineering Evaluation, EC 282844 governing CCS operations.

A.2.4 Environmental Considerations

There are several important environmental considerations in the conduct of the sediment management activities in the CCS. These considerations relate to avoidance and minimization of interactions with listed species that inhabit the CCS and to minimize the release of nutrients to the broader system during dredging. All plant staff and contractors receive training regarding interactions with wildlife during activities on site. FPL staff coordinates surveys of work areas to ensure no listed species or nesting activity will be impacted and are on call to support dredging staff. Dredging procedures address isolation of the areas being dredged and provide protocols for monitoring water quality to ensure criteria are met prior to restoring flow to each canal. In summary, a comprehensive approach to work preparation and execution is employed in all CCS activities.

A.3 Flow Management

Flow management refers to the actions required to monitor and maintain proper distribution of flow from the discharge canal into and through the main canal sections. The objectives of these actions are to ensure even flow distribution, maximizing the surface area available for heat rejection and maintaining the lowest system temperature and evaporation rates. By design, the discharge canal on the northern extremity of the CCS is intended to act as a header to distribute flow through the CCS. Additional flow must be pushed west to ensure even distribution in the main section of the CCS. This is accomplished by two features. A large canal on the western side of the CCS is designed to carry water farther south to feed the expanded canals in sections 3, 4 and 5. Adjustment of flow into each canal is further managed by throttle settings at the north end of each canal.

Flow distribution can change over time due to natural and man-made factors. Shifts in flow over time occur due to sediment deposition and berm erosion. Routine monitoring of flow distribution and temperature differentials will indicate when action is required. Dredging will necessarily affect flow distribution requiring a review and adjustment to throttles after each dredging phase. Less notable are seasonal changes in stage levels, which can swing by +/- 1 foot from mean stage level. Additionally, Circulating Water (CW) pump configuration affects stage level. The change in stage level against a relatively stable sediment level will create changes in flow distribution.

A.3.1 Flow Monitoring

Periodic and episodic monitoring is employed to maintain optimal flow conditions in the system.

Periodic flow monitoring is scheduled as a preventive maintenance activity in the event that no interim monitoring indicates a need.

- Temperature differential and thermal efficiency measurements. Temperature differentials will be monitored weekly and thermal efficiency will be estimated monthly, subject to suitable ambient conditions.
- Flow velocity measurement and mapping. This process is conducted for the full system every five years, unless specific conditions require significant adjustments in the interim period.
- Aerial Thermography. Unless required by interim dredging, the thermographic analysis will be conducted following the five year system flow velocity mapping to confirm that appropriate throttle settings have been made.

Episodic monitoring is conducted when flow conditions are changed through specific action or when other observations indicate a change in system functioning. Episodic flow monitoring can include:

- Temperature differential and thermal efficiency measurements. In addition to periodic measurements, the metrics will be analyzed following changes in plant configuration. For example, if Unit 3 is taken down for maintenance flow conditions will be assessed within 72 hours.
- Flow velocity measurement and mapping. Commonly conducted by section, this data driven process can be compared to historic and design flow conditions to determine the appropriate corrective action. The activity can be expanded to the full system if necessary.
- Aerial Thermography. Infrared photography by aircraft overflight provides a monitoring tool that can be digitized and reviewed to provide very specific recommendations for corrective action. Aerial thermography will be conducted following each sediment management phase to record the changed condition and confirm that appropriate throttle settings have been made.

A.3.2 Flow Adjustment

If the flow monitoring indicates a need to make adjustments, the project team will develop a plan for adjusting flow based on the November 2014 Enercon Sediment Management Plan, and consistent with the Enercon Engineering Evaluation, EC 282844 governing CCS operations.

A.4 Water Stage Management

Water levels in the CCS are influenced seasonally by rainfall that falls directly on the Turkey Point Power Plant site and to a lesser degree by operational water additions. When rainfall exceeds evaporation and seepage losses, stages rise. Conversely water levels drop during periods of below average rainfall. Rainfall, or the lack thereof, also influences salinity within the CCS. As CCS stages increase in response to rainfall, salinity levels drop, while during the dry season evaporative losses of freshwater concentrate salts.

