Turkey Point Units 6 & 7

SITE CERTIFICATION APPLICATION

PLANT AND ASSOCIATED NON-TRANSMISSION FACILITIES

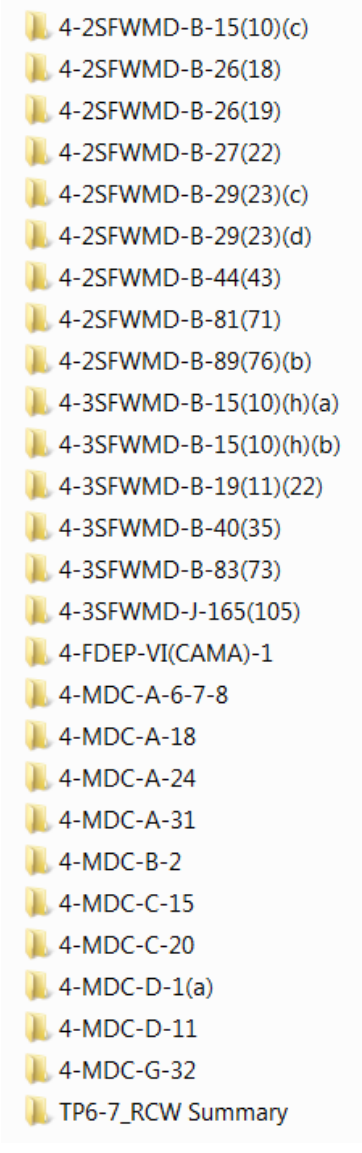
4TH ROUND COMPLETENESS RESPONSES

0938-7652

FPL

FEBRUARY 2011

To view attachments, open Windows Explorer and navigate to the CD.
All attachments are found in the “Attachments” folder:



MIAMI-DADE COUNTY (MDC)

SECTION A - PLANT SITE FOR UNITS 6 & 7 INCLUDING BARGE AREA

4-MDC-A-3 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S.

Pursuant to condition 15 of Z-56-07, FPL is required to develop a proposed study to be reviewed by DERM for compliance with Chapter 24 of the Miami-Dade County Code. Additionally, pursuant to condition 5 of l-56-07, data must be based upon groundwater modeling that uses a methodology approved by WASD in consultation with DEP, SFWMD and DERM. Miami-Dade County reiterates from meetings and past completeness responses that the model has not been approved by WASD as it is not adequate and the APT is not an acceptable hydrologic study under Chapter 24. FPL's statement that, "The APT is one element of the hydrologic study" and "...the APT together with the modeling does address those impacts," is not in compliance with Condition 15. Based on the foregoing, this item remains incomplete.

With regard to FPL's statements relating to stable isotopes in the latest completeness response, Miami-Dade County wishes to clarify that the use of stable isotopes is not adequate for the identification of water sources since such data will not be conclusive.

RESPONSE:

With respect to Condition 5, FPL has provided the information necessary to demonstrate compliance with the requirements of this condition. In particular, with the approval of the Joint Participation Agreement by MDC's Board of County Commissioners on July 20, 2010 for the supply of reclaimed water as the primary cooling water makeup source for the Turkey Point Units 6 & 7 Project, FPL has demonstrated compliance with the primary provision of Condition 5 that it "utilize reclaimed or reuse water to the maximum extent possible…" Additionally, as required by Condition 5, FPL has provided MDC with an alternative water sources plan, which outlines all sources of water not supplied by WASD through reuse. Because FPL is not proposing the use of water from the Floridan Aquifer, FPL disagrees that groundwater modeling of the Floridan Aquifer under Condition 5 is required.

With regard to Condition 15, please see Response 4-MDC-C-1, 4th Round Completeness Responses (February 2011).

With regard to the aquifer performance test (APT), as stated in 3rd Round Completeness Response 3-MDC-A-3 (July 2010), a draft of the APT plan was provided to Miami-Dade County and reviewed with the County during a meeting at Miami-Dade County Department of Environmental Resources Management (DERM) on February 4, 2009 and at a follow-up meeting on March 20, 2009. In addition, the South Florida Water Management District (SFWMD) was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and

suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

With regard to the statement that "the use of stable isotopes is not adequate for the identification of water sources since such data will not be conclusive," FPL would like to first note that radiological byproducts of operations at Units 3 & 4 (e.g., tritium), are closely regulated by the NRC pursuant to its preemptive authority under the Atomic Energy Act of 1954, as amended. Further, to date there has been no demonstration that the use of tritium as a "tracer" in proximity to a nuclear power plant is appropriate for the purpose of identifying water sources.

4-MDC-A-4 (Fourth Round)

Please see MDC's response to MDC-C-24.

RESPONSE:

Please see Response 4-MDC-C-24 below.

4-MDC-A-5 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S.

The purpose of the County's request for tritium sampling is to determine whether elevated levels of tritium are present in the groundwater in the area of the APT production well. Elevated levels of tritium during the APT would be a potential indication that the plume from the cooling canals was being drawn into the well during the test. With regard to FPL's statements relating to tritium in the latest completeness response, Miami-Dade County wishes to clarify that the County's request to sample for tritium during the APT test was not intended "to identify fresh or saltwater sources of coastal groundwater". FPL asserts that there is a federal preemption for this type of sampling; however, Miami-Dade County has consulted with the NRC and has been advised that there is no federal preemption that would prevent Miami-Dade County from seeking this type of information for evaluation of the application. FPL has presented no information to support its assertion.

FPL maintains that the use of stable isotopes of water (δD and $\delta^{18}O$) is a better indicator of the water source (fresh or salt water), however this neglects the additional possible source of cooling canal water (CCS). Per the conclusions reached by the UM Isotope study completed in 2009 prepared for the South Florida Water Management District (Swart, 2009), that while δD and $\delta^{18}O$ of the cooling canal system (CCS) have a distinctive positive signature, it is impossible to identify origin of waters with salinities less than that of Biscayne Bay as having been derived from the CCS using δD and $\delta^{18}O$ alone. The report states that using δD and $\delta^{18}O$ in combination with $\delta^{13}C$ can clearly identify waters that cannot be produced by mixing Biscayne Bay and groundwater alone. The report recommends a more rigorous sampling protocol to

define the possible extent of the CCS source waters, and that an additional isotopic indicator such as 6LiFLi ratio, as this ratio may be a diagnostic tracer of processes originating in the CCS. Furthermore, per the SFWMD Groundwater Monitoring Plan (SFWMD, 2009), developed pursuant to Conditions of Certification IX and X of the Power Plant Site Certification for the FPL Turkey Point Units 3 and 4 Nuclear Power Plant Unit Combined Cycle Plant PA 03-45A2, FPL is required to use the tracer suite of δD, $\delta^{18}O$, $\delta^{87}Sr$, and $\delta^{13}C$, ^{3}H (tritium), and a suite of ions to identify the extent of the CCS plume. While the County acknowledges that fresh groundwater and Biscayne Bay water will have indistinguishable tritium signals (Price et al, 2003), the District Monitoring Plan requires a detection level of 350 pCi/L as tritium levels are expected to be several magnitudes higher in the CCS than the background tritium levels of < 19.14 pCi/L reported by Price et al, and therefore CCS water will have a signature clearly distinct from either groundwater or Biscayne Bay water. Parameters for determination of source waters should be consistent with the DEP and SFWMD approved Turkey Point Uprate Project Monitoring Plan and the UM Isotope study.

References:

Price, R. M., Top, Z., Happel, J.D., Swart, P.K. (2003). Use of Tritium and Helium to Define Groundwater Flow Conditions in Everglades National Park, Water Resources Research, 39:9, p. 1267, DOI 10.1029/2002WR001929

South Florida Water Management District. FPL Turkey Point Power Plant Groundwater, Surface Water, and Ecological Monitoring Plan - EXHIBIT B. October 2009.

Swart, P.K. 2009. Analysis of the Stable H, O, and C Isotopic Composition of Waters in the Vicinity of Turkey Point Power Plant, South Florida. SFWMD PO 4500034800.

In addition, regarding dewatering activities, Miami-Dade County emphasizes that the information requested in this item is not limited to dewatering activities within the proposed power plant development site but also applies to all facilities and features of the project, including but not limited to installation of the proposed reclaimed water pipeline. For example, it is possible that the groundwater along some portions of the proposed reclaimed water pipeline alignment or in areas of other proposed features may be contaminated. Therefore, please detail which facilities will require dewatering during construction, provide a dewatering plan for each facility that includes impact to the groundwater (e.g. radius of influence, drawdown), the method of discharging the recovered groundwater, groundwater assessment, and potential treatment requirements.

In addition, provide a comprehensive monitoring plan, a water quality analysis of the source water, duration and total volume for each dewatering project, disposal options for any contaminated water, applicable calculations and supporting models, and justification for why dry conditions are required for each specific construction element where dewatering is proposed.

RESPONSE:

Since the 1st Round Completeness responses were provided (October 2009), FPL has evaluated alternative engineering solutions for Turkey Point Units 6 & 7 foundation construction to reduce

dewatering requirements. As a result, the foundation construction dewatering requirements have been reduced substantially from 21,300 gpm to 1,200 gpm or less. Please refer to Responses 4-2SFWMD-B-30(26)(36), 4-2SFWMD-B-44(42)49) and 4-2SFWMD-B-46(46)(c)(54) below for discussion of the revised dewatering plan, new foundation grouting methodology and potential impacts.

With regard to the APT, as stated in the 3rd Round Completeness Response 3-MDC-A-3 (July 2010), a draft of the APT plan was provided to Miami-Dade County and reviewed with the County during a meeting at MDC on February 4, 2009 and at a follow-up meeting on March 20, 2009. In addition, the South Florida Water Management District (SFWMD) was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

It is FPL's position that tritium is not a suitable tracer of cooling canal water. However, pursuant to the approved FPL Turkey Point Groundwater, Surface Water and Ecological Monitoring Plan, FPL is currently monitoring 42 groundwater wells and 28 surface water stations in and around the cooling canal system. As part of this effort, water samples from the wells, surface water and rainfall will be collected and measured for tritium at quarterly intervals. The detection limit for this effort is 10 pCi/L for locations outside the cooling canal system and 350 pCi/L for samples from the cooling canal system.

FPL will be presenting information for the three wells from the TPGW-10, the Biscayne Bay well cluster located ~500 m from Turkey Point. These wells have been logged by the USGS and screened in zones of high porosity to maximize the potential of capturing lateral trends of groundwater movement.

Miami-Dade County will have access to this data once FPL receives it and it is disseminated by SFWMD. The wells will not only provide Miami-Dade County an understanding of the vertical patterns of tritium in the groundwater but also provide insight into the temporal (i.e. seasonal) flux of tritium at different depths. The Environmental Protection Agency (EPA) drinking water limit is 20,000 pCi/L; tritium levels observed in the cooling canal system are significantly lower than that limit.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD.

With regard to dewatering, temporary trench dewatering may be required in areas where the water table is near the ground surface. Dewatering will be conducted in accordance with best management practices to prevent erosion and avoid sand, silt, sediment, or highly turbid water flowing into any wetland or waterbody. As necessary, dewatering effluent would be routed to a sediment filtration device, such as a geotextile filter bag or hay bale structure, prior to discharge in order to minimize the potential for erosion and sedimentation and comply with applicable water quality requirements. The

volume of effluent will be minimized through dewatering only immediately prior to lowering-in segments of pipe within a given location. Dewatering structures will be removed as soon as possible after the completion of dewatering activities.

Reference

HDR Engineering, Inc., 2009. *FPL Turkey Point Exploratory Drilling and Aquifer Performance Test Program Report.*

4-MDC-A-6, 4-MDC-A-7, and 4-MDC-A-8 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code and the Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County has determined that the additional information provided for review of the application as it relates to evaluating feasible distance (Section 24-5, Miami-Dade County Code) for connection to public sanitary sewers is adequate. However, In order to evaluate the project for requirements of Section 24-43 of the Code of Miami-Dade County and for any applicable variances, FPL shall provide a site plan identifying all existing Onsite Treatment and Disposal (OSTD) systems at Turkey Point. In addition, FPL shall clarify whether all OSTD systems will be properly abandoned pursuant to use restrictions for non-residential uses served by any liquid waste storage, disposal or treatment method other than a public sanitary sewer (Section 24-43.1 (6)), and whether all facilities that generate domestic sewage will be connected to the proposed STP, and shall provide a detailed estimation of flow rates, peaking factors and equalization requirements including additional flowrates resulting from abandonment of all OSTD systems. Furthermore, in order to evaluate the proposed project for conformance with non-procedural requirements of Miami-Dade County including approval of the proposed STP and discharge of both the domestic and industrial waste streams to the boulder zone. As part of the Hydrologic Study required pursuant to condition 6 of Z-56-07, FPL shall provide information as previously requested to demonstrate the geologic appropriateness of using deep wells for disposal. The Hydrologic Study shall include but not be limited to an evaluation of all impacts to surface water and groundwater (i.e. Floridan and Biscayne Aquifers), and shall include an evaluation of the proposed elimination of the freshwater inputs from the existing treatment plant.

RESPONSE:

With regard to Condition 6, FPL has provided the needed elements of a wastewater discharge plan. In this submittal and as described below, FPL is providing information to meet the required elements of a wastewater discharge plan for the on-site domestic sewage treatment plant.

Please find on the attached CD at Attachments\4MDC-A-6-7-8 *Technical Memorandum: Florida Power & Light, Turkey Point Plant: On-Site Sanitary Wastewater Treatment Plant – Rev. 1,* a revision to the technical memorandum that supersedes the Rev. 0 version provided with 3rd Round Completeness responses in July 2010 about the proposed on-site domestic wastewater treatment plant and decommissioning of existing septic tanks. Also please find on the attached CD at Attachments\4-MDC-A-6-7-8 Figure 1 that presents the locations of the existing septic tanks. The revised technical memorandum also presents information relating to flow rates and flow equalization volumes.

The salinity impact on the cooling canal system caused by removing the sanitary wastewater that currently goes to the Unit 3 & 4 injection well and the existing septic tanks was evaluated. The impact of removing these sources of "fresh" water from the cooling canal system will be less than 0.1 percent of the impact from natural rainfall variation. Therefore, salinity changes will not be measurable or detectable, and there will be no adverse environmental impact.

These sanitary systems are located within the limits of the industrial wastewater treatment facility (i.e., they are effectively surrounded by the cooling canals), the release points are shallow and the effluent is less dense than the water in the cooling canals. Consequently, effluents from these sources flow to the industrial wastewater facility through the upper layers of the Class G-III water table aquifer. The annual average flow for the injection well, as reported in the 2009 DMRs, is 4,000 gpd. The existing septic systems (Land Use facilities and Units 1 & 2) will add 1010 gallons per day (gpd) to the "fresh" water flow. The combined flow is equivalent to 5.61 ac-ft/year. The total area enclosed by the cooling canal system is approximately 5,890 acres (Lyerly, 1998). Therefore, the wastewater effluent released to the industrial wastewater facility from the existing injection well and the existing septic systems is equivalent to 0.01 inches/yr of rainfall over the cooling canal system. To put this in perspective, the average annual rainfall at nearby station SF20 is 46 inches, and year-to-year variations in the annual average rainfall can be +/- 10 inches. Therefore, the impact of removing these sources of "fresh" water from the cooling canal system will be less than 0.1 percent of the impact from natural rainfall variation. There will be no adverse impact. Salinity changes will not be measurable or detectable.

With regard to the underground injection control (UIC) wells, FPL is following the UIC permitting process for authorizing this disposal method. The steps taken to date have been fully reviewed and accepted by the FDEP UIC permitting process. FPL has evaluated the available regional data and supplied an impact analysis in Section 6.2.2 of the SCA. The impact analysis using regional data demonstrated that UIC is a suitable disposal method for the Project. In addition, FPL applied for and received authorization from FDEP to construct and operate an exploratory UIC well to determine site-specific characteristics for developing UIC wells. This application was contained in Appendix 10.2.8 of the SCA. This information demonstrates that UIC is a suitable disposal method for this Project.

There is no hydrologic study required under Condition 6 of Zoning Resolution Z-56-07. With regard to Condition 15, please see Response 4-MDC-C-1, 4th Round Completeness Responses (February, 2011).

4-MDC-A-11 (Fourth Round)

Please see MDC's response to items MDC-A-6, MDC-A-7, and MDC-A-8

RESPONSE:

Please see Responses 4 MDC-A-6, A-7, and A-8 above.

4-MDC-A-13 (Fourth Round)

Please see MDC's response to items MDC-A-6, MDC-A-7, and MDC-A-8

RESPONSE:

Please see Responses 4 MDC-A-6, A-7, and A-8 above.

4-MDC-A-17 (Fourth Round)

Please see MDC's response to MDC-A-18

RESPONSE:

Please see Response 4-MDC-A-18 below.

4-MDC-A-18 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges FPL's response regarding additional information that will be provided. The applicable County Code provisions are Sections 24-42 (3), 24-48.3 (7), and 24-48.3 (1) (d), Code of Miami-Dade County.

RESPONSE:

In response to the request made by MDC for revised drawings and calculations for the stormwater management systems, FPL has prepared the following additional information and updated the Appendix 10.8 to Rev. 1 status (found on the attached CD at Attachments\4-MDC-A-18\Attachment 2) to satisfy the information needs for the review process. The information has been discussed with MDC DERM during the August 2, 2010 and November 5, 2010 meetings. Following are the updates made to SCA Appendix 10.8 Stormwater (Rev. 1):

1. Supporting drawings generated (included on the attached CD as Attachments\4-MDC-A-18\Attachment 1):
   - Two pre-development drawings showing the boundary at the existing condition for the reclaimed water treatment facility and plant area, respectively (Figures 13 and 2).
   - Two post-development drawings showing post development drainage areas identifying the contributing and non-contributing areas to runoff generation for both reclaimed water treatment facility and plant area respectively (Figures 12 and 8).
   - A finish grade drawing showing the outlet structures (emergency spillway and riser outlet) details and elevations of the stormwater basins in the reclaimed water treatment facility area, including riprap aprons (Figure 14).
   - A storm water basin sections and details drawing showing the details of the riser and emergency spillway outlet structures for the reclaimed water treatment facility area (Figure 15).

2. Updated the stormwater basin calculation for the reclaimed water treatment facility area including the peak discharge rate calculation for the pre-development condition. This is to facilitate comparison with the peak discharge rate for the post-development. The results of the calculations are contained in the updated SCA Appendix 10.8, Rev. 1.
3. Updated Appendix 10.8 to Rev. 1 status to include revised tables, figures and all attachments reflecting the modifications/changes to the documents mentioned above. (Note: There is no attachment 3).
4. Prepared a summary table (Attachment 4) found on the attached CD at Attachments\4-MDC-A-18\Attachment 4, based on the updated Appendix 10.8, Rev. 1, and reclaimed water treatment facility stormwater basin calculation, comparing pre- and post-development drainage areas and runoff volumes for the site, nuclear administration/training area and reclaimed water treatment facility. In addition, comparison of pre- and post-development peak discharges and dry detention volume calculations were also included in this summary for the reclaimed water treatment facility.
5. Updated SCA Figure 4.2-6 Rev. 1 (Attachment 5) on the attached CD at Attachments\4-MDC-A-18\Attachment 5.

In meetings with FPL, MDC's has requested that stormwater treatment be provided, specifically capturing the first inch of runoff in dry detention before routing stormwater from the Site, nuclear administration building, training building and parking area to the industrial wastewater facility. Because the stormwater to be released from the Site, nuclear administration building, training building and parking areas is released to the industrial wastewater facility, with enough storage capacity and no surface water discharges, dry detention or retention is not required. Nevertheless, FPL has determined that there is enough space to add dry detention basins designed to detain/retain and treat the first inch of runoff from these areas for water quality control. FPL is willing to work with MDC to develop an appropriate condition of certification to address this issue.

4-MDC-A-20-1 (Fourth Round)

Please see MDC's response to item MDC-A-18

RESPONSE:

Please see Response 4-MDC-A-18 above.

4-MDC-A-20-2 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County acknowledges FPL's desire to provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

In response to the 2nd Round comment that "the surface water model and groundwater model should be coupled," FPL's position is that the objectives to be achieved by coupling are satisfied because the groundwater model simulates potentially significant surface water influences on the groundwater system. By including the boundary conditions discussed below, the influences of surface water on the groundwater system and vice versa are appropriately simulated.

As described in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations*, Rev. 1 (Bechtel Power Corporation, 2011), surface water features around the FPL Site include the following:

- Biscayne Bay
- Cooling canal system
- L-31E Canal, Model Lands Canal, Florida City Canal, and the Card Sound Canal
- Interceptor ditch

The revised groundwater model was developed using MODFLOW-2000 (Harbaugh et al., 2000). The River Package in MODFLOW-2000 was used to simulate the effects between the various canals (cooling canal system, L-31E canal, C-107 canal, Card Sound Canal, and Florida City Canal) and the groundwater system. This package is intended to model the interaction between surface water and groundwater, allowing surface water features, such as canals, to contribute to the groundwater system or drain water from it depending on the head gradient between the surface water feature and the groundwater regime. The General-head Boundary Package in MODFLOW-2000 was used to represent the interaction between Biscayne Bay and the underlying groundwater system. This package is mathematically similar to the River Package in that flow into or out of a finite-difference cell from an external source is provided in proportion to the difference in the head in the cell and the head assigned to the external source. By assigning the layer 1 cells underlying Biscayne Bay as general-head boundaries and designating the external head to be equal to the Biscayne Bay water level, the interaction between Biscayne Bay and the underlying groundwater system is simulated. Through the use of these MODFLOW packages, coupled surface water-groundwater interactions are appropriately represented in the model.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated

impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized. The steady-state, constant-density and three-dimensional groundwater model and the operational design configurations discussed above produce an environmentally conservative assessment of potential environmental impacts.

Please also see Response 4-MDC-A-21.

Reference

Harbaugh, A.W., E.R. Banta, M.C. Hill, and M.G. McDonald, 2000. *MODFLOW-2000, the U.S. Geological Survey Modular Ground-Water Model - User Guide to Modularization Concepts and the Ground-Water Flow Process*, U.S. Geological Survey Open-File Report 00-92, 121 p.

4-MDC-A-21 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County acknowledges FPL's desire to provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

The revised groundwater model was developed using MODFLOW-2000. The River Package in MODFLOW-2000 was used to simulate the effects between the canals and the groundwater system. This package is intended to model the interaction between surface water and groundwater, allowing surface water features, such as canals, to contribute to the groundwater system or drain water from it depending on the head gradient between the surface water feature and the groundwater regime. The appropriate MODFLOW package has therefore been used to account for the effects of the cooling canals.

As described in Section 3.3.3 of the revised groundwater modeling report, the flow regime is simulated using a constant density groundwater model. The primary purpose of the model is to estimate pumping rates required for construction dewatering and to assess the impacts of radial collector well operation. For the radial collector wells, the pressure influences of variable density are

insignificant relative to the hydraulic gradient imposed by pumping because approximately 97.8 percent of the water is recharged from Biscayne Bay. The revised foundation dewatering plan has significantly reduced the dewatering rates such that the area of influence is small and constrained to an area of relatively consistent density within the Turkey Point Units 6 & 7 Site. The constant density assumption is therefore justified for the purposes for which the model is intended.

Due to their size, a hard drive containing the input and output data files for the revised groundwater model will be provided to the FDEP Siting Coordination Office, the FDEP Southeast District, SFWMD, and MDC under separate cover. A copy of the input and output files will be made available to other reviewing agencies upon request.

4-MDC-A-23 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges receipt of the replacement CD that contains copies of the 2 requested reports: *Final Environmental Impact Statement Related to Operation of Turkey Point Plant,* Dockets No. 50-250 and 50-251, Washington D.C. (US Atomic Energy Commission, 1972) [File name: *Final EIS Turkey Point 1972.*pdf] and *Turkey Point Expansion Project SCA* (FPL, 2003) [File name: *Volume 3.pdf*], however, neither of these documents provided the requested information.

FPL has stated that "The Site is typically completely inundated much of the year, depending upon the operation of the Turkey Point plant and associated cooling needs." However, Miami-Dade staff observed the area exposed on several visits to the site during the wet season, and aerial photo review indicates that the site was more often exposed than flooded during the dry season period when the photos are taken. This observed variation in site hydrology and known seasonal influence on wildlife patterns must be considered when characterizing the site. Miami-Dade County acknowledges FPL's clarification on the information that has previously been provided regarding actual or potential flora and fauna that occupy or utilize the proposed plant site. However, this information does not fully and adequately characterize use of the proposed plant site by flora and fauna, especially as it relates to temporal influences (i.e. both seasonal and water level) on their presence and distribution. See comments under MDC-A-26-2.

RESPONSE: Comment noted. Observations of Miami-Dade staff that the area was both inundated and dry are consistent with the statement that the Site is inundated much of the year. The Site is within the industrial wastewater treatment facility, and water levels within this facility are directly influenced by plant operations as well as rainfall. The use of the Site by flora and fauna has been characterized in the SCA and completeness responses; in particular, please refer to 1st Round Plant and non-Transmission Response MDC-A-23 (October 2009), 2nd Round Response 2MDC-A-23 (April 2010), and 3rd Round Response 3MDC-A-23 (July 2010). As stated previously, prior to actual commencement of construction, FPL will conduct pre-clearing surveys for state and federally-listed species during the nesting season; if any nests of listed species are observed, construction in those areas will be scheduled outside of the nesting season. The surveys will be conducted in consultation with the FWC, USFWS and with MDC. FPL will comply with the applicable FWC and USFWS survey protocols and with those agencies' regulations regarding avoidance, minimization, and mitigation of impacts to state and federally-listed species, including plants that may be found within the area where construction will be undertaken.

4-MDC-A-24 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Please clarify whether seagrass mitigation is occurring in the EMB and provide a map identifying the specific location. FPL shall submit a complete mitigation plan for review that details the specific mitigation proposed for the specific project impacts including location maps, complete UMAM/W.A.T.E.R. scores, calculations and justifications related to time lag and risk, monitoring and success criteria. A complete mitigation plan is required at this time for review of the project.

RESPONSE:

Seagrass mitigation is not occurring in the Everglades Mitigation Bank (EMB). However, planned coastal restoration in the EMB includes grading the eastern side of the remnant Card Sound Canal and reconnecting the adjacent coastal wetlands (Area 10) through creation and reconnection of remnant tidal creeks. Natural recruitment of seagrasses is anticipated in that area to provide essential fish habitat. The specific location of restoration Area 10 within the EMB is shown on the figure on the attached CD at Attachments\4-MDC-A-24.

Seagrass within the remnant cooling canals of the Units 6 & 7 Site does not provide the typical ecosystem functions of seagrass communities, specifically primary production and nursery habitat needed to support commercial and recreational fisheries, as they are contained within a closed industrial wastewater treatment facility. In-kind replacement of impacts to areas of seagrass within the industrial wastewater treatment facility is not proposed. Nevertheless, wetland impacts associated with the Units 6 & 7 Site, including areas vegetated with seagrass will be mitigated through purchase of credits from the EMB.

Within the man-made barge turning basin, the 0.1-acre area of proposed dredging contains minimal coverage of seagrass, limited to approximately 0.002 acres with coverage between 5-10% of shoal grass and turtle grass. The limited extent of seagrass is due to the depth of the basin, steep banks, and rocky substrate along the edges of the basin. Due to the extremely small area of impact, specific mitigation to offset the loss of 0.002 acres of sparse seagrass is not proposed.

The mitigation for specific Project impacts has been addressed in the wetlands mitigation plan contained in the Wetland Mitigation Plan contained in SCA Appendix 10.4, Attachment E (Rev. 1, May 2010). In accordance with the licensing processes, FPL is refining the mitigation plan with input from MDC, USACE, FDEP, and the SFWMD to identify a final plan of wetland enhancement, restoration, and preservation that will offset the loss of wetland functions. The final mitigation plan will reflect agency recommendations through removal of those components with the greatest risk of meeting success criteria and incorporation of those mitigation options that have the highest probability of success, in order to cumulatively provide the necessary functional lift to offset the Project's wetland impacts upon completion of final design of Project features. Based on feedback from multiple reviewing agencies, FPL is removing the options of adding reclaimed water to the Model Lands Basin, the S20A/L-31E hydrologic enhancement, and the ENP seepage management as components of the Project's mitigation plan.

The final mitigation plan will be based on identification of actual wetland impacts following selection of the rights-of-way within the certified corridors and detailed engineering design. FPL will work with the agencies to develop the appropriate conditions of certification for the mitigation plan. The final mitigation plan, including details of proposed restoration activities, monitoring, and success criteria, will be available during the post-certification review process authorized by Section 403.5113(2), F.S., and Rule 62-17.191, F.A.C.

As described in the previous responses 3-MDC-G-20 and 2-MDC-A-25, the ERP application form (SCA Appendix 10.4, Rev. 1, May 2010), Section E, includes a Project Impact Summary (Table 1), which details the amount of wetland impact associated with each project feature and the proposed mitigation to offset those impacts. In the case of the Units 6 & 7 Site, impacts are proposed to be mitigated through the EMB. In the case of the transmission lines, impacts are proposed to be mitigated through the Hole in the Donut Mitigation Bank. These two Project features comprise approximately 70 percent of the total Project wetland impact. For the remaining Project features, including the temporary construction access roadway improvements, water delivery pipelines, reclaimed water treatment plant, and the administration and training buildings and parking area, FPL will provide compensatory mitigation through regional restoration, enhancement, and preservation of wetland habitat in accordance with the Mitigation Plan.

UMAM functional assessment and time lag and risk justification have been presented in SCA Appendix 10.4, Rev. 1 and previous Plant and non-Transmission Completeness Responses 2-MDC-G-20, MDC-G-21, 2-MDC-G-21, 3-MDC-G-21.

Typical monitoring and success criteria were presented in Plant and non-Transmission Completeness Response FDEP-II-B-81: FPL will document implementation of the proposed mitigation projects and provide monitoring of mitigation success in accordance with the requirements of the FDEP and USACE. Monitoring reports will be provided to the FDEP and USACE detailing the condition of each mitigation project relative to the prescribed success criteria as required by the FDEP and USACE and proposed corrective actions to be implemented to achieve success criteria, as necessary.

Typical success criteria used to demonstrate achievement of required mitigation include:

- Nuisance/Exotic species occupy less than 5% of the total vegetative cover of the parcel;
- Percent cover by desirable wetland species, as listed in F.A.C. Rule 62-340, shall be 95% or greater;
- Wetland species shall be reproducing naturally in the ground, shrub, and canopy stratum; and
- Final success determination shall not be made less than two years from the completion of implementation of the initial mitigation measures and when the above-mentioned criteria have been continuously met for a period of a least one growing season without intervention in the of removal of undesirable vegetation.

The specific information to be included within the mitigation monitoring reports will be determined in consultation with the FDEP and USACE; typical requirements are as follows:

- Status of construction, with a description of the extent of work completed since previous report;
- Problems encountered and solutions undertaken;

- Anticipated work for the following year;
- Panoramic photographs taken from at least four permanent stations;
- Status of nuisance/exotic vegetation eradication on the parcel;
- Status of enhancement on the parcel;
- Herbicide listing and date of application; and
- Percentage survival, density, and cover of trees and herbaceous species.

4-MDC-A-25 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges FPL's willingness to work with the agencies towards the development of additional regional shorebird habitat. Please provide the requested information, including mitigation for impacts to shorebird habitat, as part a complete mitigation plan required to offset impacts associated with this project.

RESPONSE:

The area of shorebird habitat is an artificial mudflat within the industrial wastewater treatment facility. The impact to the artificial mudflat habitat associated with Turkey Point Units 6 & 7 is not anticipated to result in significant adverse impact to shorebirds. No loss of individual shorebirds will occur as a result of construction at the Site. Construction will be conducted in accordance with FWC and USFWS guidance and requirements.

FPL will continue to work with MDC and other interested agencies to explore the need for development of additional regional shorebird habitat.

4-MDC-A-26-1 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County recently met with FPL to discuss requirements for the earthwork and materials disposal plan. Miami-Dade County acknowledges FPL's willingness to work with the County on the details of this plan.

RESPONSE:

Comment noted. As agreed during a meeting with MDC on August 25, 2010, FPL is currently drafting a conceptual Earthwork and Materials Disposal Plan that will describe how FPL intends to comply with Conditions 7 and 14. Although this information is not related to completeness of the SCA and appropriately handled post certification, the conceptual Earthwork and Materials Disposal Plan requested by these MDC questions will be submitted to MDC upon completion.

4-MDC-A-26-2 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The information provided in FPL Turkey Point Threatened and Endangered Species Evaluation and Management Plan, submitted as part of the SCA (Appendix 10.7.1.3), is not sufficient to allow Miami-Dade County to determine whether the proposed project meets the requirements of Condition 2 of MDC Zoning Resolution Z-56-07, Chapter 24 of the Miami-Dade Code, and the Miami-Dade County CDMP. This information remains incomplete because FPL has not provided adequate information on how development of the proposed plant site and associated non-transmission facilities and infrastructure impacts local ecology. The information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code and the CDMP in order to prepare the reports required by 403.507 F.S.

The number of protected species that have been observed within or near the proposed site for the plant and associated non-transmission facilities and infrastructure is large. Miami-Dade County is requesting information that is sufficient to indicate whether development of the proposed site for the plant and associated non-transmission facilities and infrastructure would impact these protected species. For example, least terns have been documented feeding at the proposed plant site. Miami-Dade County staff has observed signs indicating least tern nesting is occurring within the existing plant complex. FPL has not provided information sufficient to understand whether development of the proposed plant site and/or any of the associated non-transmission facilities and infrastructure would affect least tern nesting in the area. Miami-Dade County reiterates its request that FPL provide complete information on plant cover, plant species abundance, and *occurrence and utilization* by wildlife species including but not limited to birds, insects, fish, reptiles, and amphibians, mammals, and aquatic/marine invertebrates. Wildlife utilization information provided should include but not be limited to behavior, such as but not limited to feeding, roosting, nesting or other breeding behavior, and the specific location where the behavior was observed. This information shall account for temporal influences, and shall be appropriate to the occurrence and/or behavior of the species being studied. Examples include but are not limited to vegetation distribution information that is based on surveys conducted during times when key taxonomic characters are present to confirm identification, nesting information that is based on surveys conducted during known nesting seasons, etc. The information should include but not be limited to occurrence of plants such as the coastal leather fern *(Acrostichum aureum)* and Lamarck's trema *(Trema lamarckianum)*, and occurrence and/or utilization by wildlife such as Florida panther *(Puma concolor coryi)*, Eastern indigo snake *(Drymarchon corais couperi)*, American crocodile *(Crocodylus acutus)*, mangrove rivulus *(Rivulus marmoratus)*, wood stork *(Mycteria americana)*, whitecrowned pigeon *(Patagioenas leucocephala)*, least tern *(Sterna antillarum)*, little blue heron *(Egretta caerulea)*, reddish egret *(Egretta rufescens)*, white ibis *(Eudocimus albus)*, snowy egret *(Egretta thula)*, roseate spoonbill *(Platalea ajaja)*, tricolored heron *(Egretta tricolor)*, peregrine falcon *(Falco peregrinus)*, limpkin *(Aramus guarauna)*, American oystercatcher *(Haematopus palliates)*, brown pelican *(Pelicanus occidentalis)*, and bald eagle *(Haliaeetus leucocephalus)* and their food sources.

RESPONSE:

The Project will not jeopardize the continued existence of any local or regional populations of state or federally-listed or non-listed species of plants or animals. The number of protected species occurring in the vicinity of the Site and associated non-transmission facilities will not be reduced as a result of the construction and operation of the Project. FPL has provided information regarding the occurrence and/or utilization of wildlife as requested. Please review SCA Chapter 3, Sections 3.3.5 and 3.3.6, SCA Appendix 10.7.1.3, and the following completeness responses:

Round 1 (October 2009): FFWCC-A-1, FFWCC-A-2, FFWCC-A-3, FFWCC-A-4, FDEP-VI-C-1, FDEP-VI-C-4, FDEP-VI-C-10, SFWMD-F-137, MDC-A-26, MDC-A-30, MDC-D-1, MDC-D-18, MDC-D-19, MDC-D-20, MDC-D-21, MDC-D-22

Round 2 (April 2010): 2MDC-A-23, 2MDC-A-26-2, 2MDC-D-19, 2MDC-D-20, 2MDC-D-21, 2MDC-D-22, 2MDC-G-6

Round 3 (July 2010): 3MDC-A-23, 3MDC-A-25, 3MDC-A-26-1, 3MDC-A-26-2, 3MDC-D-19, 3MDC-D-20, 3MDC-D-21, 3MDC-G-6

FPL acknowledges that least terns have been documented feeding at the proposed Units 6 & 7 Site; however there is no documentation that least terns have nested within the boundaries of the proposed Site. Least terns are ground-nesting species and utilize artificial nesting sites, such as dredged material deposits and construction sites.

These habitat types will remain on the Turkey Point property following construction of the Project. Substrate at the Site is usually exposed between February and June, and the Site is usually inundated between June and January, depending on unit operations and rainfall. As least tern nesting typically occurs between April and September, the Site only provides potential nesting opportunity during the first months of least tern nesting season. FPL will conduct nesting surveys during the nesting season prior to construction and will comply with the applicable FWC and USFWS regulations. No significant adverse impact to least tern populations is anticipated.

FPL has provided complete information on plant cover, plant species abundance, and occurrence of wildlife species. FPL has provided a thorough analysis of the potential utilization of the Site and associated facilities by threatened and endangered species, based upon presence of habitat, field surveys, agency consultation, and over three decades of data collected at the Turkey Point plant. The potential for threatened and endangered species occurrence is based upon evaluation of the availability of suitable habitat, field surveys, previous studies, agency consultation, and data from the USFWS, FWC, and FNAI. Additional pre-clearing threatened and endangered plant surveys will be conducted during times when key taxonomic characters are present to confirm identification.

Although none of the listed avian species specified in the question have been documented as nesting within boundaries of the proposed Site and associated facilities, pre-clearing nest surveys will be conducted to coincide with known nesting seasons, provided below:

Bird	Nesting Habitat	Nesting Season
Least terns	Dredged spoils, gravel, sand	April - September
White-crowned pigeon	Isolated mangrove islands	May – September
Little blue heron*	Trees/shrubs on islands near water – Colonies	April - September
Reddish egret*	Mangroves islands – Colonies	February - June
White ibis	Islands near standing water – Colonies	March – August
Snowy egret	Swamps, mangroves, over water – Colonies	January – August
Roseate spoonbill*	Coastal islands	November - February
Tricolored heron	Islands near standing water – Colonies	February – August
Limpkin	Aquatic vegetation	February – May
American oystercatcher*	Isolated beaches, dredged material	March – July
Brown pelican	Coastal islands	Fall
Bald eagle	Tall trees near large body of water	October - May
Peregrine falcon**	N/A	N/A

*Not known to nest in the vicinity of Turkey Point according to the Florida Breeding Bird Atlas.
**Does not breed in Florida.

Source: Florida Fish and Wildlife Conservation Commission. 2003, January 6. Florida's breeding bird atlas: A collaborative study of Florida's birdlife.

4-MDC-A-27 (Fourth Round)

Please refer to MDC's response to completeness items MDC-A-26-1.

RESPONSE:

Please see Response 4-MDC-A-26-1 above.

4-MDC-A-29 (Fourth Round)

Please see MDC's response to MDC-A-26-2.

RESPONSE:

Please see Response 4-MDC-A-26-2 above.

4-MDC-A-30 (Fourth Round)

Please see MDC's response to items MDC-A-23 and MDC-A-26-2.

RESPONSE:

Please see Responses 4-MDC-A-23 and 4-MDC-A-26-2 above.

4-MDC-A-31 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated the Turkey Point Unit 6 & 7 Project Manatee Protection Plan will continue to be utilized during the operational phase, however, the document only includes the FWC Standard Manatee Construction Conditions for in-water work and does not include any operational implementations for manatee protection once construction of the improvements at the barge turning basin is completed. In addition, it cannot be determined from the information provided whether adequate clearance between the vessels and the bay bottom would be achieved for all vessels traveling through Biscayne Bay into the barge turning basin. Although some information regarding the barges was produced, the requested information regarding the length, beam and draft of the tugs and any other vessels has not been provided. FPL shall provide an appropriate manatee protection plan that includes these details.

RESPONSE: As stated in SCA Appendix 10.7.1.2 (June 2009), standard manatee conditions for construction during in-water work shall be applicable to equipment barge area expansion and barge deliveries associated with Turkey Point Units 6 & 7 construction. SCA Figure 5.1-2 Rev. 1 is provided on the attached CD at Attachments\4-MDC-A-31 and shows the barge slip with adequate width for a fendering system and barge mobility during equipment delivery. The total area of the equipment barge unloading area is 0.75 acres, including 0.65 acres of previously filled uplands and 0.1 acre within the turning basin. Normal operation of Turkey Point Units 6 & 7 will not require regular barge traffic.

As stated in SCA Appendix 10.7.1.2, Section 7, the maximum size of any vessel utilizing the existing channel and barge unloading facility is 230 feet long by 55 feet wide with a maximum draft of 6.5 feet. Any tugs or other vessels will be smaller than the barges. The existing oil barges servicing the plant have a maximum draft of 6.5 feet; the existing channel bathymetry presented in SCA Appendix 10.7.1.2 Appendix A has been provided and clearly indicates sufficient depth to accommodate the existing and proposed barges. The information provided in Appendix A to SCA Appendix 10.7.1.2 demonstrates that adequate clearance will be achieved for project-related vessels traveling through Biscayne Bay into the barge turning basin.

FPL has provided these details in the Turkey Point Units 6 & 7 Barge Delivery Plan in SCA Appendix 10.7.1.2, which includes appropriate manatee protection measures.

SECTION B – WASTEWATER REUSE

4-MDC-B-2 (Fourth Round)

This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL states in its latest response to this item that the "pipeline will be co-located with existing roadways." The Applicant must identify all such roadways where co-location is proposed. Regarding the SW 107 Avenue corridor, the Applicant must clarify whether it would be possible to construct the pipeline under the roadway within this corridor and rebuild the roadway upon completion and whether it intends to construct any portion of the pipeline in or along the SW 107 Avenue alignment. Condition 17 of Z-56-07 requires FPL to improve sheet flow for upgrades to be constructed within the portions of the transmission line corridors located within the CERP Biscayne Bay Coastal Wetlands (BBCW) Project; however, the Applicant has submitted no information to describe how sheet flow will be *improved* in the BBCW areas where construction is proposed within the transmission line corridor. Miami-Dade County acknowledges FPL's statement that sheet flow will not be impeded. However, FPL has provided no information describing the methods or features FPL proposes to improve sheet flow necessary pursuant to Z-56-07 if these or any other proposed upgrades to the transmission corridor were to be installed. In addition, please provide the results of FPL's evaluation of the sheet pile containment method to reduce wetland impacts during construction as discussed in FPL's latest response to this item.

RESPONSE:

As illustrated in SCA Figure P9.0.0-3, the various preliminary routes identified north of the C-102 Canal between the FPL transmission line right-of-way and the MDWASD treatment plant are within or adjacent to existing roadways. Similarly, co-location with existing roadways is proposed to the south with the transmission patrol road, with the existing Turkey Point Plant access road, and with the L-31E canal access roadway.

An analysis of the impacts and costs associated with construction of the pipeline within alternate corridors which include the SW 107th Avenue right-of-way was conducted. The results verified that a route within the transmission line right-of-way is the preferred location. Please see Figure 4MDC-B-2a for the location of the routes evaluated. Two routes utilizing SW 107th Avenue were evaluated (Routes 2 and 3); the results were compared to Route 1 within the proposed corridor.

CRITERIA	PROJECT NEED/ CONSIDERATION	ALTERNATE RECLAIMED PIPELINE ROUTES		
		Route 1	Route 2	Route 3
Landuse Impacts	Minimize impact	85.7 acres	105.1 acres	85.4* acres
Wetlands	Avoid and minimize impacts to wetlands, mitigate for time lag associated with in-situ restoration	38.35 acres temporary wetland impact (5.3 UMAM credits)	32.33 acres temporary wetland impact (3.0 UMAM credits)	18.96* acres temporary wetland impact (1.1 UMAM credits)

Approximate Pipeline Length/ Construction Cost	Minimize unnecessary expenditures	9.42 miles - $115.9 million (not including easement acquisition)	11.44 miles - $140.7 million (not including easement acquisition)	13.92 miles - $171.2 million (not including easement acquisition)
Private Property Owners Affected	Avoid/minimize unnecessary impacts to neighbors	Affects 24 private property landowners	Affects 56 private property landowners	Affects 60 private property landowners

*Portions of Route 3 co-located with temporary construction access roadway improvements south of SW 328th Street excluded from acreage calculations.

The SW 107th Avenue right-of-way is approximately 50' wide; installation of the pipeline requires a 75' wide temporary construction area. Therefore, not only would use of the SW 107th Avenue routes require complete removal and reconstruction of existing public roadways, but would also require acquisition of additional temporary construction easements over adjacent private lands. Similar constraints on width of existing right-of-way and need to acquire additional construction easements on private lands occur within Route 2 and 3 segments along SW 117th Avenue, SW 112th Avenue, and SW 320th Street. In addition, Routes 2 and 3 are 2 and 4.5 miles greater in length, respectively, as compared to Route 1, which increases pipeline construction costs by approximately $25 million (Route 2) and approximately $55 million (Route 3). These estimates do not include the additional costs of construction easement acquisition upon private lands. Any changes to the currently proposed design may entail increased costs or other impacts that may require revisions to the Joint Participation Agreement between FPL and MDC. In accordance with the Joint Participation Agreement, MDC will be responsible for any increased material and labor costs.

Areas adjacent to the SW 107th Ave right-of-way are primarily disturbed wetlands, many historically converted to agricultural uses; use of the SW 107th right-of-way would reduce temporary wetland impacts by approximately 6 acres (Route 2) and 19 acres (Route 3). For Route 3, the portion of Segment 6 south of SW 328th Street is co-located with the FPL-proposed temporary construction access roadway improvements on SW 117th Avenue and SW 359th Street. Installation of the pipeline within this portion of the route would be within the boundary of the proposed roadway improvements, therefore no additional land use or wetland impacts were included for this portion of Route 3 in the current analysis.

It is acknowledged that use of SW 107th Avenue would reduce impacts to mangrove wetlands, however it should be noted that many of the wetlands within Route 1 located to the west of the existing transmission line patrol road will be impacted during installation of the permitted Florida Gas Transmission Company pipeline. The proposed location of the FPL reclaimed water pipeline will maximize utilization of these previously-disturbed areas, as well as the existing patrol road, to reduce wetland impacts to the greatest extent practicable. All areas of temporary wetland impact associated with pipeline installation will be restored, and mitigation provided to offset the time lag associated with natural regeneration of wetland vegetation. Supplemental planting of wetland vegetation will be conducted if natural regeneration does not meet restoration success criteria with regards to vegetative cover.

Installing the pipeline within the transmission line right-of-way will reduce the length and corresponding cost associated with installation, minimize use of public rights-of-way, minimize the number of private property owners affected, minimize acquisition of additional construction easements adjacent to public rights-of-way, and allow utilization of previously disturbed wetlands.

FPL will design and construct the reclaimed water pipeline to maintain existing sheet flow throughout its final right-of-way. Condition 17 provides, in part, "[i]mprovements to sheet flow such that the corridors do not impede the flow of ground or surface waters will also be required where transmission corridor upgrades in this area are necessary for power distribution as a result of this project." The reclaimed water pipeline will not adversely affect improvements to sheet flow made or planned in connection with FPL's transmission facilities.

With respect to the utilization of sheet piling for pipeline installation, the use of sheet piles can reduce the trench width of pipeline construction therefore providing some reduction of the overall pipeline construction footprint. However with large diameter pipelines such as the 72 inch diameter pipe for this Project, the excavator will need to be located within the trench sheet pile wall area thus controlling the minimum trench width. It is anticipated that the reduction in the pipeline construction footprint using sheet piles would be approximately 17 percent. The cost of using a sheet pile wall for this pipeline will increase the pipeline cost by approximately 80 percent per foot of pipeline length where sheet piles are used. The use of sheet piles would add approximately $57,000,000 to the pipeline cost. FPL will utilize all practicable methods to reduce and eliminate wetland impacts during pipeline installation. Upon selection of the final right-of-way for pipeline installation, specific locations where wetland impacts may be reduced through minimization of slope widths associated with trench excavation will be identified. This information will be available post-certification as an outcome of detailed construction planning.

In response to MDC's previous request (3-MDC-B-3), FPL investigated the possibility of relocating the FPL reclaimed water treatment facility and evaluated several potential locations, both on and off the Turkey Point plant property. The reclaimed water treatment facility is a facility required for Turkey Point 6 & 7 to use reclaimed water as a primary cooling water source. The efficient operation, security and compatibility with commercial arrangements related to development of the facility are essential issues to be considered when evaluating the feasibility of any location for the reclaimed water treatment facility. It was determined that locations on the Turkey Point plant property meet the feasibility requirements for operations, security, and compatibility with commercial arrangements. Locations off of the Turkey Point plant property add complexity to all three important elements and do not provide feasible options for plant operation.

Based on reviews conducted at other operating plants and previous FPL experience with other reclaimed water projects, FPL has determined that an on-site location for the RWTF is essential to effective integration of reclaimed water into the project. Changes to the location of the RWTF complicate and negatively impact the relationship between the seller (MDC) and buyer (FPL) of reclaimed water services. Inherent in the current commercial arrangement is the concept that the pipeline is fully owned and operated by MDC. Repositioning of the FPL owned and operated RWTF within that portion of the MDC owned and operated pipeline would necessarily restrict the quality requirements and usage of portions of the MDC pipeline downstream of the FPL facility. Additionally, there are operational advantages to managing the reclaimed water quality immediately upstream of the cooling towers. This allows the operational staff to manage the water quality into the makeup reservoir, which is located on the plant Site and to immediately respond to any reclaimed water issue that affect plant operation. If the reclaimed water treatment facility is located offsite, the ability to respond would be effected and would change the plan for operation and potentially impact staffing. In addition, due to the distance from Turkey Point, an independent security team would need to be maintained for the reclaimed water treatment.

The siting opportunities for the reclaimed water treatment facility off of the Turkey Point site are all located between the SDWWTP and Turkey Point. The parcels identified that have suitable acreage to support the reclaimed water treatment facility are either not owned by FPL. In addition, any facility in this area will be within or adjacent to the footprint of the Biscayne Bay Coastal Wetlands Project study area, and separated from another existing facilities. FPL believes that locating the reclaimed in this area has a greater opportunity to fragment the landscape in an area identified for restoration. Locating the reclaimed water treatment facility at Turkey Point keeps the facility within the plant property and adjacent to other existing industrial facilities.

FPL has identified an additional potential site in an area of lower quality wetlands at the Turkey Point Plant. The additional location is an area historically dredged in association with the test cooling canal evaluations, and currently consists of upland spoil piles dominated by Australian pine, excavated open water canals, an upland access pathway, sawgrass marsh, dwarf mangroves, and exotic wetland hardwoods (Figure 4-MDC-B-2b on the attached CD at Attachments\4-MDC-B-2). Use of this significantly disturbed area would reduce wetland impacts by approximately 8 acres (18%) and reduce the associated functional loss by approximately 7 credits (21%) as compared to the current location. Should the alternate site be selected, the pipeline route would be modified south of Palm Drive to connect to the facility. The modification to the pipeline route will incur 5.3 acres of temporary wetland impact.

The FPL reclaimed water treatment facility stormwater management system presented in revised SCA Appendix 10.8 on the attached CD at Attachments\4-MDC-A-18 is typical of the system that would be used at locations with similar topographical and vegetative characteristics.

4-MDC-B-3 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The information FPL must provide shall include previously requested information relating to deposition of pollutants from the proposed cooling towers, the projected level of chloride corresponding to the TDS concentration of 53.4 mg/l referenced in FPL's response, and must specify with a map the location where this concentration is projected to occur. The information submitted must indicate whether this concentration includes rainfall dilution and what the concentration increase (both in TDS and chlorides) will be without rainfall dilution at this site. Please provide the specific citations from Florida Statutes and Florida Administrative Code in support of FPL's assertion that antidegradation standards and OFW standards would not apply to contaminants entering surface waters from operation of the cooling towers. Please indicate whether the 0.84 mg/l TDS concentration includes rainfall dilution and what the concentration increase would be without rainfall at this site and specify with a map the location where this concentration is projected to occur. In addition, please provide the expected level of chloride increases in the freshwater (constructed) crocodile ponds located within and near the cooling canal system.

RESPONSE:

FPL has continued to provide additional information requested by the County on constituents in deposition. In 1st Round Plant and non-Transmission Completeness Response MDC-B-3 (October,

2009), FPL directed the County to responses to other agency questions providing specific additional information on the constituents that may be in deposition. These constituents are regulated by FDEP as volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) as defined in Rule 62-210.200 F.A.C. Additionally, FPL provided information on nutrients, sulfur and metals. FPL's Response 2MDC-B-4 referred to 1st Round Plant and non-Transmission Completeness Response FDEP-VI-D-1, and presented information on constituents in both treated reclaimed water and saltwater.