Seasonal CCS stages have changed as little as 1.01 ft. to as much as 2.86 ft. in the period from 2010 to 2016 (Table 3). The smallest range occurred during a drought year, and the largest range occurred during 2015 when unusually heavy rainfalls combined with supplemental inflows from the L-31 E canal. While seasonal maximum stages vary widely due to rainfall, seasonal minimums appear to be more consistent around -1.15 ft. NAVD which corresponds to dry season Bay stages. Salinity also varies seasonally and has changed as little as 19.43 psu to as much as 43.83 psu. The wider range occurred in 2015 when extended drought conditions resulted in high salinities in the spring and heavy rains in the fall resulted in very low CCS salinities in early 2016.

CCS stages along the eastern side of the CCS are lower than stages to the west as a result of the operation of the Circulation Water pumps. As a result, for most of the year, water levels in the CCS are lower than stages in the Bay. Under these conditions, saltwater from beneath the Bay seeps into the CCS resulting in salt mass being added to the CCS. Analysis of stage gradients between the Bay and the eastern side of the CCS suggests that during average or dry years, salt water from the Bay is seeping into the CCS about 80% of the year. During wet years, this period drops to about 60%. The times when the CCS stage exceeds the Bay are short (generally between 10 and 20 days in duration) and occur after heavy rainfall events.

Table 3: Seasonal stage and salinity variation within the CCS

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Maximum Stage (ft)	0.44	0.07	0.00	0.41	0.94	1.73
Minimum Stage (ft)	-1.38	-1.08	-1.01	-1.23	-1.18	-1.13
Stage Change (ft)	1.82	1.15	1.01	1.65	2.12	2.86
Maximum salinity (psu)	62.66	65.11	66.96	94.33	96.64	68.86
Minimum Salinity (psu)	43.23	42.19	46.39	63.60	52.81	34.86
Salinity Change (psu)	19.43	22.92	20.57	30.73	43.83	33.99

A.4.1 Managed inflows to the CCS

There are several sources of lower salinity water that may be added to the CCS. These are categorized into two groups: 1) inflows related to the operation of the Plant (e.g., blowdown from Unit 5, stormwater runoff, and Interceptor ditch pumping operations), and 2) freshening purposes (Upper Floridan Aquifer (UFA) wells, and marine wells). Inflows resulting from operation of the Plant, while being low in salinity, are not relied upon for controlling CCS salinity levels. The UFA wells are operated for the long term management of CCS salinity levels.

The existing three marine wells have a flow capability of up to 45 MGD. Marine source water has a salinity of approximately 35 psu and therefore is to be used only when CCS salinity levels are being adversely affected by ambient conditions, such as drought. The six UFA wells have a permitted flow capacity of up to 14 MGD and a salinity of approximately 3 psu. This is FPL's primary long term freshening supply source.

The addition of 14 mgd of UFA water does not significantly impact the water stage in the CCS due to the size of the system and the rate of evaporation. The volume of water contained within the CCS ranges between 4 and 5 billion gallons depending on stage. Daily evaporation rates have been estimated on a monthly basis using FPL's Turkey Point CCS water and salt balance model as described in FPL's Comprehensive Post Uprate Monitoring Report, dated March 2016. Daily evaporation ranges from 28 to 55 MGD depending on plant operations and ambient weather conditions. Accordingly, the addition of 14 MGD of UFA freshening water reduces the daily evaporative losses from the system. The wells are not capable of measurably increasing CCS stages. However, water budget calculations indicate that the 14 MGD replacement of evaporative losses will result in CCS water stages approximately 0.1 feet higher than what occurs when the evaporation losses are not made up.

A.5 Terrestrial Vegetative Management

The berm tops and surrounding uplands around the CCS represent about 2,000 acres of property including a range of native and invasive plant species. Actions are required to provide the optimal airflow conditions for thermal efficiency as well as to minimize the amount of sediment and decayed vegetation that enters the CCS and can add to nutrient concentrations, sedimentation and clog intake screens. Excessive debris can create sufficient backpressure on intake screens to exceed operating limits, resulting in potential impacts to generation. During major sediment management campaigns, additional large scale vegetation management activities are undertaken to re-establish optimum conditions on the berm tops.

A.5.1 Berm stabilization and canal finger redress activities

As a part of the sediment management activities, berms are prepared in a manner that will minimize future erosion due to rainfall and stormwater runoff. All berms are grubbed and dressed and select berms are used to store mechanical dredge spoils. The dredged material is crowned with rocks and allowed to dry to prevent water pooling. The berm top is compacted and subsequently planted with grasses to stabilize the berm. Based on a review of available grasses, *Paspalum* is chosen to be planted on top of the berms while *Sesuvium portulacastrum* is chosen for the sides. This methodology was employed following the Phase I dredging campaign in 2015, and the berms have held up well to weathering. These procedures will be used as a basis for future berm stabilization activities during sediment removal. An amphibious back hoe is also used to reform berm edges to 45 degree angles and maintain an appropriate berm height. Edge reformation helps ensure even flow and heat rejection throughout the CCS to optimize cooling.