FPL provided information on 98 constituents for treated reclaimed water and 245 constituents as VOCs, HAPs and metals. The analyses for these constituents were provided with the 1st Round Plant and non-Transmission Completeness Response for this question (i.e., MDC-B-3, October 2009). Only 11 of the constituents in treated reclaimed water and 2 of the constituents in saltwater were above the method detection limits. For the deposition analyses of constituents, it was conservatively assumed that concentration of a constituent was at the detection limit, not lower as is the standard practice. Moreover, the amounts of the constituents evaluated are at a magnitude that is considered "insignificant" under the FDEP Rule 62-210.300(3)(b)b. F.A.C. Indeed, the amounts of HAPs are about 40 and 300 times less than the insignificant threshold, respectively, for treated reclaimed water and saltwater. Clearly, FPL provided additional information requested by the County on this subject.

The maximum location of deposition was identified in SCA Section 6.1.4.1 "as the nearest Turkey Point plant property boundary south of the Site" (June 2009) and shown in SCA Figure 6.1.4-1 (June 2009), and also shown in Figure FDEP-II-83-B-53 (October 2009) as identified in Response 2MDC-B-3 (April 2010). In both figures, FPL's property boundary is clearly identified.

Both wet and dry deposition are used to determine total deposition. However, in order to determine concentration from all atmospheric inputs, rainfall must be considered. Rainfall cannot be ignored in determining concentration, which is a valued metric in assessing impacts from deposition. The deposition analyses using the EPA and FDEP approved dispersion model AERMOD calculates both wet and dry deposition. Wet deposition in this context is deposition that occurs with rainfall. As a result, rainfall must be considered. This was identified in 1st Round Completeness Response FDEP-II-B-53 (October 2009) and explained in detail in 2nd Round Completeness Responses 2SFWMD-B-65(63) and 2SFWMD-B-65(64) (April 2010), where SFWMD asked a specific question on calculation of concentration using rainfall. Regarding deposition predicted in kg/ha/month, these values have been consistently provided in the responses identified to the County. Moreover, SCA Section 6.1.4.1 (April 2009) provided information on potential vegetation impacts for different deposition levels.

The predicted concentration of 0.84 mg/L for saltwater identified in 1st Round Completeness Response FDEP-II-B-53 (October 2009) and previously identified to the County included rainfall as noted above. The locations of the predicted concentrations from the deposition analyses were described in the 2nd Round Completeness Response 2SFWMD-B-65(64)(a) (April 2010) and shown in Figure 2SFWMD-B-65(64)(a) (April 2010) as various model domains. Deposition at any location relative to the Site can be estimated from information provided in SCA Figure 6.1.4-1 (June 2009) and Figure FDEP-II-B-53 (October 2009).

Regarding the salinity increase in the crocodile ponds, information was presented in SCA Section 6.1.4.1. An increase of salinity from 0.03 to 0.06 parts per thousand was predicted for deposition rates from 40 to 80 kg/ha/month. As noted in the SCA, the predicted deposition in this range is close to the Site and in the northern portion of the industrial wastewater facility. At crocodile ponds at

locations farther to the south and west of the Site, the predicted increase would be much lower. Although American crocodiles have salt glands that excrete excess salt and physiological mechanisms to reduce water loss (Dunson, 1970, 1980, 1982; Evans and Ellis, 1977; Dunson and Mazzotti, 1989; Mazzotti, 1989), maintenance of an osmotic balance requires access to low-salinity water for juveniles (USFWS, 1999). Hatchling crocodiles are particularly susceptible to osmoregulatory stress and may need to have exposure to low salinity water at least once per week to increase growth (Mazzotti et al., 1986; Mazzotti and Dunson, 1984); frequent rainfall typically provides a sufficient amount of freshwater. The predicted minimal increase in salinity within the ponds would be further reduced during the rainy season, which coincides with the hatching period for crocodiles at Turkey Point. Therefore, the predicted deposition will not measurably increase salinity in the cooling canals and will not affect the conditions within crocodile ponds on the cooling canal berms.

With respect to the specific citations from Florida Statutes and Florida Administrative Code in support of FPL's assertion that antidegradation standards and OFW standards would not apply to contaminants entering surface waters from operation of the cooling towers, Rules 62-4.242(1) and 63-302.300, Florida Administrative Code, contain the state's regulations related to antidegradation of surface waters from "discharges." Rule 62-4.242(2), Florida Administrative Code, contains the state's regulations related to the protection of Outstanding Florida Waters from either "discharges" to or "activities"within those designated waters. By their terms, these regulations do not apply to atmospheric deposition to surface waters resulting from operation of the cooling towers

Rules 62-4.242(1) and 62-302.3000 address antidegradation requirements for discharges to surface waters. Specifically, Rule 62-4.242(1)(b) provides "[i]n determining whether a proposed discharge which results in water quality degradation is necessary or desirable, " DEP is to consider several listed factors [emphasis added]. Atmospheric deposition resulting from operation of the Turkey Point 6 & 7 cooling towers does not constitute a "discharge" to surface waters, and therefore is not subject to these antidegradation regulations. This is consistent with the position taken by the Florida Department of Environmental Protection and is the conclusion reached by the Siting Board in a prior Power Plant Site Certification proceeding where atmospheric deposition resulting from the planned operation of an electric power plant was addressed. In its 1998 Final Order regarding FPL's Manatee Orimulsion Project, the Siting Board specifically stated that "[p]ursuant to DEP's interpretation that atmospheric deposition of nitrogen to surface waters does not constitute a 'discharge,' a formal antidegradation analysis is not required for the Project." In re: Florida Power & Light Company, Manatee Orimulsion Project, Application No. 94-35, DOAH Case No. 94-5675EPP, Final Order at ¶39 (Siting Bd. 1998).

Similarly, the OFW standards found in Rule 62-4.242(2) only apply to surface water discharges to OFWs or to dredge and fill activities that occur within an OFW. Rule 62.4.242(2(a) provides that "[n]o Department permit or water quality certification shall be issued for any proposed activity or discharge within an Outstanding Florida Waters, or which significantly degrades, either alone or in combination with other stationary installations, any Outstanding Florida Waters," unless the applicant makes certain specified showings [emphasis added]. In its 1998 Final Order regarding FPL's Manatee Orimulsion Project, the Siting Board adopted the following conclusion of law, in which the assigned state Administrative Law Judge rejected the argument that OFW requirements of F.A.C. Rule 62-4.242 apply to atmospheric deposition: the intervenors "attempt to read subsection (2)(a) of F.A.C. Rule 62-4.242 out of context to suggest that the term 'activity' includes atmospheric deposition from air emissions and surface water withdrawals. But such a reading ignores subsection (2)(d), which clearly indicates that the rule applies only to 'dredge or fill' activities and to 'discharges.' When subsections (2)(a) and (2)(d) are read together, the general term 'activity' in (2)(a) is restricted to a

sense analogous to the specific term 'dredge and fill activity' in (2)(d)." Id., Recommended Order, at ¶282 (citing State ex rel. Wedgworth Farms, Inc. v. Thompson, 101 So.2d 381, 385 (Fla. 1958)).

While these regulatory standards are not applicable to atmospheric deposition, the analyses FPL has provided demonstrate that atmospheric deposition to area waters around the Project site will not have an adverse effect on surface water quality.

After providing the above information on atmospheric deposition to Miami-Dade County as a draft response, Miami-Dade County requested the following information and/or clarifications. The additional information requested is presented below as part of the overall response to this completeness question.

Additional Information/Clarification Requested: The legend for Figure 6.1.4-1, entitled "Average Monthly Salt Deposition from Circulating Water Cooling Towers" provides monthly deposition ranges in Kg/ha/month (see below). Please clarify whether these values represent the sum of dry and wet deposition and please provide the individual values for dry and wet deposition.

- Additional Information/Clarification: The total deposition was determined using the EPA/FDEP approved AERMOD that calculates both dry and wet deposition. Wet deposition is determined by incorporating rainfall into AERMOD. Dry deposition averages 98.24 percent of the total deposition across the modeling domain as depicted in Figure 6.1.4-1. Wet deposition accounts for 1.76 percent. At each receptor this distribution may vary slightly.

Additional Information/Clarification Requested: Please clarify whether the values in the legend of Figure 6.1.4-1 (see below) refer to TDS concentrations or chloride concentrations. If the values are for TDS concentrations, please provide the chloride levels corresponding to these TDS concentrations? Alternatively you can provide an equation that you would use to convert the TDS values to estimated chloride values and we would calculate the corresponding chloride values ourselves.

- Additional Information/Clarification: The deposition values presented in SCA Figure 6.1.4-1 are total dissolved solids (TDS). TDS are also presented in completeness responses when presenting total deposition. Based on the saltwater analyses provided with the 1st completeness responses the amount of chlorides when using saltwater would be 57.8 percent of the TDS. This factor can be used directly to determine the chloride deposition in kg/ha/month. For example, based on the sample taken in Biscayne Bay, multiplying 0.578 by the deposition in kg/ha/month would calculate the chloride deposition in kg/ha/month. A deposition of 80 kg/ha/month of TDS would consist of about 46 kg/ha/month chlorides based on the sample taken in Biscayne Bay. Please note that the percentage of chlorides in the observed sample taken in Biscayne Bay is similar to the chloride concentration in seawater. The amount of chlorides in seawater is about 55 percent of total TDS for a TDS concentration of 35,000 parts per million. Since the cooling tower drift will have the same chloride concentration as the saltwater obtained from Biscayne Bay, there is no difference between the chloride concentration in cooling tower drift and that of water in Biscayne Bay.

Additional Information/Clarification Requested: With regard to the 53.4 mg/l value that we had previously asked about; can you please provide a specific response per our questions on this and include the specifically requested information as well as the explanation and calculations that convert the deposition rate into this 53.4 mg/l value?

- Additional Information/Clarification: The chloride concentration representative of a TDS concentration of 53.4 mg/L is estimated to be 30.9 mg/L. This is based on the percentage of

chlorides in the sample previously discussed (53.4 mg/L TDS x 57.8% Cl). As discussed in the SCA 3rd Round Completeness Response 3MDC-B-3, rainfall needs to be considered in determining concentrations. The drift materials from the circulating water cooling towers are no different than natural deposited materials. The materials are dissolved solids that form solid particles when the water evaporates from the aerosol. Drift particles on solid surfaces are solidified dissolved solids which are flushed from surfaces and re-dissolve with rainfall. Rainfall is part of the annual deposition and must be considered. The concentrations in mg/L were determined using the long-term average rainfall of 58.53 inches per year from SCA Table 3.3.3-2. Using this amount of average rainfall, 1 kg/ha/month of TDS is equivalent to 0.81 mg/L. This factor can be used to adjust deposition in kg/ha/month to concentration mg/L. Please note that the SCA 6.1.4 included a discussion of deposition impacts in kg/ha/month by showing deposition amounts to known effect levels.

Additional Information/Clarification Requested: Can you please clarify, based on the isocontours of Figure 6.1.4-1 (see below), where the 53.4 mg/l value is projected to occur.

- Additional Information/Clarification: The arrow inserted on the figure below shows the location of the maximum deposition outside of FPL's property boundary. It is located directly south of the circulating water cooling towers.

References

Dunson, W. A. 1970. Some aspects of electrolyte and water balance in three estuarine reptiles, the diamondback terrapin, American and "saltwater" crocodiles. *Comparative Biochemical Physiology 32:*161-174.

Dunson, W. A. 1980. Osmoregulation of crocodiles in Everglades National Park. South Florida Research Center Report T-599. Everglades National Park, Homestead, Florida.

Dunson, W. A. 1982. Salinity relations of crocodiles in Florida Bay. *Copeia 1982(2)*:374-385.

Dunson, W. A. and F. J. Mazzotti, 1989. Salinity as a limiting factor in the distribution of reptiles in Florida Bay: A theory for the estuarine origin of marine snakes and turtles. *Bulletin of Marine Science 44*:229.

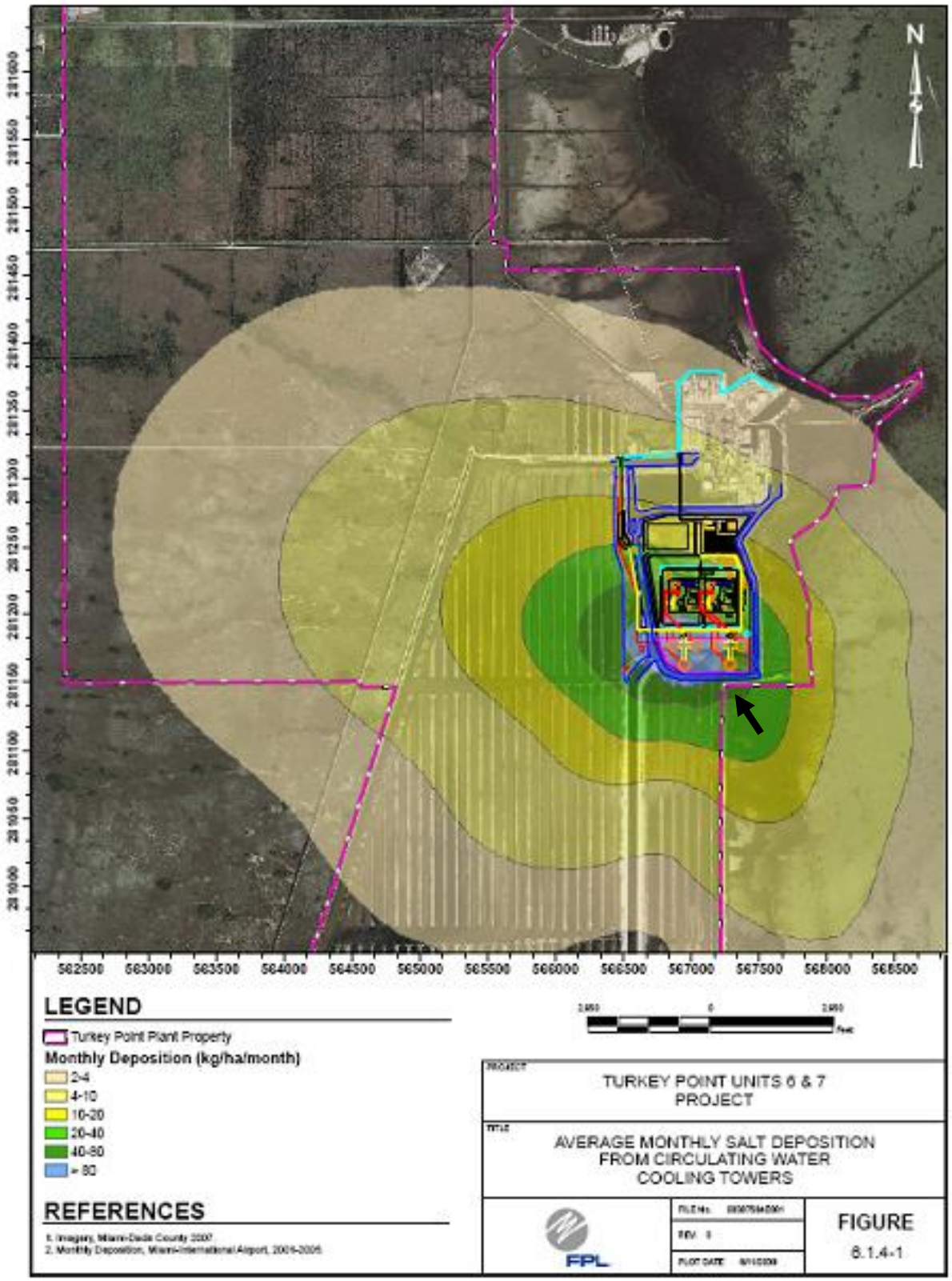
Evans, D. H. and T. M. Ellis. 1977. Sodium balance in the hatchling American crocodile, *Crocodylus acutus*. *Comparative Biochemical Physiology [A] 58*:159-162.

Mazzotti, F. J. 1989. Factors affecting the nesting success of the American crocodile, *Crocodylus acutus*, in Florida Bay. *Bulletin of Marine Science 44*:220-228.

Mazzotti, F. J. and W. A. Dunson. 1984. Adaptations of *Crocodylus acutus* and Alligator for Life in Saline Water. *Comparative Biochemical Physiology*, *79A*(4): 641-646.

Mazzotti, F. J., B. Bohnsack, M. P. McHahon and J. R. Wilcox. 1986. Field and laboratory observations on the effects of high temperature and salinity on hatchling *Crocodylus acutus*. *Herpetologica* 42(2): 191-196.

U.S. Fish and Wildlife Service. 1999. American Crocodile, *Crcodylus acutus:* Multi-Species Recovery Plan for South Florida, pp. 4-505n – 4-520; Recovery for the American Crocodile, pp. 4-521 – 4-527. Atlanta, Georgia.



SECTION C - RADIAL WELLS

4-MDC-C-1 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County acknowledges FPL's desire to provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. Miami-Dade County does not agree with FPL's statement that "the plan meets the intent of condition 4" [of Z56-07] because the withdrawals from the proposed wellfield via the radial collectors would occur in the Biscayne Aquifer, which is expressly prohibited by this zoning condition.

RESPONSE:

Please see Response 4-MDC-C-6 below for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

With respect to Condition 4 of the zoning approval, FPL continues to work with the County and other agencies on the assessment of the impacts of operation of the radial collector well system as the backup water supply for Turkey Point Units 6 & 7. The back-up water supply is necessary for reliability of plant operations and allow for use of reclaimed water as a primary makeup water source. FPL has identified the cooling water resources for the Project to employ the best combination of alternative sources to maximize the use of reclaimed water and minimize impacts to the environment and avoid impacts to fresh groundwater resources. It is FPL's position that the content of the SCA and subsequent Completeness submittals meet the intent of Condition 4. FPL requests that Miami-Dade County review the information submitted on this topic for technical merits. FPL will continue to work with the County's policy makers to clarify this condition as appropriate.

The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore.

As discussed above, by far the largest amount of water pumped by the radial collector well system originates from Biscayne Bay. The cooling canal water that is estimated to enter the radial collector wells does so at depth (i.e., below the bottom of the Bay) and, due to its density, will remain at depth regardless of radial collector well operation. The 0.3 percent from precipitation recharge represents a relatively small amount of water. Because precipitation is fresh water, it will tend to remain in the upper layers of the aquifer. Since the radial collector wells draw water at depth, the 0.3 percent is a conservative prediction of the water entering the radial collector wells. Furthermore, this 0.3 percent is of the same order of magnitude as the precision of the model water budget methodology. Therefore, the amount of fresh water drawn by the radial collector wells will be inconsequential and will not adversely impact the environment. The model demonstrates that the objective of Condition 4, to protect environmental resources, can be achieved.

As part of the Site Certification Application and subsequent completeness responses, FPL has provided comprehensive and significant information on the potential hydrologic impacts of the Turkey Point Units 6 & 7 Project features that are subject to Condition 15 of the Zoning Resolution. Since the application was submitted, FPL has also met with MDC on multiple dates to discuss Condition 15, the appropriate Project-related hydrologic study requirements, and the completeness questions and responses related to project features that may affect surface or groundwater and that are subject to Condition 15. Multiple features were discussed in these meetings, but in general the focus was on the back-up water supply (radial collector wells), stormwater management, the onsite sanitary treatment plant and onsite construction dewatering. This 4th Round Completeness submittal provides significant additional clarifying information on these project features and their potential hydrologic impact. For example, FPL has developed an engineering solution to significantly reduce the dewatering rate and any resulting hydrologic or environmental impacts required within the plant area. In addition, the robustness of the groundwater model, which predicts the impacts of the operation of the radial collector wells and of onsite construction dewatering, has been improved by adding detail (e.g. zones of higher conductivity and calibration to multiple pump tests) and recommendations that were suggested by MDC and other agencies. Other project features subject to Condition 15's hydrologic study have been addressed in the application and the completeness responses referenced in this response. FPL believes that the analysis and information contemplated during Condition 15 development has been met with these 4th Round Completeness Responses, and the other information provided in the application and the earlier responses to agency completeness questions. As agreed to in our latest meeting, FPL will arrange a follow up meeting(s) with MDC to discuss these responses once staff has had the opportunity to review these 4th Round Completeness Responses.

With this submittal and prior submittals as listed below, FPL has provided adequate information to evaluate those project elements that are reasonably expected to impact surface or groundwater.

SCA Sections and Appendices (June 2009) - 3.3.1 Geohydrology, 3.3.2 Subsurface Hydrology, 3.3.3 Site Water Budget and Area Users, 3.3.4 Surficial Hydrology, 4.5.1 Heat Dissipation System, 4.5.2 Domestic/Sanitary Wastewater, 4.5.3 Potable Water Systems, 4.5.4 Process Water Systems, 5.2 Impact on Surface water Bodies and Uses, 5.3 Groundwater Impacts, 6.1 Effects of Operation of the Heat Dissipation System, 6.2 Effects of Chemical and Biocide Discharges, 6.3.1 Surface water, 6.3.2 Groundwater, 6.3.3 Drinking Water, 6.3.5 Measurement Programs, R.9.3.4 Access Roads, R9.3.7.2 Affected Waters and Wetlands, R9.4 Effects of ROW Preparation and Construction, Appendix 10.8, Appendix 10.9.

1st Round Completeness Responses (October 2009) – MDC-A-3, MDC-A-7, MDC-A-9, MDC-A-14, MDC-A-22, MDC-C-1, MDC-C-2, MDC-C-8, MDC-C-11, MDC-C-19, MDC-C-20, MDC-C-21, MDC-D-1, MDC-D-12, MDC-D-27, MDC-G-9, MDC-G-29, MDC-G-41, FDEP-I-C-4, FDEP-I-C-5, FDEP-I-D-6, FDEP-II-A-3, FDEP-II-A-9, FDEP-II-A-10, FDEP-II-A-14, FDEP-II-A-23, FDEP-II-A-25, FDEP-II-A-26, FDEP-II-A-28, FDEP-II-A-30,FDEP-II-A-31, FDEP-II-A-32, FDEP-II-A-34,FDEP-II-A-35, FDEP-II-A-36, FDEP-II-A-37, FDEP-II-A-39, FDEP-II-B-44, FDEP-II-B-52, FDEP-II-B-56, FDEP-II-B-58, FDEP-II-B-61, FDEP-II-B-65, FDEP-II-B-66, FDEP-II-B-73, FDEP-III-1, FDEP-IV-A-1, FDEP-IV-A-2, FDEP-VI-A-4, FDEP-VI-A-5, FDEP-VI-A-6, FDEP-VI-A-7, FDEP-VI-A-8, FDEP-VI-A-9, FDEP-VI-A-10, FDEP-VI-A-15, FDEP-VI-B-1, FDEP-VI-B-2, FDEP-VI-B-3, FDEP-VI-B-4, FDEP-VI-B-5, SFWMD-B-6, SFWMD-B-9, SFWMD-B-11, SFWMD-B-15, SFWMD-B-21, SFWMD-B-25, SFWMD-B-27, SFWMD-B-29, SFWMD-B-30, SFWMD-B-34, SFWMD-B-35, SFWMD-B-36,

SFWMD-B-39, SFWMD-B-40, SFWMD-B-42, SFWMD-B-43, SFWMD-B-44, SFWMD-B-45, SFWMD-B-46, SFWMD-B-47, SFWMD-B-48, SFWMD-B-50, SFWMD-B-53, SFWMD-B-54, SFWMD-B-55, SFWMD-B-63, SFWMD-B-66, SFWMD-B-68, SFWMD-B-70, SFWMD-B-71, SFWMD-B-81, SFWMD-B-85, SFWMD-B-87, SFWMD-B-89, SFWMD-B-91, SFWMD-B-93, SFWMD-D-119, SFWMD-H-153.

Reports

- Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0 (Bechtel Power Corporation, 2009)
- HDR Engineering, Inc., 2009. FPL Turkey Point Exploratory Drilling and Aquifer Performance Test Program Report.
- HDR Engineering, Inc., 2009. Cooling Water Supply and Disposal Design Report. March 2009
- HDR Engineering, Inc., 2008. Report - Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7. June 30, 2008.
- HDR Engineering, Inc., 2007. Work Order #1 – Task 1.4 Analysis of Baseline Water Source Technical Review Report. December 2007.
- HDR Engineering, Inc., 2008. Work Order #2 – Task 1 Initial Water Source Alternative Screening Technical Review Report. March 2008.
- HDR Engineering, Inc., 2007. Work Order #2 – Tasks 2 and 3 Water Source Alternative Characterization and Scope Technical Review Report. March 2008.

2nd Round Completeness Responses (Part A) (April 2010) – 2-MDC-A-6, 2-MDC-A-11, 2-MDC-A-22, 2-MDC-A-33, 2-MDC-C-6-APT-1, MDC-C-6-APT-3, MDC-C-6-Conc-1, 2-MDC-C-24-RCW, 2-MDC-D-1, 2-MDC-D-27, 2-FDEP-VI-CAMA-6, 2-FDEP-VI-CAMA-7, 2-FDEP-VI-CAMA-8, 2-FDEP-VI-COC-2, 2-SFWMD-B-15(10)h, 2-SFWMD-B-25(28), 2-SFWMD-B-26(16), 2-SFWMD-B-26(21), 2-SFWMD-B-29(25)b, 2-SFWMD-B-29(25)g, 2-SFWMD-B-34(27), 2-SFWMD-B-39(30), 2-SFWMD-B-40(31),2-SFWMD-B-40(32), 2-SFWMD-B-40(33), 2-SFWMD-B-40(35), 2-SFWMD-B-42(40), 2-SFWMD-B-44(42), 2-SFWMD-B-53(52), 2-SFWMD-B-57(55), 2-SFWMD-B-66(65), 2-SFWMD-B-70(69), 2-SFWMD-H-153(98)a.

2nd Round Completeness Responses (Part B) (July 2010) - 2-MDC-A-3, 2-MDC-A-5, 2-MDC-C-6-GWM-5, 2-FDEP-VI-CAMA-2, 2-FDEP-VI-CAMA-4,2-FDEP-VI-CAMA-5, 2-FDEP-SED-III-2, 2-SFWMD-B-3(2), 2-SFWMD-B-3(3), 2-SFWMD-B-4(4), 2-SFWMD-B-15(10)c, 2-SFWMD-B-15(10)e, 2-SFWMD-B-26(17), 2-SFWMD-B-29(25)a, 2-SFWMD-B-36(29), 2-SFWMD-B-42(39), 2-SFWMD-B-44(43), 2-SFWMD-B-92(78).

3rd Round Completeness Responses (July 2010) – 3-MDC-A-3, 3-MDC-A-5, 3-MDC-A-6, 3-MDC-A-13, 3-MDC-A-18-9, 3-MDC-B-2, 3-MDC-B-3, 3-MDC-C-6, 3-MDC-D-1(a), 3-MDC-G-41, 3-FDEP-VI-CAMA-4,3-FDEP-VI-CAMA-5, 3-FDEP-VI-CAMA-6, 3-SFWMD-B-57(55), 3-SFWMD-D-119(87).

4th Round Completeness Responses (February 2011) - 4-MDC-A-6, A-7, A-8, 4-MDC-A-20-2, 4-MDC-A-21, 4-MDC-B-2, 4-MDC-B-3, 4-MDC-C-1, 4-MDC-C-2, 4-MDC-C-3, 4-MDC-C-6, 4-MDC-C-6-GWM-2, 4-MDC-C-6-GWM-3, 4-MDC-C-6-GWM-4, 4-MDC-C-6-GWM-5, 4-MDC-C-6-Conc-2, 4-MDC-C-6-Conc-4, 4-MDC-C-6-Conc-6, 4-MDC-C-

6-Conc-End, 4-MDC-C-8, 4-MDC-C-9, 4-MDC-C-13, 4-MDC-C-15, 4-MDC-C-23, 4-MDC-D-1(a), 4-MDC-D-27, 4-MDC-G-9, 4-FDEP-VI-CAMA-1, 4-FDEP-VI-CAMA-2, 4-FDEP-VI-CAMA-4, 4-FDEP-VI-CAMA-5, 4-FDEP-VI-CAMA-7, 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(2), 4-SFWMD-B-3(3)a, 4-SFWMD-B-15(10)a, 4-SFWMD-B-15(10)b, 4-SFWMD-B-15(10)c, 4-SFWMD-B-15(10)i, 4-SFWMD-B-15(10)j, 4-SFWMD-B-15(10)k, 4-SFWMD-B-27(22), 4-SFWMD-B-30(26), 4-SFWMD-B-30(29)a, 4-SFWMD-B-40(32), 4-SFWMD-B-44(42), 4-SFWMD-B-45(44), 4-SFWMD-B-46(44)a, 4-SFWMD-B-46(44)b, 4-SFWMD-B-51(51), 4-SFWMD-B-55(53), 4-SFWMD-B-64(62), 4-SFWMD-B-81(71), 4-SFWMD-B-82(72), 4-SFWMD-B-87(75), 4-SFWMD-B-89(76)a, 4-SFWMD-B-92(78), 4-SFWMD-D-119(87), 4-SFWMD-F-145(92).

Revised SCA Appendix 10.8 (February 2011).

Reports

- Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1 (Bechtel Power Corporation, 2011)
- Radial Collector Well Summary (Golder 2011)

With regard to the aquifer performance test (APT), as stated in 3rd Round Completeness Response 3-MDC-A-3 (July 2010), a draft of the APT plan was provided to Miami-Dade County and reviewed with the County during a meeting at Miami-Dade County Department of Environmental Resources Management (DERM) on February 4, 2009 and at a follow-up meeting on March 20, 2009. In addition, the South Florida Water Management District (SFWMD) was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

4-MDC-C-2 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County acknowledges FPL's desire to provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. Miami-Dade County does not agree with FPL's statement that "the plan meets the intent of condition 4" [of Z56_07] because the withdrawals from the proposed wellfield via the radial collectors would occur in the Biscayne Aquifer, which is expressly prohibited by this zoning condition.

RESPONSE:

With respect to Condition 4 of the zoning approval, FPL continues to work with the County and other agencies on the assessment of the impacts of operation of the radial collector well system as the backup water supply for Turkey Point Units 6 & 7. The back-up water supply is necessary for

reliability of plant operations and allow for use of reclaimed water as a primary makeup water source. FPL has identified the cooling water resources for the Project to employ the best combination of alternative sources to maximize the use of reclaimed water and minimize impacts to the environment and avoid impacts to fresh groundwater resources. It is FPL's position that the content of the SCA and subsequent Completeness submittals meet the intent of Condition 4. FPL requests that Miami-Dade County review the information submitted on this topic for technical merits. FPL will continue to work with the County's policy makers to clarify this condition as appropriate.

The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore.

As discussed above, by far the largest amount of water pumped by the radial collector well system originates from Biscayne Bay. The cooling canal water that is estimated to enter the radial collector wells does so at depth (i.e., below the bottom of the Bay) and, due to its density, will remain at depth regardless of radial collector well operation. The 0.3 percent from precipitation recharge represents a relatively small amount of water. Because precipitation is fresh water, it will tend to remain in the upper layers of the aquifer. Since the radial collector wells draw water at depth, the 0.3 percent is a conservative prediction of the water entering the radial collector wells. Furthermore, this 0.3 percent is of the same order of magnitude as the precision of the model and the water budget methodology. Therefore, the amount of fresh water drawn by the radial collector wells will be inconsequential and will not adversely impact the environment. The model demonstrates that the objective of Condition 4, to protect environmental resources, can be achieved.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal.

4-MDC-C-3 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

With this and prior submittals as described below, adequate hydrogeologic information from the area of the proposed radial collector well installation has been provided to evaluate the potential impacts of the Project.

Information describing the results of the APT was provided in the 1st Round Completeness responses and in the APT report (HDR, 2009). As stated in 3rd Round Completeness Response 3-MDC-A-3, a draft of the APT plan was provided to MDC and reviewed with the County during a meeting at MDC on February 4, 2009 and a follow-up meeting on March 20, 2009. In addition, the SFWMD was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other stable isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

Using data and information from the APT, FPL provided the groundwater modeling report with the 1st Round Completeness responses (subsequently revised with 4th Round Completeness responses) that assessed the potential impacts of the radial collector wells, Site dewatering and operational stormwater on the areas where there is a relationship with the existing industrial wastewater treatment facility.

In the 2nd Round Completeness responses, FPL provided geologic, hydrologic and water quality data supporting the groundwater modeling report, and addressed the potential impacts of the Project on groundwater, surface water, salt intrusion, movement of the hypersaline water associated with the industrial wastewater facility, and to evaluate potential Project-related impacts to wetlands resources and Biscayne Bay in numerous completeness responses and supporting analyses.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal.

Because of the voluminous amount of data and analyses on the radial collector wells, a summary has been prepared that describes this feature of the Project. This summary is referred to as *FPL Turkey Point Units 6 & 7 Project Radial Collector Well Summary* (2011) on the attached CD.

4-MDC-C-4 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulation, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been

revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Please also see Response 4-MDC-C-3 above for site-specific hydrologic data.

4-MDC-C-5 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulation, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal. Information on the lithological characteristics can be found in Section 2.3 of the report.

4-MDC-C-6 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. FPL asserts that the "lens of fresher groundwater" should not extend much past the shoreline of Turkey Point peninsula since the source of the fresh water is rainfall. However, to date, no water quality data has been presented to the County delineating the extent of the aforementioned freshwater lens that would support this assertion. Furthermore, there has been no data or modeling provided that identifies the source of the freshwater lens in question or the extent to which it would be consumed by operation of the radial collectors. Adequate information is required to determine the impact of the radial collector well system on the fate and transport of the groundwater plume associated with the cooling canal system, the potential for and effect of the recharge of the radial collector well system through horizontal preferential flow zones in the aquifer, the impact of the radial collector well system on salt intrusion, and the impact on wetlands and nearshore surface and groundwater water quality in Biscayne Bay, including as it relates to CERP efforts to promote estuarine conditions in nearshore areas. As noted in the previous comments to FPL, an adequate water quality sampling plan that provides for the collection of sufficient samples to address baseline conditions prior to, during, and after

the completion of any aquifer hydraulic studies, including the time it takes for the system to return to baseline conditions, is necessary for review of the proposed project and shall be incorporated into the hydrologic study required pursuant to condition no. 15 of Z-56-07.

RESPONSE:

The lens of fresher water that is almost always found under an island or a peninsula located in a saltwater environment is a well-recognized phenomenon (see schematic figure below). The phenomenon is discussed and the characteristics of the lens can be calculated using methods found in most text books on hydrogeology (e.g., C.W. Fetter, *Applied Hydrogeology*, Macmillan, 3rd Edition, 1994, pp. 373-376). As noted in the comment above and as previously discussed, the source of the fresher water is simply rainfall infiltration in the upland areas of the Turkey Point peninsula. This lens of fresher water is nearly stagnant and is confined to the upland areas of the peninsula (Fetter, 1994). It does not represent a freshwater source for the Bay, or a resource for benthic organisms in the Bay. The reduction of this fresher water lens by operation of the radial collector wells will have no adverse environmental impacts on the surrounding Bay. If the radial collector wells are operated for 1 to 2 weeks, the pumping will remove most of the fresher water lens below the peninsula. The removal of this fresher water lens will have no adverse environmental impact on the surrounding Bay. Over time, when the radial collector wells are not operating, rainfall infiltration will recharge the aquifer below the peninsula and this fresher water lens will be re-established.

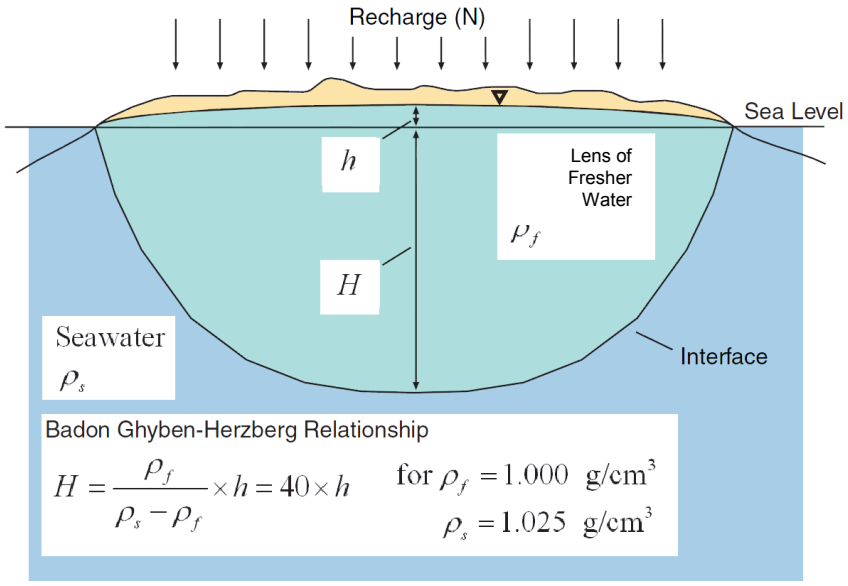


Figure 1 (adapted from Fetter, 1994)

FPL has continued to provide additional information regarding the geologic, hydrologic and water quality data for the Project. In addition, FPL has provided, as requested in the 2nd Round Completeness response, information specifically related to the potential environmental impacts of the Project.

As part of the 1st Round Completeness responses, FPL provided geologic, hydrologic and water quality data for the Site and for the APT. Using this information, FPL provided the groundwater modeling report with the 1st Round Completeness responses (subsequently revised with 4th Round

Completeness responses) that assessed the potential impacts of the radial collector wells, Site dewatering and operational stormwater on the areas where there is a relationship with the existing industrial wastewater treatment facility.

In the 2nd Completeness Round, FPL provided geologic, hydrologic and water quality data supporting the groundwater modeling report and addressed the potential impacts of the Project on groundwater, surface water, salt intrusion, movement of the hypersaline water associated with the industrial wastewater facility, and to evaluate potential Project-related impacts to wetlands resources and Biscayne Bay in numerous completeness responses and supporting analyses.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations. Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Because of the voluminous amount of data and analyses on the radial collector wells, a summary has been prepared that describes this feature of the Project. This summary is referred to as *FPL Turkey Point Units 6 & 7 Project Radial Collector Well Summary, 2011* on the attached CD at \RCW Summary.

As discussed in 4th Round Completeness Response 4-2SFWMD-B-30(26) the construction dewatering approach and the impact evaluation for the Site have been revised.

In addition, Response 4-MDC-A-18 above provides supplemental information on operational stormwater management plans. Together, these responses and the additional information about the radial collector wells, demonstrate that sufficient information has been provided to evaluate the SCA. In conclusion, the potential impacts of the radial collector wells, dewatering and stormwater on the existing industrial wastewater treatment facility will be very small.

The modeling study conducted by the U.S. Army Corps of Engineers (USACE) for the Biscayne Bay Coastal Wetlands Study, Alternative O, Tentative Selected Plan Evaluation (July 2007) (BBCW Phase 1 Draft Integrated PIR and EIS, Appendix A, Attachment A-1, March 2010) shows that in the area of the Turkey Point peninsula the CERP Project will have very little or no impact on the salinity. According to the USACE modeling, the CERP salinity benefits will occur further north in Biscayne Bay. Therefore, operation of the radial collector wells will have no adverse impact on the CERP efforts to promote estuarine conditions in the near shore areas.

As part of the Site Certification Application and subsequent completeness responses, FPL has provided comprehensive and significant information on the potential hydrologic impacts of the Turkey Point Units 6 & 7 Project features that are subject to Condition 15 of the Zoning Resolution. Since the application was submitted, FPL has also met with MDC on multiple dates to discuss Condition 15, the appropriate Project-related hydrologic study required and the completeness questions and responses related to project features that may affect surface or groundwater and that are subject to Condition 15. Multiple features were discussed in these meetings, but in general the focus was on the back-up water supply (radial collector wells), stormwater management, the onsite sanitary treatment plant and onsite construction dewatering. This 4th Round Completeness submittal provides

significant additional clarifying information on these project features and their potential hydrologic impact. For example, FPL has developed an engineering solution to significantly reduce the dewatering rate and any resulting hydrologic or environmental impacts required within the plant area. In addition, the robustness of the groundwater model, which predicts the impacts of the operation of the radial collector wells and of onsite construction dewatering, has been improved by adding detail (e.g. zones of higher conductivity and calibration to multiple pump tests) and recommendations that were suggested by MDC and other agencies. Other project features subject to Condition 15's hydrologic study have been addressed in the application and the completeness responses referenced in this response. FPL believes that the analysis and information contemplated during Condition 15 development has been met with these 4th Round Completeness Responses, and the other information provided in the application and the earlier responses to agency completeness questions. As agreed to in our latest meeting, FPL will arrange a follow up meeting(s) with MDC to discuss these responses once staff has had the opportunity to review these 4th Round Completeness Responses.

Please also refer to 4-MDC-C-1 above for information satisfying Condition 15.

Reference

Fetter, C. W., 1994. Applied Hydrogeology, 3rd ed., Prentice-Hall, New Jersey.

4-MDC-C-7 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. With regard to FPL's statement relating to a federal preemption for tritium sampling, Miami-Dade County has consulted with the NRC and has been advised that there is no federal preemption that would prevent Miami-Dade County from seeking this type of information for evaluation of the application. FPL shall provide support for its assertion that a preemption exists. The SFWMD Groundwater Monitoring Plan (SFWMD, 2009), developed pursuant to Conditions of Certification IX and X of the Power Plant Site Certification for the FPL Turkey Point Units 3 and 4 Nuclear Power Plant Unit Combined Cycle Plant Uprate Project PA 03-45A2, FPL is required to use the tracer suite of δD, $\delta^{18}O$, $\delta^{87}Sr$, and $\delta^{3}H$ (tritium), and a suite of ions to identify the extent of the CCS plume. FPL's assertion that the use of tritium is not suitable for use as a tracer in proximity to the nuclear power plant is addressed in the Monitoring Plan through the measurement of rainfall tritium in the vicinity of Turkey Point and adjustments made for the calculation of background levels of tritium in groundwater near the CCS if necessary, and therefore tritium is considered a suitable tracer of CCS water (SFWMD, Appendix E, 2009).

RESPONSE:

Please refer to Responses 4-MDC-A-3 and 4-MDC-A-5 above.

4-MDC-C-8 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed

project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Information describing the results of the aquifer performance test was provided in the 1st Round Completeness responses and in the APT report (HDR, 2009). Using data and information from the APT, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model.

One of the changes that were made to the model specifically addresses 1st Round Completeness MDC-C-8. The revised groundwater model incorporates stratigraphic preferential flow zones associated with two zones of high secondary porosity. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

In the many completeness responses and supporting analyses, FPL has provided geologic, hydrologic and water quality data supporting the groundwater modeling report and addressed the potential impacts of the Project on groundwater, surface water, salt intrusion, movement of the hypersaline water associated with the industrial wastewater facility, and evaluated potential Project-related impacts to wetlands resources and Biscayne Bay.

Because of the voluminous amount of data and analyses on the radial collector wells, a summary has been prepared that describes this feature of the Project. This summary is referred to as a *FPL Turkey Point Units 6 & 7 Project Radial Collector Well Summary, 2011* on the attached CD at \RCW Summary.

4-MDC-C-9 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in

Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1 (Bechtel Power Corporation, 2011) attached to this submittal. Figures 59-60 from the revised groundwater modeling report present the drawdown contours that define the cone of influence associated with the operation of the radial collector wells.

Please see Response 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

4-MDC-C-10 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please refer to Response 4-MDC-C-6 above.

4-MDC-C-11 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Please see response to 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

4-MDC-C-12 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507

F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Please see response to 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

4-MDC-C-13 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please see Response 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent of the aquifer recharge will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore. These near shore areas are within the saline portion of the aquifer. The radial collector wells will have no adverse impact on that portion of the Biscayne Aquifer that supplies fresh drinking water.

With respect to Condition 4 of the zoning approval, FPL continues to work with the County and other agencies on the assessment of the impacts of operation of the radial collector well system as the backup water supply for Turkey Point Units 6 & 7. The back-up water supply is necessary for reliability of plant operations and allow for use of reclaimed water as a primary makeup water source. FPL has identified the cooling water resources for the Project to employ the best combination of alternative sources to maximize the use of reclaimed water and minimize impacts to the environment and avoid impacts to fresh groundwater resources. It is FPL's position that the content of the SCA and subsequent Completeness submittals meet the intent of Condition 4. FPL requests that Miami-Dade County review the information submitted on this topic for technical merits. FPL will continue to work with the County's policy makers to clarify this condition as appropriate.

The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore.

As discussed above, by far the largest amount of water pumped by the radial collector well system originates from Biscayne Bay. The cooling canal water that is estimated to enter the radial collector wells does so at depth (i.e., below the bottom of the Bay) and, due to its density, will remain at depth regardless of radial collector well operation. The 0.3 percent from precipitation recharge represents a relatively small amount of water. Because precipitation is fresh water, it will tend to remain in the upper layers of the aquifer. Since the radial collector wells draw water at depth, the 0.3 percent is a conservative prediction of the water entering the radial collector wells. Furthermore, this 0.3 percent is of the same order of magnitude as the precision of the model and the water budget methodology. Therefore, the amount of fresh water drawn by the radial collector wells will be inconsequential and will not adversely impact the environment. The model demonstrates that the objective of Condition 4, to protect environmental resources, can be achieved.

4-MDC-C-14 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please see response to 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

4-MDC-C-15 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL has continued to provide additional information regarding the mixing chamber model that was used to assess potential impacts from the radial collector wells on salinity in Biscayne Bay. In the response to the 1st Round Completeness Question MDC-C-15, FPL identified where the information requested could be found. As presented in 1st Round Response SFWMD-B-63 and identified to the County, the model documentation, calibration and sensitivity analysis were provided in 1st Round

Completeness Attachment SFWMD-B-63a (also on the attached CD at Attachments*Attachment SFWMD-B-63a Salinity Impact Analysis.pdf and Figure SFWMD-B-63(a).pdf*).

Regarding the influence on the existing industrial wastewater facility, as presented in Response 2MDC-C-6GWM-5 (July 2010), the groundwater model determines the amount of water originating from the Bay, but it does not calculate the impact of that withdrawal on the Bay salinity. This must be determined by a separate analysis. The salinity impact provided in the SCA and described in 1st Round of Completeness information was an entirely separate analysis from the groundwater model. The salinity impact analysis calculates the impact of the withdrawal on the Bay salinity and was provided for that specific purpose. The salinity analysis accounts for salinity variations in the Bay by using time-series salinity data collected over several years at several locations around the Turkey Point peninsula. As identified to the County, the salinity impact analysis was discussed in the SCA and the model documentation was provided in the previous Completeness Rounds and the associated Attachments SFWMD-B- 63a, SFWMD-B-63b, and SFWMD-B-63c (also attached here).

FPL has continued to provide additional information on this subject. The County is directed to the following completeness responses that provide supplemental information on the mixing chamber model that addresses the salinity impacts of the radial collector wells:

1st Round Plant and non-Transmission Completeness Responses (October 2009)

FDEP-VI-A-8, FDEP-VI-B-1, SFWMD-B-55, SFWMD-B-59, SFWMD-B-60

2nd Round Plant and non-Transmission Completeness Responses (Part A) (April 2010)

2FDEP-VI(CAMA)-6, 2FDEP-VI(CAMA)-8, 2SFWMD-B-56(54), 2SFWMD-B-58(56), 2SFWMD-B-60(57), 2SFWMD-B-60(58)

2nd Round Plant and non-Transmission Completeness Responses (Part B) (July 2010)

2FDEP-SED-III-2, 2FDEP-VI(CAMA)-4, 2FDEP-VI(CAMA)-5

3rd Round Plant and non-Transmission Completeness Responses (July 2010)

3SFWMD-B-56(54), 3FDEP-VI(CAMA)-4, 3FDEP-VI(CAMA)-5, 3FDEP-VI(CAMA)-6.

4th Round Plant and non-Transmission Completeness Responses (December 2010)

4-2SFWMD-B-15(10)(k), 4-3SFWMD-B-55(53) 58) a) through 4-3SFWMD-B-55(53) 58) i), 4-3SFWMD-B-62(60), 4-FDEP-VI(CAMA)-4, 4-FDEP-VI(CAMA)-5, 4-MDC-C-6

The information presented in these responses supports the analyses that were performed with water quality data for four stations in Biscayne Bay. These salinity impact analyses from multiple stations demonstrate that radial collector wells will have no adverse impact on the salinity in Biscayne Bay.

4-MDC-C-16 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please refer to Responses 4-MDC-C-2 and 4-MDC-C-6 above.

4-MDC-C-18 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

This question was answered in the 3rd Round Completeness Response to 3MDC-C-18 submitted in July 2010. The response is included below:

This comment, which originated in 1st Round Plant and non-Transmission Completeness, requests construction details for the radial collector wells, including locations, designs, numbers, and pipe sizes. These well construction details will not be available until post-certification. However, FPL believes this information is not necessary to provide the required review of the Project.

Section 24-43.2 of the MDC code is inapplicable to the radial collector well system proposed to supply backup cooling water supply for the operation of Turkey Point Units 6 & 7. Subsection (1) is titled "Regulation of on-site *domestic well* systems generally" [emphasis added]. A review of that code section does not reveal any provision that seeks to regulate a well other than an "on-site domestic well system." The County's Code, at Section 24-5, defines "domestic well system" to mean "any water supply system using a well and piping to provide potable water for human consumption." The proposed radial collector wells will not be providing water for human consumption; the produced water will be used for cooling purposes within the Project. Potable water for use at the site will be supplied by MDWASD or from bottled water sources.

Even assuming that the remaining subsections of 24-5 apply to wells other than domestic wells, to the extent this comment suggests that these remaining subsections of establishes well construction criteria applicable to the radial collector wells, the delegation from SFWMD to the MDC Health Department of its exclusive authority to regulate water well construction is limited to water wells less than 12 inches in diameter. The radial collector wells will be larger than 12 inches in diameter.

Further, Section 373.217, F.S., grants the state of Florida (including the Siting Board for projects subject to the PPSA) "the exclusive authority . . . for consumptive use of water." Any local regulation in conflict with that exclusive authority over consumptive use of water is preempted. As such, to the extent Section 24-43.2 of the MDC code purports to regulate consumptive use of water, it is preempted.

Subject to the foregoing, FPL will provide the County with those analyses of water use required under the various conditions of the Zoning Resolution.

4-MDC-C-19 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Groundwater water quality data collected as part of the APT conducted on Turkey Point were provided in 1st Round Response MDC-C-19 (October 2009).

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Please see Response 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

4-MDC-C-20 (Fourth Round)

No additional information has been provided. This item remain·s incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. Miami-Dade County acknowledges the documentation submitted with the SCA and in the latest submittal, however details related to the wetlands areas to be impacted by the proposed radial well delivery pipeline have not been clearly delineated. Please indicate on sheets 3.00 through 3.08 the footprint of the temporary construction area and the radial collector well delivery. pipeline. These details are not shown on the submitted documents. Furthermore, Figure 3MDC-C-20 refers to a "Stack Laydown Mitigation Area" but does not show the footprint of the pipeline or the temporary construction impacts in relation to this area.

RESPONSE:

The footprint of the temporary construction area associated with the radial well delivery pipeline and the jurisdictional wetland boundary is illustrated in Figure 4-MDC-C-20 entitled *Turkey Point Stack Laydown Mitigation Area and Jurisdictional Wetland Boundaries, and Radial Collector Well Delivery Pipeline on the attached CD at Attachments\4-MDC-C-20*. The temporary construction area associated with the radial collector well delivery pipeline installation is located outside of the existing stack laydown mitigation area.

4-MDC-C-22 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please see Responses 4-MDC-C-6 and 4-MDC-C-13 above.

4-MDC-C-23 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

The 1st Round comment MDC-C-23 stated that a 3-dimensional mathematical model is needed to support the conclusion that the Biscayne Aquifer would not be affected by operation of the radial collector wells. This same comment also stated that the model was needed to determine the influence cones of the proposed radial collector wells and whether the extraction of water from the Biscayne Bay system will change or reduce the freshwater inflow to the bay and/or increase salinity.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

The groundwater model results (Bechtel Power Corporation, 2011) show the influence cones of the radial collector wells and show that the extraction of water will not affect freshwater zones of the Biscayne Aquifer.

A salinity impact analysis, that evaluated the potential salinity change in Biscayne Bay from operation of the radial collector wells, was submitted with the Turkey Point Units 6 & 7 SCA. The salinity impact analysis was extended to include several other water quality monitoring stations in response to requests from reviewers. The salinity impact analyses continue to show that the operation of the radial collector wells will not cause significant or adverse impacts to salinity in the Bay.

The results of these analyses are discussed in detail in other responses. Because of the voluminous amount of data and analyses on the radial collector wells, a summary has been prepared that describes this feature of the Project. This summary is referred to as *FPL Turkey Point Units 6 & 7 Radial Collector Well Summary, 2011* on the attached CD at \RCW Summary.