In addition to berm stabilization and vegetative management activities during sediment campaigns, FPL maintains a lower level of ongoing activities to address growth and degradation between major campaigns. Implementation of these processes maximizes system thermal efficiency, reduces intake weed/pine needle problems, improves the overall reliability of the cooling system and supports crocodile nesting/hatching seasons.

A.5.2 Vegetation Removal and Management Objectives

The management objective is to reduce vegetation on berm tops to a consistent and controllable level. Some specific berms are identified as crocodile nesting habitat, based on historic nesting behavior.

Native vegetation is maintained and all exotics are removed on these berms. This approach keeps mangrove and Buttonwood trees in place and reduces scrub and brush. On all other berms, power equipment is used to maintain small brush, grass, weeds to a low and consistent level. In addition, all moderately sized vegetation is removed and stock piled for controlled burns. An amphibious back hoe is used to remove tall exotic (i.e. Australian pine) vegetation. Australian pine, in addition to creating poor habitat for crocodiles, has a shallow root system, a high evapotranspiration rate, and is easily toppled over, making it a poor anchor for sediments.

A.5.3 Annual review and Planning Cycle

FPL conducts a review as a part of its annual budgeting cycle. It is this review that assesses the current status of all vegetation management practices (routine and sediment campaign related) and establishes the annual forward plan to achieve an optimal level of thermal performance. This process is generally consistent with the approach discussed in the Sediment Management Plan of Section A.2.3, and will be expanded to address those areas that are not covered by the Sediment Management Plan.

Note: No chemical additives are anticipated to be required for thermal efficiency management of the CCS.

A.6 Upset Recovery

The performance metrics discussed in Section 4.1 will provide the basis for identifying an upset condition. Action in response to degraded performance is time intensive with multiple long lead activities. Such action is also resource intensive, so careful analysis of performance data, coupled with review of historic trends and potential impacts (seasonal fluctuations, water quality influences, drought or heavy rainfall conditions, etc.) must be conducted to establish the need for and scale and timing of response.

Recovery options include the following actions:

- Re-initiation of Unit 1 CW pumps (as available) to provide additional circulation.
- Selective throttle adjustment.
- Selective mechanical dredging.
- Full system flow balancing.
- System wide sediment management.
- Additional freshening flows if salinity trend bears such action.
- Addition of aeration pumps to promote additional evaporative cooling.

Part B: Long Term System Management (beyond 5 years)

B.1 Sediment Management

The 2015 – 2019 campaign is estimated to be sufficient to provide the necessary margin to maintain annual average CCS thermal efficiency above 70% through the licensed period of operation for Units 3 and 4 (2031 and 2032, respectively). Monitoring of the metrics discussed in 4.1 will provide leading indication of future needed sediment management.

B.2 Flow, Water Stage, and Terrestrial Vegetative Management

The activities and methods described in Part A will be continued.

B.3 Submerged Aquatic Vegetation (SAV)

B.3.1 SAV Re-establishment

Formerly, SAV covered roughly 50% of the CCS bottom. Widgeon grass (*Ruppia maritima*) is the dominant species of grass that usually grows within the CCS canal bottoms. *R. maritima* has a wide geographic distribution and is found from the tropics to temperate regions. According to Koch et al., the salinity tolerance of *R. maritima* is approximately 55 PSU. Optimal temperatures for growth and development range from 20 – 25°C (68 – 77°F). Sections 4, 5 and the return canals are the coolest areas in the CCS and provide the best areas to focus on sea grass re-establishment.

Two methods will be considered for activities. Natural emergence is anticipated as water conditions improve and stabilize to promote growth of dormant seed banks. Depending on the success of this method, FPL may augment this approach with direct manual planting of sea grass beds to initiate colonies.

B.3.2 Harvesting and Maintenance Activities

Once sea grasses have been re-established, a maintenance program to prevent impact to plant operations must be enforced. FPL employs mobile and stationary grass/weed harvesting units. These units have the ability to remove floating, active material on the surface or up to 5 feet below the water surface. All procedures remain in place to restart the manual harvesting and maintenance program.