Please also see Responses 4-MDC-A-3, 4-MDC-A-20-2, 4-MDC-C-1, 4MDC-C-2, 4-MDC-C-6, and 4-MDC-C-13 above.

4-MDC-C-24 (Fourth Round)

Miami-Dade County concurs that the information provided regarding FPL's Water Supply Alternative Analysis is adequate for review; however, information necessary to evaluate the radial collector wells remains incomplete. Completeness issues related to the radial collector wells and use of the Biscayne Aquifer as a source of cooling water (Condition 4 of Z-56-07), the Alternative Water Sources Plan required pursuant to Condition 5 of Z-56-07, conformance with other conditions of Z -56-07, the CDMP, and other substantive requirements of Miami-Dade County Code are addressed in other MDC completeness comments.

RESPONSE:

Comment acknowledged regarding FPL's Water Supply Alternative Analysis. Please see Response 4-MDC-C-6 above for information on the revised groundwater model, and potential impacts of the radial collector wells on groundwater and surface water.

SECTION D - ACCESS ROAD

4-MDC-D-1(a) (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The proposed access roads include new roads (immediately east and west of L-31 E) and substantial upgrades to both characteristics and operation of existing roads, including multi-lane paving and 24-hour utilization of roads that are currently unpaved with only sporadic use. The road improvements will impact the existing road corridor and the surrounding jurisdictional wetlands, which have been documented by FPL and others to provide habitat for a large array of flora and fauna, including many state and federally listed species. Roads are well documented in the scientific literature to disrupt ecological corridors and cause significant

mortality of wildlife where they do so. In addition, noise and constant traffic are likely to have secondary impacts on wildlife behavior. FPL has not provided information that is sufficient for Miami-Dade County to evaluate potential impacts to ecological corridors that the proposed access roads will cross, hydrogeology in the surrounding wetlands, invasive species occurrence, or listed species occurrence. FPL has not provided information that is sufficient for Miami-Dade County to evaluate indirect impacts due to improved public access to the area and potential limitations on public agency access to the area. Miami-Dade County reiterates its request that FPL provide complete information on these potential impacts.

FPL shall provide complete information on plant cover, plant species abundance, and *occurrence and utilization* by wildlife species along the proposed road corridors including but not limited to birds, insects, fish, reptiles, and amphibians, mammals, and aquatic/marine invertebrates. Wildlife utilization information provided should include identification of location and characteristics of ecological corridors that are crossed by the roads. This information shall account for temporal influences, and shall be appropriate to the occurrence and/or behavior of the species reported. Examples include but are not limited to vegetation distribution information that is based on surveys conducted during times when key taxonomic characters are present to confirm identification, nesting information that is based on surveys conducted during known nesting seasons, etc. The information should include but not be limited to occurrence of plants such as the coastal leather fern *(Acrostichum aureum)*, laltice-vein fern *(Thelypteris reticulata)*, mangrove rubber vine *(Rhabdadenia biflora)*, pine pink *(Bletia purpurea)*, and Lamarck's trema *(Trema lamarckianum)*, and occurrence and/or utilization by wildlife such as Florida panther *(Puma concolor coryi)*, Eastern indigo snake *(Drymarchon corais couperi)*, American crocodile *(Crocodylus acutus)*, mangrove rivulus *(Rivulus marmoratus)*, wood stork *(Mycteria americana)*, white-crowned pigeon *(Patagioenas leucocephala)*, least tern *(Stema antillarum)*, little blue heron *(Egretta caerulea)*, reddish egret *(Egretta rufescens)*, white ibis *(Eudocimus albus)*, snowy egret *(Egretta thula)*, roseate spoonbill *(Platalea ajaja)*, tricolored heron *(Egretta tricolor)*, peregrine falcon *(Falco peregrinus)*, limpkin *(Aramus guarauna)*, American oystercatcher *(Haematopus palliates)*, brown pelican *(Pelicanus occidentalis)*, and bald eagle *(Haliaeetus leucocephalus)* and their food sources.

FPL states in the response, "There will be no barriers to sheetflow", however, FPL has not provided detailed information supporting this assertion. FPL shall provide the requested information, including how the proposed access roads will be consistent with Conditions 9, 17, and 21 of Resolution Z-56-07.

FPL states in the response, "FPL will coordinate with DERM staff to revise the Exotic Species Management Plan". Miami-Dade County considers this item incomplete until the requested management plan has been submitted and is considered sufficient.

FPL has not provided information sufficient for Miami-Dade County to evaluate whether the proposed security measures will adequately address concerns about potential impacts to the surrounding wetlands due to increased public access. FPL shall provide complete details concerning physical and operational methods for access control on all roads south of SW 344 Street that are proposed for temporary improvements.

FPL has not provided sufficient information for Miami-Dade County to evaluate the alternatives analysis for road selection with respect to the requirements of Chapter 24 of the Miami-Dade County Code. Please provide the requested information, including demonstration that environmental impacts have been avoided and minimized.

RESPONSE:

Information on existing vegetation and expected wildlife along the road corridor was provided in SCA Chapter R9, Section R9.3.7, including FLUCFCS codes, dominant vegetation and potential state and federally-listed species. SCA Appendix 10.4 includes over 40 USACE data forms providing specific vegetation observed in the roadway corridor during the wetland surveys. In addition, 1st Round Completeness Response MDC-D-9 (October 2009) contains information regarding exotic vegetation along the road corridor. Prior to construction, FPL will conduct pre-clearing listed species surveys within the selected rights-of-way. The surveys will be conducted in consultation with the FWC, USFWS and with MDC. FPL will comply with the applicable FWC, DACS, and USFWS regulations regarding avoidance, minimization, and mitigation of impacts to state and federally-listed species, including plants.

The existing transmission patrol road along SW 359th Street is a 14 foot wide rock road with an elevation of approximately 3.3 to 3.5 feet (NAVD88). The road contains 60 15-inch arch culverts (15" high by 21" wide) from SW 137th Ave. eastward to the end of the roadway immediately west of the L-31E Canal as shown in the attached figures from FDER Permit #130558149, Figure 4-MDC-D-1(a) on the attached CD. The culvert inverts and the adjacent ground elevations are approximately 0 feet (NAVD88). The seasonal high water elevation in the area of the patrol road is approximately 1.25 feet (NAVD88).

The temporary improvements to SW 359th Street from SW 137th Avenue to SW 117th Avenue will consist of three paved travel lanes, a paved striped median, and stabilized shoulders on both sides of the roadway. The elevation of the roadway crown in this section is approximately 6.0 feet (NAVD88). From SW 117th Avenue to the Turkey Point site the roadway will consist of four paved travel lanes, a paved striped paved median, and stabilized shoulders on both sides. The elevation of the roadway crown in this section is approximately 6.1 feet (NAVD88). Stormwater treatment will be provided in swales constructed on both sides of the roadway. The bottom elevation of the roadside swales is approximately 2.7 feet (NAVD88).

The existing system of culverts has been working well to provide sheet flow for the past 25 years. FPL proposes to replace the 60 existing 15-inch arch culverts (15"high by 21"wide) with new 20-inch arch culverts (20" high by 28" wide) utilizing the same culvert locations, and the same invert elevations, as part of the temporary roadway improvements to SW 359th Street. The approximately 80 percent increase in pipe cross sectional area provided by the proposed 20-inch arch culverts will improve flows to accommodate up to a one foot increase in water elevations that could result from future CERP projects. Final road design will be coordinated with MDC post-certification. FPL will work with MDC to develop the appropriate conditions of certification.

Following construction of Units 6 & 7, the temporary improvements will be removed and the roadway returned to a transmission patrol road. The 60 culverts will be shortened to extend from the toe of slope on either side of the patrol road. The six foot box culvert will be removed.

Brazilian pepper, Australian pine, melaleuca and shoe-button ardisia will be removed and eradicated within an area extending up to 50-ft from the edge of pavement on FPL property adjacent to SW 359th Street, and within the public rights-of-way adjacent to construction access roadway improvements along public roadways. Specific details of exotic vegetation management are provided in the "Turkey Point Units 6 & 7 Draft Exotic Vegetation Management Plan" submitted to MDC on February 25, 2011 pursuant to Resolution Z-56-07.

With regard to public access along the temporary construction access roadways, there are currently no restrictions along these roadways. FPL committed in the CDMP amendment to deter public access on these roadways. At FPL's expense, all temporary roadway improvements south of SW 344th Street will be patrolled by security personnel when in active use. In addition, FPL will maintain security gates or other appropriate security measures during inactive periods on privately-owned roadway improvements. Therefore, control of public access to these roadways will be improved over current conditions.

As described in the CDMP amendment language provided in the 3rd Round Completeness response (July 2010), Miami-Dade County and other agencies with needed access shall, after providing proper notification to FPL, be granted access to FPL's private roadway. The construction of the access road improvements south of SW 344th Street is expected to occur over approximately 18 months. Any restrictions in accessing EEL lands by County staff during road construction will be temporary.

FPL's 3rd Round Completeness response to this question included the following documents on CD describing our analysis of an alternative road alignment conducted during the CDMP amendment process:

- New Canal Road Option Analysis Memo (dated 2/8/10)
- New Canal Road Option Figures (dated 2/8/10)
- New Canal Road Option Wetland Summary Tables (dated 2/8/10)
- PTN 6 &7 Project Memorandum (dated 3/15/10)

The Miami-Dade County's Board of County Commissioners (BOCC) approved the CDMP amendment providing for the proposed roadway alignment. FPL has thoroughly reviewed alternative roadway alignments and demonstrated that the BOCC-approved corridor is the most appropriate for the Project.

4-MDC-D-1(b) (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has not provided information sufficient for Miami-Dade County to evaluate whether the proposed security measures will adequately address concerns about potential impacts to the surrounding wetlands due to increased public access. FPL shall provide complete details concerning physical and operational methods for access control on all roads south of SW 344 Street that are proposed for temporary improvements.

RESPONSE:

Please see Response 4-MDC-D-1(a) and previous Response 3MDC-D-1(b) (July 2010).

4-MDC-D-9 and 4-MDC-D-10 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges FPL's efforts on developing the Exotic Management Plan, however, this item. will be considered incomplete until a more detailed plan has been submitted and is considered sufficient.

RESPONSE:

Although this information is not related to completeness of the SCA and appropriately handled post certification, the Exotic Vegetation Management Plan requested by these MDC questions will be submitted to MDC under separate cover.

4-MDC-D-11 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL states in the response, "the potential for protected tree species is acknowledged". Please provide the requested tree survey.

RESPONSE:

Field surveys of tree resources within the Site, the FPL reclaimed water treatment facility, the nuclear administration and training building, the temporary construction access road improvements area, the radial collector well area, and the radial collector well delivery pipeline were conducted the week of December 6th ,2010 and the week of January 17th, 2011in accordance with Section 24-49, MDC Code, and MDC guidelines (http://www.miamidade.gov/derm/library/permits/tree_survey_guidelines.pdf). A total of 537 non-exempt trees in upland areas were identified; the resulting survey locations upon aerial imagery and associated tabular data are provided on the attached CD at Attachments\4-MDC-D-11. As stated previously, tree surveys will be conducted within the final rights-of-way for the potable and reclaimed water pipelines post-certification, pursuant to Section 24-49, Chapter 24 of the MDC Code.

The results of the additional field surveys and a tree mitigation plan (if applicable) will be available during the post-certification review process authorized by Section 403.5113(2), F.S., and Rule 62-17.191, F.A.C. FPL will work with the agencies to develop the appropriate conditions of certification for the tree surveys.

4-MDC-D-12 (Fourth Round)

Please see MDC's responses to MDC-A-26-2, MDC-D-1, MDC-D-9 and MDC-D-10, and MDC-D-21.

RESPONSE:

Please see Responses 4-MDC-A-26-2, 4-MDC-D-1, 4-MDC-D-9 and 4-MDC-D-10 above, and Response 4-MDC-D-21 below.

4-MDC-D-13 (Fourth Round)

Please see MDC's response to item MDC-D-1.

RESPONSE:

Please see Response 4-MDC-D-1 above.

4-MDC-D-14 (Fourth Round)

Please see MDC's response to items MDC-D-1, MDC-D-9, and MDC-D-12.

RESPONSE:

Please see Responses 4-MDC-D-1, 4-MDC-D-9, and 4-MDC-D-12 above.

4-MDC-D-15 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. A complete wetlands mitigation plan must be submitted for review that details the specific mitigation proposed for the specific project impacts including UMAM/W.A.T.E.R. scores, calculations and justifications related to time lag and risk, and monitoring and success criteria.

RESPONSE: Please see Response 4-MDC-A-24 above.

4-MDC-D-16 (Fourth Round)

Please see MDC's response on item MDC-D-1, MDC-D-9, MDC-D-12, MDC-D-14, and MDC-D-15.

RESPONSE:

Please see Responses 4-MDC-D-1, 4-MDC-D-9, 4-MDC-D-12, 4-MDC-D-14, and 4-MDC-D-15 above.

4-MDC-D-19 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The item remains incomplete because the information provided for *Task 1* in page 4 of the report entitled "American Crocodile Monitoring Program for the Turkey Point Uprate" is conflicting. Specifically, the reported numerical and written percentages of animals captured during the surveys do not match; please provide clarification as to which are the correct percentages. Additionally, please clarify how entries using the "+" sign in the tables presented in the 2009 Turkey Point American Crocodile Report should be interpreted. For example, the sixth entry on Table entitled "Night Surveys 2009" of the subject report has the entry "7+16+10" under the column labeled "Hatchlings captured"; please clarify how this entry should be interpreted.

RESPONSE: Please note that additional information was provided in the 3rd Round Completeness response. The percentages listed in Task 1 of the report entitled "American Crocodile Monitoring Program for the Turkey Point Uprate" were calculated as follows:

A total of 124 crocodiles were captured in 2009, of which 8 were recaptured and therefore not included in the total for the percentage calculation:

- 15 animals or 13% (15/116 x 100) young of year
- 76 animals or 66% (76/116 x 100) juveniles
- 19 animals or 16% (19/116 x 100) subadults
- 6 animals or 5% (6/116 x 100) adults

In addition, 55 animals of the 70 animals for which growth was calculated or 79% (55/70 x 100) were hatchlings.

With regard to the Night Survey 2009 Table included in the report entitled “2009 Turkey Point American Crocodile Report”, the “7 + 16 + 10” value listed under the “Hatchlings captured” column corresponds to the location where the hatchlings were captured, shown in the “Location of capture” column. For example 7 hatchlings were found in location C11SXN2, 16 hatchlings were found in location B12SXN4(S) pond and 10 hatchlings were found in location B31SXN5(N) pond.

4-MDC-D-20 (Fourth Round)

Please see MDC's response to item MDC-A-23 and MDC-A-26-2.

RESPONSE:

Please see Responses 4-MDC-A-23 and 4-MDC-A-26-2 above.

4-MDC-D-21 (Fourth Round)

No additional information has been provided. This item remains incomplete and.· information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. In addition, FPL shall provide the referenced USFWS South Florida Multi-Species Recovery Plan (U.S. Fish and Wildlife Service, 1999) as supporting information for the SCA. FPL shall also provide a copy of the Moler (1992) reference cited in FPL's Turkey Point Units 6 & 7 Supplemental Analysis, Transmission Lines, Third Completeness and Supplemental Analysis CD of SCA Information Submitted by FPL Regarding Turkey Point Transmission Line Corridors, Response MD(3)-09 as supporting information for the SCA.

FPL stated in the response that the "exact location of wildlife crossing and protected species information signage has not been determined". However, wildlife crossings features should be located based on where the proposed roads cross ecological corridors. This information has been requested by Miami-Dade County, but has not yet been provided by FPL. FPL shall provide additional information on the location and design of required wildlife protection features and wildlife underpasses associated with the access roads. This information is needed to evaluate potential impacts of the project.

FPL has asserted in its response that "it is unlikely that the proposed temporary addition of lanes to existing roadways to facilitate construction traffic will adversely affect the Eastern indigo snake." However, FPL has not provided the results of the listed species surveys requested by Miami-Dade County to support this assertion. FPL shall provide the results of the requested listed species surveys and shall provide information, based on the results of the surveys, on whether the proposed construction access roads will result in mortality of Eastern indigo snakes, and if so, how many are likely to be killed based on the location and duration of operation of the roads. FPL shall provide information on how the assertion that there will be no adverse impact to Eastern indigo snakes will be verified after the proposed access roads have been constructed and are operational.

FPL's response to 2MDC-D-1(b) (April 2010) indicated that public access will be restricted from SW 359th Street by locked gates when construction is complete. Please clarify how public access to this stretch will be restricted while the roads are in active use. (See also Miami-Dade County response to item MDC-D-1(a).) Please clarify how FPL will address potential impacts to wildlife on the portions of the access road that are located south of SW 344 Street and within public rights of way. Please clarify how FPL will address potential impacts from enhanced public access on the portions of the access road that are located south of SW 344 Street and within public rights of way.

RESPONSE:

As stated in Response 4-MDC-D-21 (Fourth Round) of Transmission Completeness, Moler's Rare and Endangered Biota of Florida, Volume III (1992) is readily available through libraries, and for purchase through the University Press of Florida online at http://www.upf.com/book.asp?id=MOLERF92 or through bookstores.

The referenced USFWS South Florida Multi-Species Recovery Plan (U.S. Fish and Wildlife Service, 1999) is publicly available through the USFWS website at http://www.fws.gov/verobeach/index.cfm?Method=programs&NavProgramCategoryID=3&programID=107&ProgramCategoryID=3.

FPL met with the US Fish & Wildlife Service, Florida Fish & Wildlife Conservation Commission and MDC in September, October, and December 2010 to discuss wildlife protection during construction and operation of the Project. Wildlife protection along SW 359th Street was a concern to agency staff. Wildlife crossings are typically developed using mortality data and travel corridors of known species. As previously stated in SCA Appendix 10.7.1.3 (June 2009), wildlife underpasses will be located on SW 359th Street east of the L-31E Levee and north of the industrial wastewater treatment facility. The existing SW 359th Street west of the L-31E Levee is currently a transmission patrol road that is used infrequently. There are no known upland corridors adjacent to SW 359th Street that wildlife utilize to cross the road. No mortality data is available for the patrol road. To provide crossing opportunities for larger mammals such as deer, FPL will install one six foot high by 24 feet wide box culvert, or similar type of culvert, for wildlife crossing between SW 137th Avenue and SW 117th Avenue. The new 20-inch arch culverts placed along the length of the road will provide crossing opportunities for a range of species, from small reptiles and amphibians (e.g. snakes, turtles, frogs), to larger reptiles (e.g. alligators) and medium-sized mammals (e.g. raccoons). The need for other wildlife exclusion devices such as fencing will be determined during roadway design. FPL will develop the appropriate wildlife protection features for SW 359th Street between the L-31E Canal and SW 137th Avenue, based upon continued consultation with USFWS, FWC and MDC post-certification.

The exact location of protected species information signage has not been determined, but would likely include the following intersections: 137th Avenue and Palm Drive, 117th Ave and Palm Drive, 117th Avenue and 359th Street, and 137th Avenue and 359th Street, as well as at approximately one-mile intervals along each of the above-mentioned roadways.

As previously stated in responses to Completeness Rounds 1, 2, and 3, no Eastern indigo snakes have been observed within the proposed temporary construction access road corridor. Nevertheless, FPL will conduct additional pre-clearing listed species surveys following selection of final rights-of-way for linear facilities, to include surveys for the Eastern indigo snake in accordance with USFWS and FWC protocols. FPL will comply with the USFWS Standard Protection Measures for Eastern Indigo Snakes during construction and operation. FPL can verify the assertion that there will be no adverse impact to Eastern indigo snakes after the proposed access roads have been constructed and are operational through documentation of avoidance of mortality. FPL will comply with the applicable regulations regarding avoidance, minimization, and mitigation of impacts to other state and federally-listed species.

Please see Response 4-MDC-D-1(b) above for information regarding restriction of public access south of 344th Street.

4-MDC-D-22 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including

Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges FPL's efforts to coordinate with Miami-Dade County and USFWS to address management and preservation of listed species and their critical habitats, including identification of appropriate wildlife protection features necessary for the construction access roads, however, this item will be considered incomplete until the information has been submitted and is considered sufficient.

Please also see Miami-Dade County's response to items MDC-A-23, MDC-A-26-2, MDC-D-1(a), MDC-D-1(b), MDC-D-9, MDC-D-12, MDC-D-13, MDC-D-21, MDC-D-23.

RESPONSE: FPL has consulted with MDC, USFWS and FWC to address management and preservation of state and federally-listed species. FPL will provide a revised Threatened and Endangered Species Evaluation and Management Plan (Rev. 1) that incorporates the information gathered during these consultations.

4-MDC-D-23 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Miami-Dade County acknowledges FPL's efforts to coordinate with Miami-Dade County and USFWS to address management and preservation of listed species and their critical habitats, including identification of appropriate wildlife protection features necessary for the construction access roads, however, this item will be considered incomplete until the information has been submitted and is considered sufficient.

RESPONSE: FPL has consulted with MDC, USFWS and FFWCC to address management and preservation of state and federally-listed species. FPL will provide a revised Threatened and Endangered Species Evaluation and Management Plan that incorporates the information gathered during these consultations.

4-MDC-D-24 (Fourth Round)

Please see MDC's response to item MDC-D-1 (a).

RESPONSE:

Please see Response 4-MDC-D-1 (a) above.

4-MDC-D-25 (Fourth Round)

Please see MDC's response to item MDC-D-1(a).

RESPONSE:

Please see Response 4-MDC-D-1 (a) above.

4-MDC-D-26 (Fourth Round)

Please see MDC's response to item MDC-D-1 (a).

RESPONSE:

Please see Response 4-MDC-D-1 (a) above.

4-MDC-D-27 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S.

RESPONSE:

Roadway stormwater will be managed in the roadside swales to be addressed in accordance with applicable SFWMD and MDC methods. Conceptual designs of roadway cross-sections are provided in SCA Figures R9.3.2-1 through R9.3.2-9.

Final road design will be coordinated with MDC post-certification. FPL will work with MDC to develop the appropriate conditions of certification.

Please refer to Response 4-MDC-D-1(a).

4-MDC-D-29 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. Information regarding the specific location of the proposed roadways is needed in order for Miami-Dade County to evaluate the proposed project's conformance with local requirements.

RESPONSE:

In addition to the location maps shown in SCA Chapter R9.0, the location of the proposed temporary roadway improvements are also provided on the 71 plan sheets in the *Turkey Point Units 6 & 7 Roads and Bridges Conceptual Design Report* (HDR, 2009) submitted in the 1st Round response. These figures show the location of the roadway improvements over aerial photographs. The roadway improvements along SW 359th Street will be completely contained within FPL property. Although specific details of the temporary roadway improvements have yet to be determined, it appears that significant right-of-way exists along SW 328th Street to accommodate the roadway improvements with no impact to private landowners. Depending upon the final design width of the roads along SW 137th Avenue and SW 117th Avenue, some impacts to adjacent property owners outside of the right-

of-way may be necessary. If additional property is needed outside of public rights-of-way, FPL will obtain the necessary property interests.

FPL is certifying a corridor for these roadways and therefore, final design information will not be available until post-certification. FPL roadway engineers will meet with MDC Public Works staff to determine the appropriate design for the temporary roadway improvements that will provide safe access to the site during construction while meeting appropriate MDC and FDOT temporary roadway standards.

FPL will work with the agencies to develop an appropriate condition of certification for submittal of the final roadway designs.

SECTION E - FPL-OWNED FILL SOURCE

Miami-Dade County comments that pertain to the FPL-owned fill source feature are no longer pertinent to this evaluation due to the fact that this project feature has been removed from FPL's Site Certification Application as of May 2010.

SECTION G - MISCELLANEOUS

4-MDC-G-1 (Fourth Round)

Please see MDC's response to items MDC-A-6, MDC-A-7, and MDC-A-8

RESPONSE:

Please see Responses 4-MDC-A-6, 4-MDC-A-7, and 4-MDC-A-8 above.

4-MDC-G-3 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

Please see Responses 4-MDC-C-6 and 4-MDC-B-3 above.

4-MDC-G-6 (Fourth Round)

Please see MDC's response to items MDC-A-23, MDC-A-25, MDC-A-26-2, MDC-D-11, and MDC-D-21.

RESPONSE:

Please see Responses 4-MDC-A-23, 4-MDC-A-25, 4-MDC-A-26-2, 4-MDC-D-11, and 4-MDC-D-21 above**.**

4-MDC-G-7 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S.

RESPONSE:

FPL is refining the mitigation plan with input from MDC, USACE, FDEP, and the SFWMD to identify a final plan of wetland enhancement, restoration, and preservation that will offset the loss of wetland functions. The final mitigation plan will reflect agency recommendations through removal of those components with the greatest risk of meeting success criteria and incorporation of those mitigation options that have the highest probability of success, in order to cumulatively provide the necessary functional lift to offset the Project's wetland impacts upon completion of final design of Project features.

Based on feedback from multiple reviewing agencies, FPL is removing the option of adding reclaimed water to the Model Lands Basin as a component of the Project's mitigation plan. Although not currently proposed as part of the Turkey Point Units 6 & 7 mitigation plan, construction of the reclaimed water pipeline and FPL reclaimed water treatment facility will provide the infrastructure necessary to provide large quantities of reclaimed water for future environmental restoration projects in southern Miami-Dade County.

As stated in the Appendix 10.4 of the SCA, the mitigation plan was developed to identify several mitigation opportunities for consideration that collectively provide more functional lift than required to offset the Project's wetland impacts. The final mitigation plan will incorporate those mitigation options that cumulatively provide the necessary functional lift to offset the Project's wetland impacts upon completion of final design of Project features. Based on feedback from multiple reviewing agencies, the S20A/L-31E hydrologic enhancement and ENP seepage management options are also being removed from the revised mitigation plan.

The final mitigation plan will be based on identification of actual wetland impacts following selection of the rights-of-way within the certified corridors and detailed engineering design. The final mitigation plan, including details of proposed restoration activities, monitoring, and success criteria, will be available during the post-certification review process authorized by Section 403.5113(2), F.S., and Rule 62-17.191, F.A.C. FPL will work with the agencies to develop the appropriate conditions of certification for the mitigation plan.

4-MDC-G-9 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. The County acknowledges FPL's reference to installation of culverts, however information on the number, size and location of the culverts associated with the access roads is needed.

RESPONSE:

The existing transmission patrol road along SW 359th Street is a 14 foot wide rock road with an elevation of approximately 3.3 to 3.5 feet (NAVD88). The road contains 60 15-inch arch culverts (15" high by 21" wide) from SW 137th Ave. eastward to the end of the roadway immediately west of the L-31E Canal as shown in the attached figures from FDER Permit #130558149. The culvert inverts and the adjacent ground elevations are approximately 0 feet (NAVD88). The seasonal high water elevation in the area of the patrol road is approximately 1.25 feet (NAVD88).

The existing system of culverts has been working well to provide sheet flow for the past 25 years. FPL proposes to replace the 60 existing 15-inch arch culverts (15"high by 21"wide) with new 20-inch arch culverts (20" high by 28" wide) utilizing the same culvert locations, and the same invert elevations, as part of the temporary roadway improvements to SW 359th Street. The approximately 80 percent increase in pipe cross sectional area provided by the proposed 20-inch arch culverts will improve flows to accommodate up to a one foot increase in water elevations that could result from future CERP projects. Final road design will be coordinated with MDC post-certification. FPL will work with MDC to develop the appropriate conditions of certification.

4-MDC-G-10 (Fourth Round)

Please see MCC's response to item MDC-D-12.

RESPONSE:

Please see Response 4-MDC-D-12 above.

4-MDC-G-11 (Fourth Round)

Please see MDC's response to items MDC-G-6, MDC-D-1, MDC-D-9, MDC-D-12, MDCD-14, and MDC-D-16.

RESPONSE:

Please see Responses 4-MDC-G-6, 4-MDC-D-1,4- MDC-D-9, 4-MDC-D-12, 4-MDC-D-14, and 4-MDC-D-16 above.

4-MDC-G-12 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. With regard to the proposed mitigation project involving the discharge of wastewater to the Model Lands wetlands, FPL has not provided the requested information to determine whether the applicable water quality standards would be met. With regard to the proposed wastewater reuse treatment plant, FPL has not provided the requested information to determine whether the facility would meet the substantive requirements of Miami-Dade County, including the information requested in MDC-B-3.

RESPONSE:

FPL is refining the mitigation plan with input from MDC, USACE, FDEP, and the SFWMD to identify a final plan of wetland enhancement, restoration, and preservation that will offset the loss of wetland functions. The final mitigation plan will reflect agency recommendations through removal of those components with the greatest risk of meeting success criteria and incorporation of those mitigation options that have the highest probability of success, in order to cumulatively provide the necessary functional lift to offset the Project's wetland impacts upon completion of final design of Project features. Based on feedback from multiple reviewing agencies, FPL is removing the options of adding reclaimed water to the Model Lands Basin, the S20A/L-31E hydrologic enhancement, and the ENP seepage management as components of the Project's mitigation plan. With regard to adding reclaimed water to the Model Lands Basin as a component of the Project's mitigation plan. The reclaimed water pipeline and FPL reclaimed water treatment facility have the capacity to provide large quantities of reclaimed water for future environmental restoration projects in southern Miami-Dade County.

The final mitigation plan will be based on identification of actual wetland impacts following selection of the rights-of-way within the certified corridors and detailed engineering design. FPL will work with the agencies to develop the appropriate conditions of certification for the mitigation plan. The final mitigation plan, including details of proposed restoration activities, monitoring, and success criteria, will be available during the post-certification review process authorized by Section 403.5113(2), F.S., and Rule 62-17.191, F.A.C.

4-MDC-G-13 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

Please see Response 4-3SFWMD-B-30(26) above for more details about the revised dewatering plan and new foundation grouting methodology. This modification effectively eliminates the impacts of the dewatering aspects of the Project. Please see also Response 4-2SFWMD-B-46(46)(c). With the elimination of potential impacts from dewatering due to the use of grouting, the operation of the radial collector well system is the only aspect of the Project that could potentially impact the features cited by MDC. The groundwater modeling report addresses the impacts of radial collector well system operation. The range in modeled impacts due to seasonal changes in water levels in Biscayne Bay was assessed in the sensitivity analysis documented in the modeling report (Bechtel Power Corporation, 2011) As shown in Figure 65 and Tables 11 and 12 of that report, the range in impacts due to seasonal changes was found to be small. The range of seasonal change tested in the sensitivity analyses is similar in magnitude to the daily changes due to tides and therefore the range of these impacts will also be small. In addition, it should be recognized that, as a backup water supply, the radial collector well system will not be operated constantly and any impacts due to their operation will be transient and temporary in nature. The type of changes to the hydrologic system associated with the Project are small in magnitude and restricted almost entirely to the offshore environment, and therefore will not cause adverse impacts to the features cited by MDC.

4-MDC-G-20 and MDC-G-21 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. A complete wetlands mitigation plan must be submitted for review that details the specific mitigation proposed for the specific project impacts including UMAM/W.AT.E.R. scores, calculations and justifications related to time lag and risk, and monitoring and success criteria.

RESPONSE:

See Response 4-MDC-A-24 above.

4-MDC-G-23 (Fourth Round)

Please see MDC's response to items MDC-G-6, MDC-D-1, MDC-D-9, MDC-D-12, MDCD-14, and MDC-D-16.

RESPONSE:

Please see Responses 4-MDC-G-6, 4-MDC-D-1, 4-MDC-D-9, 4-MDC-D-12, 4-MDC-D-14, and 4-MDC-D-16 above.

4-MDC-G-26 (Fourth Round)

Please see MDC's responses to items MDC-D-1, MDC-D-9, MDC-D-12, MDC-D-13, MDC-D-21, and MDC-D-23.

RESPONSE:

Please see Responses 4-MDC-D-1, 4-MDC-D-9, 4-MDC-D-12, 4-MDC-D-13, 4-MDC-D-21, and 4-MDC-D-23 above.

4-MDC-G-27 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. A complete wetlands mitigation plan must be submitted for review that details the specific mitigation proposed for the specific project impacts including UMAM/W.A.T.E.R. scores, calculations and justifications related to time lag and risk, and monitoring and success criteria.

RESPONSE: Please see Response 4-MDC-A-24 above.

4-MDC-G-28 (Fourth Round)

Please see MDC's response to item MDC-G-20.

RESPONSE:

Please see Response 4-MDC-G-20 above.

4-MDC-G-30 (Fourth Round)

Please see MDC's response to item MDC-G-7.

RESPONSE:

Please see Response 4-MDC-G-7 above.

4-MDC-G-31 (Fourth Round)

No additional information has been provided. This item remains incomplete and information previously requested must be provided to allow the County to determine whether the proposed project meets the requirements of Miami-Dade County Code, zoning regulations, including Resolution Z-56-07, and the CDMP, in order to prepare the reports required by section 403.507 F.S. FPL has indicated it will provide information towards the completeness of this item at a later date and the County will review that information in a subsequent round of completeness. The County acknowledges FPL's response regarding mitigation ratios applicable to federal review of this project. However, a complete mitigation plan including mitigation ratios consistent with state and local requirements is required for review of this project. The Hole-in-the-Donut (HID) Mitigation bank was permitted by the State of Florida and was scored under State law utilizing the Wetlands Rapid Assessment Procedure (WRAP) and the Basis of Review (BOR). Be advised that the County will require mitigation based upon the requirements of the codes and ordinances of Miami-Dade County and the ratios determined in the BOR. Therefore, any mitigation proposal that includes credits from HID will be required to meet the BOR ratios of 2.5 *[sic]***: 1 to 4: 1. A complete mitigation plan must be submitted for review that details the specific mitigation proposed for the specific project impacts including UMAM/W.A.T.E.R. scores, calculations and justifications related to time lag and risk, and monitoring and success criteria.**

RESPONSE:

According to FDEP permit # 132416479, issued 2/15/1995, the Hole-in-the-Donut (HID) Mitigation bank was not scored utilizing the Wetlands Rapid Assessment Procedure (WRAP) and the Basis of Review (BOR). The HID permit pre-dates the Wetland Rapid Assessment Procedure (SFWMD Technical Publication REG-001, September 1997) http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wrap99.pdf and the SFWMD Basis of Review for Environmental Resource Permit Applications (October 1995) http://www.dep.state.fl.us/legal/rules/surfacewater/sfreview.pdf.

According to 62-345.100(6), F.A.C.:

> *Pursuant to paragraph 373.414(18)(b), F.S., an entity that has received a mitigation bank permit issued by the Department of Environmental Protection or a water management district under Sections 373.4135 and 373.4136, F.S., prior to the adoption of this rule* (UMAM) *must have impact sites assessed for the purpose of deducting bank credits using the credit assessment method, including any functional assessment methodology, that was in place when the bank was permitted.*

The HID permit states "mitigation for wetland impacts within the Mitigation Service Area will consist of a set dollar amount per acre of impact." The use of the HID is proposed to offset impacts to similar wetland types occurring within the transmission facility corridors. The mitigation ratios for HID referenced by FPL were identified based upon consultation with the USACE, the HID managers, and are consistent with other applicants' use of the HID. The HID was permitted prior to adoption of 62-345.100(6), F.A.C., with cost per credit equivalent to offset 1 acre of impact. The HID managers indicate that the bank currently uses a ratio of 1:1. Review of recent USACE permits indicate 1:1 ratio, as does the recent USACE public notice issued for the HID (GP-74 Expiration/Revised Mitigation Procedures at Hole-in-the-Donut (HID) May 27, 2010):

> "the existing ratio system established under the Special Area Management Plan (SAMP) will be maintained for the HID ledger. Mitigation will be calculated using the existing ratio of 1.5:1 established under the SAMP to off-set unavoidable wetland impacts for the Bird Drive and North Trail Basins. For the remainder of the Mitigation Service Area (Miami-Dade County) the HID will comply with the minimum ratio score of 1:1 as required by the Federal Mitigation Rule."

4-MDC-G-32 (Fourth Round)

Miami-Dade County acknowledges receipt of the requested figure, however, it appears that FPL may have misunderstood the request for information and the information remains incomplete as a result. The original information request was: " ... please provide a detailed map of all FPL land holdings within the Biscayne Coastal Wetlands and Model Lands Basins. Please identify on the map which areas are proposed for development and which are proposed for mitigation." The second request was independent of the first request. The provided figure does not appear to show all lands proposed for development because lands proposed for development that are not owned by FPL and/or that lie outside the Biscayne Bay Coastal Wetlands study area are not depicted on the map. For example, the linear feature that appears to be the proposed reclaimed water pipeline is not depicted emerging from the plant site, nor is it depicted north of the C-102 Canal. The provided figure apparently does not accurately depict all lands proposed for mitigation because the lands east of L -31 E that are proposed for hydrologic restoration as mitigation are not depicted. Please provide a corrected figure that identifies which areas are proposed for development and which are proposed for mitigation.

RESPONSE:

Figure 4-MDC-G-32-1 on the attached CD at \4-MDC-G-32 illustrates FPL landholdings within the Biscayne Bay Coastal Wetlands study area and Model Lands Basin. Figure 4-MDC-G-32-2 (also on the attached CD at Attachments\4-MDC-G-32 illustrates areas proposed for mitigation. Figures illustrating the lands proposed for development were provided in the SCA Application (June 2009). Please see SCA Figures 1.4-1, 1.4-4, P9.0.0-1, P9.0.0-2, R9.0.0-1, R9.0.0-2, D9.0.0-1, and D9.0.0-2. Also see SCA Appendix 10.4, Attachment B, Sheets 1-3.

4-MDC-G-35 (Fourth Round)

Please see MDC's response to items MDC-G-20, MDC-G-21, and MDC-D-15.

RESPONSE:

Please see Responses 4-MDC-G-20, 4-MDC-G-21, and 4-MDC-D-15 above.

4-MDC-G-40 (Fourth Round)

Please see MDC's response to items MDC-A-26-1 and MDC-A-26-2.

RESPONSE:

Please see Responses 4-MDC-A-26-1 and 4-MDC-A-26-2 above.

4-MDC-G-41 (Fourth Round)

Miami-Dade County acknowledges FPL's response regarding Turkey Point Units 6 & 7 discharge of stormwater to the existing cooling canals. Please see MDC's response to items MDC-A-5 and MDC-A-18, as well as responses that refer to the Hydrologic Study required pursuant to condition 15 of Z-56-07.

RESPONSE:

With regard to Condition 15, please see Response 4-MDC-C-1 4th Round Completeness Responses above.

With regard to the aquifer performance test (APT), as stated in 3rd Round Completeness Response 3-MDC-A-3 (July 2010), a draft of the APT plan was provided to Miami-Dade County and reviewed with the County during a meeting at Miami-Dade County Department of Environmental Resources Management (DERM) on February 4, 2009 and at a follow-up meeting on March 20, 2009. In addition, the South Florida Water Management District (SFWMD) was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

4-MDC-G-42 (Fourth Round)

Please refer to MDC's response to completeness items MDC-A-26-1

RESPONSE:

Please see Response 4-MDC-A-26-1 above.

4-MDC-G-44 (Fourth Round)

Please see MDC's response to items MDC-A-26-1 and MDC-A-26-2.

RESPONSE:

Please see Responses 4-MDC-A-26-1 and 4-MDC-A-26-2 above**.**

4-MDC-G-45 (Fourth Round)

Please see MDC's response to item MDC-A-26-2.

RESPONSE:

Please see Response 4-MDC-A-26-2 above.

4-MDC-G-46 and MDC-G-47 (Fourth Round)

Please refer to MDC's response to completeness items MDC-A-26-1

RESPONSE:

Please see Response 4-MDC-A-26-1 above.

ADDENDUM

Although the following comments were not included with 4th Round Completeness, they appeared to be unresolved in 3rd Round. Nevertheless, FPL is providing responses as follows.

4-2MDC-C-6-GWM-2

2) The hydrogeologic framework the model is based on was found to be deficient. The BA is conceptualized as a dual-porosity aquifer; the model assumes equivalent porous media flow regimes. The aquifer contains preferential flow zones and matrix porosity, which will dictate groundwater flow. These zones must be investigated and characterized by appropriate field and geophysical methodologies, and integrated into a model that will be capable of simulating dual-porosity flow regimes.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate suggestions from numerous reviewing agencies and was re-calibrated to the aquifer performance tests on the Unit 6 & 7 plant area and the Turkey Point peninsula. The results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD.

The revised groundwater model for the Turkey Point Units 6 & 7 incorporates two zones of higher hydraulic conductivity to reflect the presence of secondary porosity flow zones. The two secondary porosity flow zones were identified following a review of the geotechnical boring logs and geophysical logs obtained from subsurface investigations performed at and within the vicinity of the Units 6 & 7 Site.

4-2MDC-C-6-GWM-3

3) The model was developed as a steady state model, and per assumption 3.3.2 it appears that the model was compared to the average of the monthly averages from June and December 2008. The hydrology of the CCS, Aquifer and the Bay have significant temporal differences that will affect sources of water into the RCWs. Average conditions at the start of the wet and dry season are not adequate to assess source water of the RCWs.

RESPONSE:

The groundwater model has been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal.

The revised model continues to be a steady-state model. For purposes of model calibration and validation, the water level in Biscayne Bay has been prescribed to be elevation -1.05 ft NAVD88 because this value represents the average water surface elevation for the period between February 2009 and May 2009. This time period is when the aquifer pumping tests, the data from which serve as the basis for model calibration and validation, were performed. For the purposes of assessing impacts associated with construction dewatering and radial collector well operation, the water level in Biscayne Bay has been set to the long-term average (-0.81 ft NAVD88) to be representative of long-term average conditions.

Recognizing the potential for sea level variation to affect radial collector well water sources, a sensitivity analysis was conducted with the revised groundwater model wherein the Biscayne Bay water level and the cooling canal water levels were varied between the seasonal high water level in the Bay of 0.09 ft NAVD88 and the seasonal low water level of -1.40 ft NAVD88. General head boundary conditions along the model perimeter were increased by 0.90 ft and decreased by 0.59 ft to reflect the seasonal high and seasonal low groundwater elevations, respectively. This sensitivity analysis is described in Section 5.2.3 of the revised groundwater modeling report referenced above. Results of the sensitivity analysis are summarized in Table 11 of the report. The results indicate that the contributions from each of the water sources for the radial collector wells are relatively insensitive to sea level. For example, Biscayne Bay is predicted to contribute 97.8 percent of the water to the radial collector wells in the base case simulation where sea level is set to the long-term average (-0.81 ft NAVD88), whereas running the model using the seasonal high and low water levels results in values of 98.1 percent and 97.6 percent, respectively. These steady-state results demonstrate that accounting for sea level variation in a transient model would not affect conclusions regarding radial collector well water sources.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated

impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized. The steady-state, constant-density and three-dimensional groundwater model and the operational design configurations discussed above produce an environmentally conservative assessment of potential environmental impacts.

Please also see Response 4-2SFWMD-B-45(44).

4-2MDC-C-6-GWM-4

4) The model found 97% of water for the RCWs to originate from the Bay. Although model documentation is not clear how this number was obtained, it appears to be an artifact of the model. The Bay is represented by a constant head boundary, with the zone budget analysis (Figure 51) limited to the Bay area itself. The top two hydrostratigraphic units were assigned an anisotropy ratio of 1:1, and assigned therefore a vertical hydraulic conductivity equal to the horizontal hydraulic conductivity, based on model calibration. This is contrary to published data referenced in the model documentation.

RESPONSE:

The groundwater model has been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) attached to this submittal. Please note that the revised model shows that 97.8 percent of the water collected by the radial collector wells is recharged from Biscayne Bay.

Groundwater model revisions were implemented to ensure that the relative contributions from the various sources supplying the radial collector wells are estimated without bias. In particular, the constant head boundary conditions used to represent the presence of Biscayne Bay have been replaced with general head boundary conditions. General head boundary conditions are known to more accurately represent surface water-groundwater interactions, whereas the potential exists for constant head boundary conditions to overestimate the flux between surface water and groundwater (Sophocleous et al., 1995). Furthermore, the vertical anisotropy (K_h:K_v) of the hydrostratigraphic units represented in the model now ranges from 8:1 to 15:1. Taking the upper hydrostratigraphic units to be vertically anisotropic is expected to increase contributions from sources located horizontally and decrease the contributions from sources located vertically (e.g., Biscayne Bay). Finally, the control volume established for the ZoneBudget analysis was delineated to quantify the contributions of the various water sources to the radial collector wells. Because Biscayne Bay is one of the sources, this control volume must necessarily include the portion of the aquifer underlying Biscayne Bay and within the capture zone of the radial collector wells. Given the above model revisions as well as others documented in the revised groundwater modeling report, the predicted amount of water from Biscayne Bay supplying the radial collector wells should not be an artifact of the model.

Please see Response 4-2MDC-C-6-GWM-3 above for a description of several bounding conditions incorporated into the model simulations that maximize the calculated hydrologic and environmental impacts.

Reference

Sophocleous, M. A., Koussis, A. D., Martin, J. L., and Perkins, S. P. (1995). "Evaluation of simplified stream-aquifer depletion models for water rights administration." *Ground Water*, 33(4), 579-588.

4-2MDC-C-6-GWM-5.

Biscayne Bay salinity varies temporally as well as spatially and the Bay ecosystem is extremely sensitive to the changes and timing of salinity. The RCWs at 124 mgd will place significant stress on the aquifer and the Bay (see above – model concludes 97% of water for RCWs comes from the Bay). The model assumes Biscayne Bay is a constant head, constant density, and at steady state, therefore it cannot assess the changes in salinity over time and space in the bay as a result of the RCWs.

RESPONSE:

The groundwater models, the original Rev. 0 and the revised Rev. 1, assume constant head, constant density, and steady state conditions. The groundwater models, however, are not used to assess changes in salinity over time and space in the Bay. This is the reason for the separate salinity impact analysis for the Bay provided in SCA Section 6.1.3.1 and in Completeness Responses SFWMD-B-60 (October 2009), SFWMD-B-63 (October 2009), 2SFWMD-B-60(58) (April 2010), 3SFWMD-B-56(54) (July 2010), and 3FDEP-VI(CAMA-6) (July 2010), and summarized in the attached *FPL Turkey Point Units 6 & 7 Radial Collector Well Summary, 2011* attached to this submittal. The groundwater model is used to determine the area of the Bay through which most of the water is drawn (the area of influence, or AOI). This does not change with time or with Bay salinity. The AOI is used in the salinity impact analysis to determine the impact of the withdrawal on the Bay salinity.

4-2MDC-C-6-Conc-2

Conclusions

Based on the completeness review performed on the results of the APT and the groundwater modeling report provided in the SCA, the County finds the information submitted as being incomplete. With respect to the performance of the APT, the County has determined that the following items must be addressed in order to comply with the completeness determination of this application:

2. The exploratory drilling activities associated with the lithologic classification of the BA and the identification of preferential flow zones within the subsurface need to be performed to address the shortcomings noted in the APT.

RESPONSE:

The groundwater model has been revised to account for the presence of these preferential flow zones as described in the revised groundwater modeling report, *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal. The revised model represents the upper preferential flow zone as a laterally continuous, 1-ft-thick layer at the top of the Key Largo formation. The lower preferential flow zone is represented as a laterally continuous, 1-ft-thick layer located 15 ft below the top of the Fort Thompson formation. Because the revised groundwater model reflects the presence of these preferential flow zones, the predicted impacts of radial collector well operation account for their presence as well.

4- 2MDC-C-6-Conc-4

Conclusions

Based on the completeness review performed on the results of the APT and the groundwater modeling report provided in the SCA, the County finds the information submitted as being incomplete. With respect to the performance of the APT, the County has determined that the following items must be addressed in order to comply with the completeness determination of this application:

4. Further investigation to understand and quantify the seepage rate and the hydrologic behavior of the site with respect to the region and the proposed RCWs.

RESPONSE:

The seepage rate and the hydrologic behavior of the proposed radial collector wells have been evaluated using the groundwater flow model (Bechtel Power Corporation, 2011). During radial collector well operation, the rate at which surface water from Biscayne Bay is being drawn towards the Bay bottom has been estimated as part of the groundwater modeling effort and is documented in the updated groundwater modeling report attached to this submission. Section 5.2.2 of this report summarizes the approach velocities averaged over the entire radial collector well catchment (the total area within Biscayne Bay contributing water to the radial collector wells), the immediate radial collector well area, and the laterals. Table 12 of the report includes the results of analyses used to determine the sensitivity of seabed approach velocity to key hydrogeological parameters and boundary conditions. Figure 64 of the report illustrates the spatial distribution of the seabed approach velocity for the base case model.

Please see Response 4-2MDC-C-6-GWM-3 above for a description of several bounding conditions incorporated into the model simulations that maximize the calculated hydrologic and environmental impacts.

4-2MDC-C-6-Conc-6

Conclusions

Based on the completeness review performed on the results of the APT and the groundwater modeling report provided in the SCA, the County finds the information submitted as being incomplete. With respect to the performance of the APT, the County has determined that the following items must be addressed in order to comply with the completeness determination of this application:

6. Provide an adequate approach to adequately determine the source of water being pulled in by the RCWs.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal.

Figures 59-60 from the revised groundwater modeling report present the results in terms of drawdown that define the cone of influence associated with the operation of the radial collector wells. Table 11 of the report summarizes the contributions to the radial collector wells from Biscayne Bay and near shore areas, with the latter being further broken down to include the cooling canal system and onshore precipitation. Results from the base case model indicate that 97.8 percent of the water supplied to the radial collector wells would originate from Biscayne Bay. The sensitivity of this value to key hydrogeological parameters and boundary conditions was assessed quantitatively by sensitivity analyses. The sensitivity cases investigated varied the vertical location of the radial collector well laterals, the water levels in Biscayne Bay, and the vertical hydraulic conductivity of the hydrogeological units underlying Biscayne Bay. Table 11 of the revised groundwater modeling report provides the results of the sensitivity analyses and indicates that the contribution from the Biscayne Bay to the radial collector wells would vary from approximately 95.3 to 99.2 percent for the range of parameters and boundary conditions investigated.

Please see Response 4-2MDC-C-6-GWM-3 above for a description of several bounding conditions incorporated into the model simulations that maximize the calculated hydrologic and environmental impacts.

4-2MDC-C-6-Conc-End

With respect to the groundwater modeling report, the County finds the model unacceptable for the evaluation purposes of the radial collector well system and the effect on the surrounding environment. Regardless, it should be noted that even though issues associated with the groundwater model have been noted, the conclusions demonstrate a violation of Condition No. 4 of Z-56-07 which prohibits the withdrawal of groundwater from the Biscayne Aquifer.

At a minimum, the County requires that the deficiencies noted above to be remedied and incorporated into a single, comprehensive hydrological study for a thorough technical review to allow the County to determine compliance with the requirements of Chapter 24 Miami-Dade County and the CDMP, Condition No. 15 of Z-56-07, and to allow the County to prepare the reports required by 403.526 F.S.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), attached to this submittal.

Table 11 of the revised groundwater model report summarizes the contributions to the radial collector wells from Biscayne Bay and near shore areas, with the latter being further broken down to include the cooling canal system. Results from the base case model indicate that 97.8 percent of the water supplied to the radial collector wells would originate from Biscayne Bay on a steady-state basis. The sensitivity of this value to key hydrogeological parameters and boundary conditions was assessed quantitatively by sensitivity analyses. The sensitivity cases investigated varied the vertical location of the radial collector well laterals, the water levels in Biscayne Bay, and the vertical hydraulic conductivity of the hydrogeological units underlying Biscayne Bay. Table 11 of the revised groundwater modeling report provides the results of the sensitivity analyses and indicates that the contribution from the Biscayne Bay to the radial collector wells would vary from approximately 95.3 to 99.2 percent for the range of parameters and boundary conditions investigated.

With regard to Condition 15, please see Response 4-MDC-C-1 4th Round Completeness Responses (February, 2011).

With regard to the aquifer performance test (APT), as stated in 3rd Round Completeness Response 3-MDC-A-3 (July 2010), a draft of the APT plan was provided to Miami-Dade County and reviewed with the County during a meeting at Miami-Dade County Department of Environmental Resources Management (DERM) on February 4, 2009 and at a follow-up meeting on March 20, 2009. In addition, the South Florida Water Management District (SFWMD) was also provided a copy of the plan and a meeting was held on March 6, 2009 to discuss the plan. Both agencies had comments and suggestions, most of which were incorporated into the APT plan. The only sampling recommendation that MDC made that was not included was sampling the well water for tritium. FPL decided to use other isotopes during the pump test to address this question. The results of the isotope analysis were provided in the APT report (HDR, 2009).

FPL TURKEY POINT UNITS 6 & 7 SITE CERTIFICATION APPLICATION
PLANT AND NON-TRANSMISSION FACILITIES
4TH ROUND COMPLETENESS

4-2SFWMD-B-3(2)

1) The response refers to the 14 observation well clusters being installed as part of the expanded monitoring of the plant. In addition, the response indicates that preliminary evaluation of the data suggests that both the upper and lower secondary porosity zones are laterally continuous. Please address the following regarding the above and the drawdown data for the pumping tests at Units 6 and 7 and the Turkey Point peninsula:

a) Does the data from these well clusters, or other data, provide information indicating additional flow zones between the lower flow zone described in the response (below approximately -65 to -75 feet NGVD) and the base of the Biscayne Aquifer?
b) Would the presence of these lower flow zones be important to the modeling or evaluation of potential flow from the cooling canal system into the surrounding aquifer?
c) Do the zones of secondary porosity assumed to be laterally continuous have similar transmissivities within the two areas?
d) The hydraulic conductivity values presented in Section 2.7.1 of the Bechtel, October 2009 report for aquifer performance tests (APTs) at Units 6 and 7 (PW-6U, PW-7U, PW-6L, and PW-7L) appear to be derived from transmissivities estimated from the AQTESOLVE® Hantush (1960) solution and appear relatively low compared to the results of the APT conducted at Turkey Point in April and May of 2009 using AquiferWin32® (presented in Table 5.2 of the HDR August 19, 2099 report). Is this a function of actual site conditions or the solution used?

Why are the transmissivity values derived using AQTESOLVE® Hantush (1960) solution for the APT at the peninsula (shown in Appendix F of the HDR report) not included in Table 5.2 of the HDR report and why are they significantly lower than transmissivities estimated using the AquiferWin32® solution?

In addition to the above, FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

1. a) Does the data from these well clusters, or other data, provide information indicating additional flow zones between the lower flow zone described in the response (below approximately -65 to -75 feet NGVD) and the base of the Biscayne Aquifer?

Data acquired during the installation of the 14 observation wells suggest that an upper zone exists at the top of the Key Largo formation and is laterally continuous across the Turkey Point site. Data indicate the presence of lower zones; however, the elevations at which these lower zones are present are not consistent, suggesting that these lower zones are discontinuous. Some borehole logs indicate that secondary porosity zones occur at depths in excess of -65 to -75 ft NGVD (e.g., TPGW-2).

b) Would the presence of these lower flow zones be important to the modeling or evaluation of potential flow from the cooling canal system into the surrounding aquifer?

The presence of secondary porosity zones below depths of -65 to -75 ft NGVD is unimportant to the modeling or evaluation of potential flow from the cooling canal system into the surrounding aquifer for two reasons. First, these zones occur at variable elevations, suggesting they are not in hydraulic connection with one another. Second, these zones are significantly deeper than the upper secondary porosity zone (top of Key Largo formation) and lower secondary porosity zone (15 ft below top of Fort Thompson formation) that are represented as laterally continuous in the revised groundwater model. These two zones, the upper in particular, are expected to play a more significant role in evaluating the potential flow from the cooling canal system into the surrounding aquifer than discontinuous zones occurring at greater depths.

c) Do the zones of secondary porosity assumed to be laterally continuous have similar transmissivities within the two areas?

Each zone of secondary porosity taken to be laterally continuous is assumed to have the same transmissivity within the Units 6 & 7 plant area and the Turkey Point peninsula area (i.e., homogeneous within the model layer).

(d) The hydraulic conductivity values presented in Section 2.7.1 of the Bechtel, October 2009 report for aquifer performance tests (APTs) at Units 6 and 7 (PW-6U, PW-7U, PW-6L, and PW-7L) appear to be derived from transmissivities estimated from the AQTESOLVE® Hantush (1960)solution and appear relatively low compared to the results of the APT conducted at Turkey Point in April and May of 2009 using AquiferWin32® (presented in Table 5.2 of the HDR August 19, 2099 report). Is this a function of actual site conditions or the solution used?

The aquifer performance test (APT) performed by HDR at the Turkey Point peninsula utilized a pumping well and observation wells that were open to both the Miami Limestone and the Key Largo Limestone and positioned at distances ranging from 80 ft to 2,000 ft from the pumping well. Mean transmissivity values determined from the test ranged from 700,000 ft^2/day to 1,200,000 ft^2/day. Taking the open interval of the PW-1 pumping well (i.e., 24 ft) as a characteristic aquifer thickness, corresponding hydraulic conductivity values ranging from 10.3 cm/s to 17.6 cm/s were determined.

The comparable tests performed by Bechtel at the Units 6 & 7 site (i.e., PW-6U and PW-7U) used pumping wells and observation wells that were open to the Key Largo Limestone and located at distances ranging from 10 ft to 40 ft from the pumping wells. Transmissivity values of 312,000 ft^2/d and 294,000 ft^2/d were estimated for the PW-6U and PW-7U tests, respectively. Based on the thickness of the Key Largo Limestone at the test sites, 33 ft at PW-6U and 24 ft at PW-7U, hydraulic conductivity values of 3.3 cm/s and 4.3 cm/s were calculated for the two test sites. Note that tests PW-6L and PW-7L were targeted at characterizing the aquifer properties of the deeper Fort Thompson Formation and are not comparable to the PW-1 test that was performed in the shallower Miami Limestone and Key Largo Limestone formations.

The differences between the transmissivity and hydraulic conductivity values determined for the Turkey Point peninsula versus those determined for the Units 6 & 7 site are attributed to the

differences in the spatial scales of the two testing programs. As indicated in the HDR (2009) report, the noted increase in hydraulic conductivity with scale is likely a natural consequence of the aquifer heterogeneity (Rovey, 1998). Over short distances, water converging toward a borehole must generally flow across heterogeneities. Therefore, small-scale tests tend to measure a weighted harmonic mean of the hydraulic-conductivity field. Over a larger area, as performed at the Turkey Point peninsula, however, flow is primarily along high-conductivity heterogeneities. Therefore, large-scale tests approach a weighted arithmetic mean where high-conductivity heterogeneities have a greater influence (Rovey, 1998). In a hydrogeological environment characterized by non-homogeneous elements of a certain size (vugs, cavities, burrows, etc. as observed in the Biscayne Aquifer), hydraulic conductivity and transmissivity mean values each converge with increasing scale of measurement. Ultimately, as scale of measurement increases, measured values attain essentially the same value irrespective of the location of the test volume (Howard et al, 2002). As such, the values obtained at the far-field wells can likely be considered more reliable estimates of transmissivity than the values obtained using the closer wells for this test.

Why are the transmissivity values derived using AQTESOLVE® Hantush (1960) solution for the APT at the peninsula (shown in Appendix F of the HDR report) not included in Table 5.2 of the HDR report and why are they significantly lower than transmissivities estimated using the AquiferWin32® solution?

The transmissivity derived using the distance-drawdown method in AQTESOLVE® is included in Table 5.2 of the HDR report and is 800,000 ft^2/day. The transmissivity in MW-4 using AQTESOLVE® (far-field well MW-4) was calculated as 528,000 ft^2/day, which is consistent with the values obtained using Aquifer-Win. This value was inadvertently left off of Table 5.2 of the HDR report. It is not unusual for different methods to provide somewhat different results.

References

HDR, Inc. 2009. *Florida Power & Light Exploratory Drilling and Aquifer Performance Test Program, August 9, 2009.*

Howard, K. W. and R. G Israfalov. 2002. *Current Problems in Hydrogeology in Urban Areas, Urban Agglomerates, and Industrial Centers*, NATO Science Series, Vol 8, pg 389.

Rovey, Charles W. II. 1998. *Digital Simulation of the Scale Effect in Hydraulic Conductivity, Hydrogeology Journal, Volume 6, No. 2*, August 1998.

In addition to the above, FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-3(3)

2) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. The model has been revised to incorporate two laterally continuous, preferential flow zones identified from more recent borehole logs and geophysical data, and recalibrated and validated against multiple aquifer pumping tests. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-3(3)(a)

3) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Two laterally continuous, preferential flow zones have been incorporated into the revised groundwater model as described in Response 2SFWMD-B-3(2) (July 2010) and as documented in the revised groundwater modeling report. Table 11 of the revised report summarizes the contributions to the radial collector wells from Biscayne Bay and inland sources, with the latter being further broken down to include the cooling canal system and eastward regional flow. Results from the base case model indicate that 1.9 percent of the water supplied to the radial collector wells would originate from the boundaries representing the cooling canal system. The sensitivity of this value to key hydrogeological parameters and boundary conditions was assessed quantitatively by sensitivity analysis. The sensitivity cases investigated varied the vertical location of the radial collector well laterals, the water levels in Biscayne Bay, and the vertical conductivity of the hydrogeologic units underlying Biscayne Bay. Table 11 of the revised report provides the results of the sensitivity analysis and indicates that the contributions from the cooling canal system to the radial collector wells could

vary from 0.4 to 1.7 times the base case for the range of parameters and boundary conditions investigated.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized.

Any hypersaline water drawn towards the radial collector well system will remain at depth within the aquifer due to the placement of the radial collector well laterals well below the seabed and due to its higher density relative to saltwater. Therefore, the withdrawals will not cause adverse impacts to groundwater or surface water. The steady-state, constant-density and three-dimensional groundwater model and the operational design configurations discussed above produce an environmentally conservative assessment of potential environmental impacts.

4-2SFWMD-B-3(3)(b)

4) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. The model has been revised to incorporate two laterally continuous, preferential flow zones identified from more recent borehole logs and geophysical data, and recalibrated and validated against multiple aquifer pumping tests. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, and 2011.

4-2SFWMD-B-4(4)

5) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-6(5)

6) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, (Rev. 0)* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please also see Response 4-2SFWMD-B-3(2) above.

4-2SFWMD-B-6(6)

7) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that this question was answered in 2nd Round Plant and non-Transmission Completeness Response 2SFWMD-B-6(6) (July 2010). The answer to this question did not depend on results from

the groundwater modeling. Notwithstanding, the revised groundwater model report (Bechtel Power Corporation, 2011) is on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-6(7)

8) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. The model has been revised to incorporate two laterally continuous, preferential flow zones identified from more recent borehole logs and geophysical data, and recalibrated and validated against multiple aquifer pumping tests. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-10(8)

9) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

This question was answered in the 2nd Round Completeness response to 2SFWMD-B-10(8) (July 2010). The answer to this question did not depend on results from the groundwater modeling. Nonetheless, the revised *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) is on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-11(9)

10) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in

Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1 (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please also see Responses 4-2SFWMD-B-30(26)(36) and 4-2SFWMD-B-46(46)(c)(54) below for discussion of the revised dewatering plan and new foundation grouting methodology.

4-2SFWMD-B-15(10)(a)

11) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the first round of completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The groundwater model has been revised such that the vertical anisotropy (K_h:K_v) of the hydrogeologic units represented in the model now ranges from 8:1 to 15:1. In addition, the model has been revised to incorporate two laterally continuous, preferential flow zones identified from more recent borehole logs and geophysical data, and recalibrated and validated against multiple aquifer pumping tests. The hydraulic conductivity of the aquifer in which the radial collector wells are to be completed, as estimated by model calibration, is within the range expected based on site-specific tests and literature values. These model updates are described in the revised groundwater modeling report.

Particle tracking (MODPATH) and water budget (ZoneBudget) analyses have been performed to determine the sources of the water supplying the radial collector wells, including Biscayne Bay and the cooling canal system, and their relative contributions. These analyses and associated results are discussed in Section 5.2.1 and presented in Figures 61 and 62 and Table 11 of the revised groundwater modeling report (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Sensitivity analyses have also been completed using the revised groundwater model to determine the sensitivity of model predictions to key hydrogeological parameters and boundary conditions. The sensitivity cases investigated varied the vertical location of the radial collector well laterals, the water levels in Biscayne Bay, the vertical conductivity of the hydrogeologic units underlying Biscayne Bay, and the hydraulic conductivity of the formation in which the radial collector well laterals are completed. The sensitivity to these parameters and boundary conditions were assessed for the drawdown induced within the top layer of model by the operation of the radial collector wells, the sources and relative contributions of the water supplying the radial collector wells, and the approach velocity to the bay floor. Results are summarized in Figures 65-67 and Tables 11 and 12 of the revised groundwater modeling report.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized. The steady-state, constant-density and three-dimensional groundwater model and the operational design configurations discussed above produce an environmentally conservative assessment of potential environmental impacts.

The groundwater model results described above and documented in the revised groundwater model report were produced using MODFLOW-2000. The laterally continuous, preferential flow zones were represented as 1-ft-thick layers having a hydraulic conductivity five times that of the formation in which the preferential flow zone is located. Because flow in the preferential flow zones is not expected to be turbulent, use of the U.S. Geological Survey Conduit Flow Process for MODFLOW was deemed to be unnecessary.

4-2SFWMD-B-15(10)(b)

12) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The groundwater model has been revised as follows:

- The constant head boundary conditions used to represent the presence of Biscayne Bay have been replaced with general head boundary conditions. General head boundary conditions are known to more accurately represent surface water-groundwater interactions, whereas the

potential exists for constant head boundary conditions to overestimate the flux between surface water and groundwater (Sophocleous et al., 1995).

- Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized.

- The vertical anisotropy (Kh:Kv) of the hydrogeologic units represented in the model now ranges from 8:1 to 15:1, with the upper two hydrogeologic units underlying the Bay having an anisotropy of 15:1. In the prior version of the model, the vertical anisotropy of these two units was taken to be 1:1. Taking these upper two units to be vertically anisotropic is expected to increase the quantity of water contributed from sources located horizontally (i.e., the cooling canal system) and decrease the water contributed from sources located vertically (i.e., Biscayne Bay).

- Laterally continuous, preferential flow zones have been incorporated into the model, whereas the prior model did not include such zones. Including the upper flow zone in the model, located at the top of the Key Largo formation, is expected to maximize the potential contributions of water to the radial collector wells from the cooling canal system. Furthermore, it has been assumed that the radial collector well laterals are completed in the upper preferential flow zone, which would further increase the potential for the cooling canal system to contribute water to the radial collector wells.

These model revisions described above and associated results are documented in the revised groundwater modeling report, *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The revised groundwater modeling indicates that approximately 1.9 percent will be recharged from the area of the cooling canal system. Any hypersaline water drawn towards the radial collector well system will remain at depth within the salt water (G-III) aquifer due to the placement of the radial collector well laterals well below the seabed and due to its higher density relative to saltwater. Therefore, the withdrawals will not cause adverse impacts to groundwater or surface water.

Reference

Sophocleous, M. A., Koussis, A. D., Martin, J. L., and Perkins, S. P. (1995). "Evaluation of simplified stream-aquifer depletion models for water rights administration." *Ground Water, 33(4),* 579-588.

4-2SFWMD-B-15(10)(c)

13) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

The model has been revised to address the questions related to layering. In the revised model, the layers are laterally continuous across the model domain. In the original model, surface water features had been incised into layers resulting in lateral discontinuity between some cells.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-15(10)(d)

14) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-15(10)(e)

15) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-15(10)(f)

16) FPL indicates that they will provide a response to this question at a later date; therefore, this response remains incomplete.

RESPONSE:

The revised groundwater model incorporates the effects of the intake pumps for the existing units through the use of boundary conditions.

Please see Response 4-2SFWMD-B-15(10)(b) above for a description of several bounding conditions incorporated into the model simulations that maximize the calculated hydrologic and environmental impacts.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-15(10)(g)

17) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and

enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-15(10)(h)

18) The response to this question is incomplete. Correlation graphics between grab samples and the corresponding Aqua TROLL® readings were not provided (third bullet, first paragraph). This data was requested in this question to demonstrate an apparent inconsistency between the variances of salinities of MW-1, MW-2, MW-4, and MW-5, as shown in Figure 6.3, and chloride results for samples collected from those wells. Specifically, chlorides decreased by approximately 28, 15, 7, and 17 percent, respectively for MW-1 , MW-2, MW-4, and MW-5 in the grab samples collected on March 18, 2009 and May 12, 2009. Salinity in those wells, as shown in Figure 6.3 for that time period, appears to have remained relatively stable. With respect to the above, please address the following:

- **a) Please explain the apparent inconsistencies. While the Aqua TROLLs® are factory calibrated, documentation of calibration checks at the time of field measurements should still be provided.**
- **b) Please provide all QA/QC documents supporting the results reported.**
- **c) The Aquatroll data files included on Disk 1 of the 4/10/10 data response contain data through 4/21/2010 for five wells shown on Figure 6.3. Please provide all data files through the end of the monitoring period (end of post-APT monitoring) and all data files for the remaining monitoring points (MW-3, barge slip, IWF) for the entire monitoring period.**

RESPONSE:

a) Grab samples were collected from the monitor wells before and after the APT. With only two samples per well, it is difficult to determine a trend. The percent change in chlorides and total dissolved solids (TDS) for the two grab samples for wells MW1, MW2, MW3, MW4, and MW5 are presented below. The salinity recorded by the Aqua TROLLs® for MW1, MW2, MW3, MW4, and MW5 during the background and test period indicated a variation of salinity during the recorded period and is also presented below.

Well Number	Percent change in reported chlorides	Percent change in reported TDS	Aqua TROLL® range of variation in Salinity
MW-1	17	-7	8
MW-2	28	NA	10
MW-3	-4	3	3
MW-4	15	-4	8
MW-5	7	3	8

NA=Percent change could not be calculated. Data before the APT is not available.

As can be observed, there is a degree of variability in the data. During the background period, the salinity in the Bay decreased 30 percent after a rainfall event. This lower salinity lasted several days. The APT began shortly after this event and the water drawn into the Bay bottom may have had a lower salinity which may have had an impact on water samples in the monitor wells several days later.

It is difficult to resolve the apparent data inconsistency based on the limited dataset and the natural conditions described above. FPL believes that the Aqua TROLL® instruments were working properly.

Therefore, the data in question do not represent a trend or a conflict with the data from the Aqua TROLL® instruments.

b) Laboratory QA/QC information was provided in previous responses and also presented in the APT report. Copies of the Aqua TROLL® factory calibration sheets are on the attached CD at \4-3SFWMD-B-16(10)(h)(b).

Field calibration of the Aqua TROLL® instruments for the APT was performed prior to deploying the trolls in the monitoring wells. Conductivity calibration solution was supplied by In-Situ, along with In-Situ Cal Cups to be used for the calibration. Using Win-Situ Mobile on the Rugged Reader, the following steps were performed as instructed:

- Go to Sensors tab, select sensor, and click Calibrate
- In the next screen, select Conductivity, click Calibrate
- In the next screen, enter Specific Conductivity of the solution in µS/cm. Click Start
- When response is stable, the cell constant should be 0.98 – 1.02
- When you are satisfied with the cell constant, click Commit to write it to the sensor.

The cell constants for each instrument were written in the attached field book, included on the attached CD at Attachment \4-2SFWMD-B-15(10)(h)(b), to document the calibration.

c) The Aqua TROLL® data files from 2/11/09 to 5/12/09 for MW-1, MW-2, MW-3, MW-5, barge slip and the industrial wastewater treatment facility are on the attached CD at \4-3SFWMD-B-16(10)(h)(c). Also attached are the Aqua TROLL® data files from 2/10/09 to 4/2/09 for PW-1. Please see response to 4-2-SFWMD-B-26(18) for additional data files from PW-1. In addition, the Aqua TROLL® data files from 4/1/09 to 5/12/09 for MW-4 are attached. No data is available for MW-4 prior to 4/1/09. On 4/1/09 the contractor performed well maintenance on MW-4 and during the probe removal inadvertently lost all the data.

4-2SFWMD-B-15(10)(i)

19) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) 1st Round

Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please note that FPL has revised the groundwater model to address the questions posed as a part of the completeness process and in technical meetings with SFWMD staff. The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent of the aquifer recharge will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore. Figures 59 and 60 in the modeling report show the steady state drawdown contours in two different layers, i.e. the cone of influence for the radial collector wells, which is responsive to the District's request for an analysis of the "degree of movement" of water in and beneath the permitted industrial wastewater treatment facility.

As noted above, the revised groundwater modeling indicates that approximately 1.9 percent will be recharged from the area of the cooling canal system. Any hypersaline water drawn towards the radial collector well system will remain at depth within the salt water (G-III) aquifer due to the placement of the radial collector well laterals well below the seabed and due to its higher density relative to saltwater. Therefore, the withdrawals will not cause adverse impacts to groundwater and surface water.

4-2SFWMD-B-15(10)(j)

> **20) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

In Response 4-2SFWMD-B-15(10)(j), the approach to model calibration has been revised to incorporate data from additional aquifer performance tests conducted at the Units 6 & 7 Site for the other test wells, in addition to the PW-7L test. Specifically, the model has now been calibrated using data from the PW-7L and PW-7U tests, conducted at the Units 6 & 7 Site, and data from the PW-1 test, conducted on the Turkey Point peninsula. Following calibration, the model was validated using data from the PW-6U test, a data set independent of that used for model calibration, to establish

greater confidence in the calibration. The calibration and validation process, along with the resulting goodness-of-fit statistics, are described in Section 4.0 of the revised groundwater modeling report.

4-2SFWMD-B-15(10)(k)

21) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please note that the "modeling uncertainty" that was suggested in the 2nd Round Completeness comment 2SFWMD-B-15(10)(k) (April 2010) has been thoroughly addressed in the revised modeling report (Bechtel Power Corporation, 2011). Many of the model changes that were suggested by reviewers have been incorporated into the revised model; the calibration process was expanded to include additional pump test data; and sensitivity analyses were conducted to assess the model precision. The results show that the model predictions are stable and reliable. The conclusions that were reached based on the original groundwater modeling are effectively unchanged. The radial collector wells will withdraw water from a saline aquifer that will be recharged from the surface. The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent of the aquifer recharge will originate from the boundaries representing Biscayne Bay, approximately 1.9 percent will originate from the boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore. Therefore, the radial collector wells will not withdraw fresh groundwater. The radial collector wells will have no adverse impact on that portion of the Biscayne Aquifer that supplies fresh drinking water. The induced seabed velocity calculated by the revised model is still very small, approximately 0.00002 ft/sec (6.2×10^{-4} cm/sec).

Please note that the reference in the 2nd Round Completeness comment 2SFWMD-B-15(10)(k) (April 2010) to "local evidence in the HDR APT report of the presence of groundwater with lower salinity than Biscayne Bay" has been addressed in previous completeness responses. This anomalous salinity value does not point to a freshwater source for Biscayne Bay. As discussed in Response SFWMD-B-60 (October, 2009), there is no evidence of significant freshwater inflow to the Bay in the area around the Turkey Point peninsula. Significant freshwater inflows to Biscayne Bay have been identified primarily in areas north of Homestead Bayfront Park. Water quality data from the APT conducted on the Turkey Point peninsula (HDR, 2009) show that, with one exception (monitor well MW-1 SS), groundwater salinity is similar to average Bay water salinity. As discussed in 2nd Round Completeness Response 2SFWMD-B-15(10)(h) (April 2010) and 2MDC-C-6-APT-1 (April, 2010), the somewhat fresher water observed in the shallow monitoring well MW-1 SS is almost certainly the result of local infiltration of rainwater that creates a "fresher water lens" in the aquifer under the

Turkey Point peninsula. This lens of fresher water is nearly stagnant and is confined to the upland areas of the peninsula (Fetter, 1994). It does not represent a freshwater source for the Bay, or a resource for benthic organisms in the Bay.

As discussed in 2nd Round Completeness Response 2SFWMD-B-57(55) (April, 2010), based on the annual average salinity near the Turkey Point peninsula, the water in this area of Biscayne Bay contains less than 1.0 percent freshwater from groundwater sources. Jeremy Stalker's doctoral dissertation (2008) (Figure 2.13) shows that canal water sources contribute approximately 48 percent of the freshwater in the area of the Turkey Point peninsula. This source of freshwater flows into the Bay primarily through canals located north of Homestead Bayfront Park. Therefore, the canal water must be transported to the area around the Turkey Point peninsula by surface currents in the Bay. The study also shows (Figure 2.14) that groundwater sources contribute only approximately 8 percent of all freshwater in this area of Biscayne Bay. Direct precipitation on the surface of the Bay contributes the remaining 44 percent of the annual average freshwater inflow. The information presented in Jeremy Stalker's dissertation can be used to show that on an annual average basis, groundwater makes up only a fraction of 1 percent of the Bay water near the Turkey Point peninsula. Furthermore, like the canal water, most of the freshwater derived from groundwater sources that is transported into the area around the Turkey Point peninsula is very likely transported by surface currents.

Salinity data collected by Biscayne National Park (BNP, 2008) also supports the conclusion there is no significant freshwater inflow to Biscayne Bay in the area of the Turkey Point peninsula. BNP salinity monitoring stations 12 and 13 are co-located about 1 mile east of the Turkey Point peninsula. Station 12 is positioned near the bottom and station 13 is positioned near the surface. These stations are the closest monitoring stations to the Turkey Point peninsula and the data were collected on a 15-minute interval. For the 2006-2007 monitoring year (Table 3.11-2, BNP, 2008), the annual average salinities at stations 12 and 13 were 32.51 practical salinity units (psu) and 32.29 psu, respectively. The annual median salinities were 33.09 psu and 32.75 psu, respectively. The bottom station has the slightly higher average and median salinity. The data clearly show that near the Turkey Point peninsula the water column is well mixed and there is no significant inflow of freshwater entering the Bay from the groundwater below.

Finally, the salinity impact analysis that was originally presented in SCA Section 6.1.3.1 using salinity data from station BB41 has been rerun using salinity data from several monitoring stations as requested by various agency reviewers. The original conclusions remain unchanged. The analyses consistently show that near the radial collector wells, the water withdrawal will have a slight moderating effect on the salinity regime in the Bay. During the wet periods, when the Bay salinity is typically low, the salinity near the radial collector wells will not be quite as low when the wells are operating. During the dry periods, when the Bay salinity is typically high, the salinity near the radial collector wells will not be as high when the wells are operating. When the Bay is near its average salinity, changes in salinity from operation of the radial collector wells would not be measurable. This moderating effect will be small near the wells and undetectable 1 mile from the center of pumping, or in any other part of Biscayne Bay. The highly localized salinity changes are well within the natural ranges occurring in Biscayne Bay. The salinity impact analysis demonstrates that the effect of operating the radial collector wells on the salinity regime in Biscayne Bay is theoretical, *de minimus*, and confined to a small geographic area therefore maintaining essentially natural conditions. Therefore, any changes in salinity would be environmentally insignificant and essentially natural conditions would be maintained in Biscayne Bay.

Although the radial collector wells will be a backup cooling water source, FPL's assessment of impacts of radial collector well operation has assumed that the radial collector wells will operate 100 percent of the time, at full capacity, to provide a conservative assessment of potential impacts to Biscayne Bay and regional water resources. Since no adverse impacts have been identified under the 100 percent operation scenario, there is reasonable assurance that more limited radial collector well operation (only when reclaimed water is not available in sufficient quality or quantity) will not adversely impact water quality or aquatic systems in Biscayne Bay or harm regional water resources.

Nevertheless, in recognition of the backup nature and purpose of the radial collector wells, FPL is prepared to accept an enforceable restriction on the use of this backup water supply based upon that established in the Conditions of Certification for FPL's West County Energy Center (WCEC). The WCEC condition provides an example of a recently-licensed power plant that uses reclaimed water as its primary water source. The WCEC condition allows withdrawals from the Floridan Aquifer for up to 90 days per calendar year as a temporary backup water supply source. A similar condition for Turkey Point Units 6 & 7 would allow operational reliability in the event that reclaimed water is not available. Since the radial collector wells will be used only as a backup water supply, these wells may not be operated at all during some years other than for routine testing and maintenance.

FPL proposes that the following language be considered for inclusion in a possible SFWMD Condition of Certification for Turkey Point Unit 6 & 7:

> Although reclaimed water will be the primary water source for Turkey Point Units 6 & 7, there may be temporary disruptions in the delivery of reclaimed water supply to Unit 6 or 7. Consequently, utilizing a reliable, backup supply source for the Project is in the public interest and is consistent with the criteria set forth in Section 2.2 of the Basis of Review for Water Use Application within the SFWMD. Therefore, this Certification authorizes a maximum withdrawal of 125 million gallons per day (MGD) from the radial collector wells, and a maximum annual withdrawal of 11,250 million gallons per year (MGY) for Units 6 & 7.

References

Biscayne National Park (2008). *Annual Report, Salinity Sampling in Biscayne Bay (2006-2007)*, Biscayne National Park, July 27, 2008.

Fetter, C. W. (1994). Applied Hydrogeology, 3rd ed., Prentice-Hall, New Jersey.

Stalker, J. C. (2008). *Hydrological dynamics between a coastal aquifer and the adjacent estuarine system, Biscayne Bay, South Florida*. Ph.D. Dissertation, Florida International University, Miami, FL.

4-3SFWMD-B-19(11)

> **22) Staff checked both the CD and hardcopies of the first completeness responses and could not find Attachments SFWMD-K-167a & b. Please provide a copy of these attachments with the next set of completeness responses.**

RESPONSE:

Attachments SFWMD-K-167a and SFWMD-K-167b are on the attached CD at Attachments\4-3SFWMD-B-19(11)(22).

4-2SFWMD-B-20(12)

23) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Secondary porosity observed during drilling has been considered in the revised groundwater model.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-26(15)

24) Please provide an explanation regarding the inconsistency between this data and known groundwater data, as the data provided indicates that there may be potential water quality problems.

RESPONSE:

As stated in the 3rd Round Response, since this information was from a single grab sample, the number of samples was not sufficient to present any trend in water quality.

4-2SFWMD-B-26(17)

25) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please refer to Response 2SFWMD-B-26(17) (July 2010).

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-26(18)

26) FPL did not provide a response to this question; therefore, this response remains incomplete. Please provide the raw electronic data (water level/quality) files for the failed Aqua TROLLs located in pumping well PW-1.

RESPONSE:

Please find 4 MSExcel® spreadsheet files for Aqua TROLL® data collected from well PW-1 on the attached CD at Attachments\4-2SFWMD-B-26(18).

File Name	Dates of data collection
BG only_PW-1.xls	2/10/2009 – 4/2/2009
PW1_step_Atroll.xls	4/2/2009 – 4/5/2009
APT PW1 L test2and3.xls	4/4/2009 – 4/15/2009
PW1 test 3 AquaT.xls	4/15/2009 – 4/21/2009

4-3SFWMD-B-26(19)

27) This response and the HDR report (Figure 3.2, dated August 19, 2009) show twelve seepage meters; however, the electronic data submitted by FPL only shows six seepage meters and is annotated by a "G" and "P" after each number. Further analysis of the data (2 files: Seepage meter tidal aggregation data FINAL.xls and seepage meter aggregate data FINAL.xls) indicates that the equations for the calculations have been removed or are not present and the relationship with surface water levels and the pump operations have not been combined into one spreadsheet, thus data is spread over multiple spreadsheets. The data should be presented uniformly with one common x-axis graphic(s). Please provide the combined final files (seepage meters, tidal water levels, and APT pump operation) along with a corrected table or graphic explaining or showing the final names and locations of the seepage meters.

RESPONSE:

In the 2nd Round Completeness response to this question submitted in April 2010, two MSExcel® spreadsheet files were provided. The file *Seepage meter aggregate data FINAL.xls* is the data and

analysis for the seepage meter test conducted during the APT. This file contains water levels in the Bay as a depth for each of the 12 meters at the time of sampling. Also contained in the spreadsheet is a note if the APT pump is on or off. A column has been added to the attached spreadsheet file *Seepage meter aggregate data FINAL with pump times.xlsx*. This new column presents the pumping rate during each data collection date and can be found on the attached CD at Attachments\4-3SFWMD-B-26(19).

The second spreadsheet file, *Seepage meter Tidal aggregate data FINAL.xls*, on the attached CD at \4-3SFWMD-B-26(19) is the data and analysis of the seepage meters post APT sampled at high tide and low tide. As explained in the APT report (HDR, Inc. 2009), the original meters (numbers 3, 4, 5, 6, 9 and 10), remained in place and the remaining 6 meters (numbers 1, 2, 7, 8, 11 and 12) were moved next to the original 6 meters. The meter locations are listed below:

Latitude	Longitude	Original Meter No.	Reset Meter No.
25.43748	-80.32144	3	1P
25.43754	-80.32144	4	2G
25.43764	-80.32146	5	3G
25.43770	-80.32150	6	4G
25.43818	-80.32154	9	5P
25.43932	-80.321.62	10	6P

Similar to the data presented in the first spreadsheet referenced, water depth at the sampling time was included in the spreadsheet. Since this data collection period was after the APT, there is no pumping rate reference.

Reference

HDR, Inc. 2009. *Florida Power & Light Exploratory Drilling and Aquifer Performance Test Program,* August 9, 2009.

4-3SFWMD-B-26(21)

28) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

The 2nd Round comment and the response (April, 2010) were related to water level data collected as part of the APT. It did not relate to the groundwater modeling effort.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-27(22)

29) Please provide a topographic survey (electronically in an ADCII format and AutoCad file) for that portion of the Turkey Point peninsula where the four radial collector wells are proposed. The survey should extend from water's edge to water's edge (low tide) and two hundred feet to the east and west of each caisson center point at one-foot contour intervals. The survey should be signed and sealed by a Florida-registered professional licensed surveyor.

RESPONSE:

This request for a topographic survey was discussed with SFWMD staff in a conference call on October 28, 2010. During that call, the SFWMD staff indicated that this request could be met using topographic LiDAR data available from the SFWMD database. Figure 1 on the attached CD at Attachments\4-3SFWMD-B-27(22) shows 1-ft contours NAVD88 (North America Vertical Datum of 1988) for the Turkey Point peninsula generated from 2007-08 Miami-Dade 10-ft DEM, published 11/23/2009. The DEM was created using data from the 2007 Florida Division of Emergency Management Statewide Coastal LiDAR project.

As discussed in 1st Round Completeness Response SFWMD-B-27, the radial collector well site is only a few feet above high tide. Ground surface elevations are typically 2.5 ft to 4.5 ft NAVD 88. The LiDAR data show some limited areas with elevations up to 6 ft NAVD88 near the eastern end of the peninsula. While the Turkey Point peninsula is not subject to submergence during seasonal high tide, it could be submerged during a significant storm event.

The radial collector well caissons will be installed within the previously filled upland areas of the Turkey Point peninsula, surrounded by silt fencing prior to construction to avoid erosion/turbidity impacts to nearby surface waters. As described in SCA Section 5.4.1.2, FPL will utilize BMPs during construction of the radial collector wells to isolate the construction area with turbidity curtains, silt screens, or other erosion and turbidity control measures.

In the 1st Round Completeness Response SFWMD-B-27, FPL committed to take appropriate and necessary steps to protect nearby waters from turbidity and nutrient runoff during construction of the radial collector wells and associated pipelines.

The lateral excavations will be directionally drilled approximately 25 to 40 ft below Biscayne Bay. As discussed in 1st Round Completeness Response FDEP-II-A-27, the drilling technology envisioned for the radial collector wells is a conventional rotary-type horizontal drilling method whereby the

drilling fluid consists of formation water. The drilling would occur from a position inside the concrete caisson that would be maintained in a dewatered condition. This would place the drilling equipment below sea level and allow use of the natural head in the formation (and Bay) to push the drilling water (and cuttings) back toward the caisson.

4-SFWMD-B-29(23)

30) Please address the following items concerning porewater sampling of the muck:
- **a) Please provide the results of the water content and bulk density of the samples analyzed.**
- **b) The nutrient content of the materials is much higher than in pristine mangrove muck soils, particularly porewater, TP, and ammonia. These TP concentrations seem inconsistent with generally low soil TP concentrations. Please check the validity of the results and provide an explanation of this finding (e.g., verify that all units reported are correct).**
- **c) Please provide QA/QC documentation associated with the tables cited.**
- **d) Please provide a detailed description of the leachate extraction methodology, including the PH and the duration of extraction.**
- **e) Please provide information on other contaminants (e.g. mercury) within the muck soils.**

RESPONSE:

a) The water content or percent moisture of the soil/sediment samples, as reported by the laboratory, are listed in the table below. As described in 2nd Round Completeness Response 2SFWMD-B-29(23) (July 2010), the parameter list for the muck sampling and analysis was selected based on input from SFWMD representatives in a meeting with FPL on 3/31/2010. The SFWMD suggested parameter list included total and leachable phosphorus, percent organic and nitrogen. FPL added total and leachable total organic nitrogen, ammonia, total Kjeldahl nitrogen, nitrate and nitrite. FPL also collected porewater samples in addition to muck samples.

Bulk density and percent moisture were not on the agreed-upon parameter list. Consequently, the soil/sediment samples were not collected with the intent of determining either of these parameters under *in situ* conditions. As discussed in 2nd Round Response 2SFWMD-B-92(78) (July 2010), the soil/sediment samples were collected from two depths and composited for laboratory analysis. Therefore, the sample percent moisture does not reflect *in situ* moisture conditions. The drainable water content of the muck, by volume, (i.e., saturation minus field capacity) was estimated using the USDA Soil Water Characteristics -- Hydraulic Properties Calculator (http://hrsl.arsusda.gov/soilwater/Index.htm). The site-specific muck characteristics used in the calculation, as described in 1st Round Response SFWMD-B-29 (October 2009), are unit weight (i.e., bulk density) of 80 lbs/ft^3, 55 to 60 percent clay, 8 percent organic content and normal compaction.

	Sample Percent Moisture (By Weight)									
	PA-1	**PA-2**	**PA-3**	**PA-4**	**NAB-1 East**	**NAB-2 West**	**NAB-3 North**	**RWTF-1**	**RWTF-2**	**RWTF-3**
Run 1	61.8	67.6	62.4	71.6	86.1	78.6	69.3	63.9	70.4	70.8
Run 2	67.1	66.1	72.1	72.2	88.8	75.7	68.7	63.4	65.6	72.0
Average	64.5	66.9	67.3	71.9	87.5	77.2	69.0	63.7	68.0	71.4

PA: plant area
NAB: nuclear administration building
RWTF: reclaimed water treatment facility

b) The total phosphorus porewater concentrations are consistent with the SPLP leachate samples, which were all below the detection limit of 0.31 mg/l. The units used in the tables are consistent with the laboratory reports. The units are consistent with the analytical method used.

c) The QA/QC data is included in the laboratory reports on the attached CD at Attachments\4-2SFWMD-B-29(23)(c).

d) The samples were analyzed in accordance with General Engineering Labs (GEL) standard operating procedures (SOP) entitled "Standard Operating Procedure for Synthetic Precipitation and Leaching Preparation" on the attached CD at Attachments\4-2SFWMD-B-29(23)(d). As listed in section 6.0 of the GEL SPLP SOP, Fluid # 1 was used for extraction with a pH of 4.20 +/- 0.05. In addition, as described in section 10.4.4 of the SOP, the extraction vessel was tumbled for 18 +/- 2 hrs.

e) As described in 2nd Round Response 2SFWMD-B-29(23) (July 2009) and in part (a) of this response, the parameter list for the muck sampling and analysis was selected based on input from SFWMD representatives in a meeting with FPL on 3/31/2010. FPL has supplied all of the available data.

4-2SFWMD-B-29(25)(a)

31) How long will the muck be stored in the plant area and then along the Industrial Wastewater Facility canal sites?

RESPONSE:

The muck from the Plant Area will be stockpiled temporarily within the Plant Area only long enough to drain the porewater within it. This is not anticipated to be a long period of time and is only a step taken prior to moving the muck to its final storage location in the spoils area.

4-3SFWMD-B-29(25)(b)

32) FPL did not provide a response to this question; therefore, this response remains incomplete.

RESPONSE:

This question was answered in 2nd Round Response 2SFWMD-B-29(25)(b) (April 2010). Additional information is provided in Responses 4-2SFWMD-B-30(26)(36), 4-2SFWMD-B-46(46) and 4-2SFWMD-B-44(42)(49) below.

4-2SFWMD-B-29(25)(c)

33) Please provide a data table with results (n, mean, SD, range) for each isotope measured per each type of substrate measured.

RESPONSE:

As stated in 2nd Round Response 2SFWMD-B-29(25)(c) (July 2010), in March 2010, FPL conducted a radiological assessment of 60 muck, lime rock and porewater samples taken from 15 locations on the proposed Units 6 & 7 site. At that time, FPL stated that, aside from tritium, no radioactive material attributable to Units 3 & 4 operation was detected in the analyses. Tritium, a byproduct of operations at Units 3 & 4, is closely regulated by the NRC pursuant to its preemptive authority under that Atomic Energy Act of 1954, as amended. Tritium ranged from 326 to 2830 picocuries, levels well below NRC limits. As requested, the following tables present the result of the March 2010 survey:

Licensed Radioactive Materials Survey Results - July, 2010

Licensed Radioactive Material:	Tritium-H3					
	n	**mean**	**sigma**	**low**	**high**	**MDC**
Muck (solid fraction) pCI/g	15	U	N/A	U	U	11
Muck (liquid fraction) pCI/L	15	1662.2	671.7	326	2830	200
Lime Rock (10-24 ft) pCi/g	15	U	N/A	U	U	11
Lime Rock (18-126 ft) pCi/g	15	U	N/A	U	U	11
Total	60					

MDC - Minimum Detectable Concentration
U - Below MDC

Licensed Radioactive Material:	Cobalt-60					
	n	**mean**	**sigma**	**low**	**high**	**MDC**
Muck (solid fraction) pCI/g	15	U	N/A	U	U	0.38
Muck (liquid fraction) pCI/L	NT	NT	NT	NT	NT	NT
Lime Rock (10-24 ft) pCi/g	15	U	N/A	U	U	0.38
Lime Rock (18-126 ft) pCi/g	15	U	N/A	U	U	0.38
Total	45					

MDC - Minimum Detectable Concentration

U - Below MDC
NT - Liquid Fraction Not Tested

Licensed Radioactive Material:	Strontium-90					
	n	**mean**	**sigma**	**low**	**high**	**MDC**
Muck (solid fraction) pCI/g	15	U	N/A	U	U	0.17
Muck (liquid fraction) pCI/L	NT	NT	NT	NT	NT	NT
Lime Rock (10-24 ft) pCi/g	15	U	N/A	U	U	0.17
Lime Rock (18-126 ft) pCi/g	15	U	N/A	U	U	0.17
Total	45					

MDC - Minimum Detectable Concentration

U - Below MDC
NT - Liquid Fraction Not Tested

Licensed Radioactive Material:	Cesium-137					
	n	**mean**	**sigma**	**low**	**high**	**MDC**
Muck (solid fraction) pCI/g	15	U	N/A	U	U	0.18
Muck (liquid fraction) pCI/L	NT	NT	NT	NT	NT	NT
Lime Rock (10-24 ft) pCi/g	15	U	N/A	U	U	0.18
Lime Rock (18-126 ft) pCi/g	15	U	N/A	U	U	0.18
Total	45					

MDC - Minimum Detectable Concentration

U - Below MDC
NT - Liquid Fraction Not Tested

Statistical Calculations		
Tritium - H3	**Sample #**	**pCI/L**
	1	2390
	2	1680
	3	1470
	4	2420
	5	2090
	6	1700
	7	1400
	8	1380
	9	697
	10	1440
	11	1380
	12	2390
	13	1340
	14	2830
	15	326
High		2830
Low		326
Mean		1662.2
Standard Deviation		671.7

4-3SFWMD-B-29(25)(f)

34) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that the 2nd Round Completeness comment asked for specific information about the muck data that had been provided in the 1st Completeness Response SFWMD-B-29 (October 2009), and 2nd Round Response 2SFWMD-B-29(25)(f) (April 2010) answered the question that was asked. Additional information on the muck characteristics and expected construction impacts was provided in Part B Response 2SFWMD-B-92(78) (July 2010). The conclusion reached from the nutrient loading analysis presented in 2SFWMD-B-92(78) (July 2010) was that no adverse environmental impact to the industrial wastewater facility is expected from excavating the muck or from placing the muck on the existing upland spoil areas within the industrial wastewater facility.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in

Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1 (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-29(25)(g)

35) FPL did not provide a response to this question; therefore, this response remains incomplete.

RESPONSE:

This question was answered in the 2nd Completeness Round Part A Response 2SFWMD-B-29(25)(g) (April 2010), and by reference in Part B Responses 2SFWMD-K-179(107) and 2SFWMD-B-29(23) (July 2010). No further questions were received in 3rd Round Completeness.

4-2SFWMD-B-30(26)

36) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Since the 1st Round Completeness responses were provided, FPL has evaluated alternative engineering solutions for Turkey Point Units 6 & 7 foundation construction to reduce dewatering requirements. As a result, the foundation construction dewatering requirements have been reduced substantially, by an order of magnitude, to 1,200 gpm or less. There will be no exchange of water or materials with Biscayne Bay.

The revised foundation dewatering plan calls for using concrete diaphragm walls around each foundation excavation to minimize horizontal flow. In addition, a horizontal grouted barrier will be constructed below the bottom of each excavation (i.e., below -35 ft NAVD 88) to the bottom of the diaphragm walls to minimize vertical flow. The diaphragm walls are expected to extend to an elevation of about -60 ft NAVD88. The figure below shows the proposed methodology whereby grout is injected in a series of "Primary" borings until refusal is achieved. Subsequent borings are then drilled in between the borings of the prior step. Three series of borings are possible after the "Primary" set, which could include "Secondary," "Tertiary," and "Quaternary," sets. Each set is drilled and grout injected until refusal occurs. "Quaternary" borings may not be required at all locations, only where excessive seepage is observed as the excavation progresses.

The revised groundwater model, as presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), shows that seepage into the excavation is expected to be about 200 gpm or less with both of these engineered barriers in place. However, as discussed below, during the initial phases of construction for each unit, while isolated seepage points are identified and plugged and material is excavated, dewatering rates may be higher (i.e., up to 1,000 gpm).

The foundations will be constructed in essentially dry conditions. Consequently, the foundation construction for each unit will require three dewatering phases, as described below:

1. **Testing and Remedial Grouting Phase** – After both the diaphragm wall and the horizontal grouted barrier have been installed, the engineered containment will be tested to identify and locate potential seepage anomalies (i.e., areas that allow water to flow into the contained area). This will be done by pumping the water out of the contained area and simultaneously conducting geophysical testing to locate the anomalies. The dewatering and geophysical testing process will take approximately one week; during this time, the dewatering rates may be up to 1,000 gpm. Pumping will then be stopped and water levels will be allowed to recover. If necessary, remedial grouting will be conducted in the identified seepage zones. Remedial grouting could take up to 5 weeks to complete. If necessary, the testing and remedial grouting process may be repeated. After the final remedial grouting, the contained area will be dewatered to approximately -35 ft (NAVD 88). Therefore, the overall duration for this phase of construction could be up to 13 weeks. During this time, dewatering may be conducted for up to 3 weeks at a maximum rate of 1,000 gpm. The average dewatering rate for this phase of construction could be up to 231 gpm (0.333 MGD). The total dewatering volume could be up to 30.3 million gallons.
2. **Excavation Phase** – The excavation phase is expected to take 3 months. As the excavation proceeds, remaining seepages that are revealed by the excavation will be evaluated and remediated as necessary. During this phase of construction, dewatering pumping rates up to 1,000 gpm may be required. The average pumping rate, however, will be 400 gpm or less.
3. **Foundation Construction Phase** – Once the excavation is complete, dewatering by sump pumps at the bottom of the excavation would maintain essentially dry conditions for foundation construction. Numerous small seeps would be expected to contribute a total flow less than 200 gpm. This rate of pumping would be maintained during the entire period of foundation construction, roughly 24 months.

Construction of the Unit 6 foundation will be initiated first. Construction of the Unit 7 foundation will follow at least 6 months after construction of Unit 6 is started. Therefore, the maximum dewatering requirements for both units are as shown in the table below:

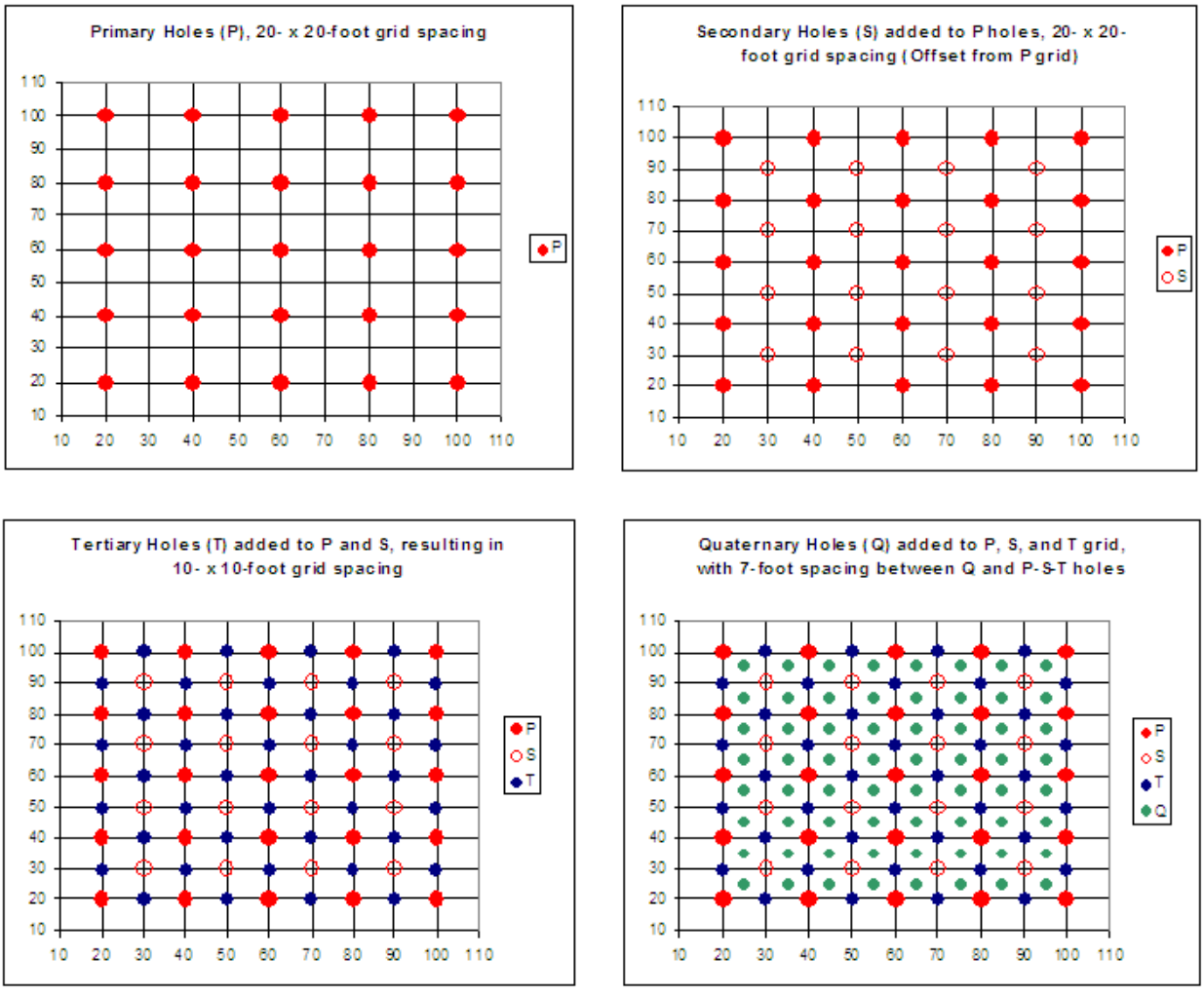
Planned Foundation Construction Dewatering Schedule

Time from Start (months)	Unit 6		Unit 7		Total Dewatering Rate	
	Maximum (gpm)	Average (gpm)	Maximum (gpm)	Average (gpm)	Maximum (gpm)	Average (gpm)
0-3	1,000	231	0	0	1,000	231
4-6	1,000	400	0	0	1,000	400
7-9	200	200	1,000	231	1,200	431
10-12	200	200	1,000	400	1,200	600
13-30	200	200	200	200	400	400
31-36	0	0	200	200	200	200

Based on the dewatering schedule shown in the table above, the maximum 3-month average dewatering rate is 600 gpm (months 10 through 12). The maximum 6-month average dewatering rate is 516 gpm (average for months 7 through 12) and the maximum 1-year average dewatering rate is

458 gpm (average for months 4 through 15). The hydraulic analysis presented in 1st Round Completeness Response SFWMD-B-46 (October 2009) showed that the response of the cooling canals would be 0.0137 ft/MGD. Using this same analysis, the addition of 1,200 gpm would increase water levels in the canal system by only 0.29 inch, or less.

The analysis presented in 4-2SFWMD-B-46(46)(c) below demonstrates that these dewatering rates will have no adverse environmental impact because the change in the canal inflow rate and the consequent change in the canal water level will be small (i.e., 20 percent or less of the standard deviation in natural variability caused by rainfall). Consequently, the substantially reduced dewatering rates will not cause an adverse environmental impact to water resources in the area.



Pattern of grouting holes

Source: Figure 51 Groundwater Modeling Report, Rev. 1 (Bechtel Power Corporation, 2011).

4-3SFWMD-B-34(27)

37) In the response to this question, FPL indicates that they previously provided Unit 5 construction dewatering monitoring data to the SFWMD. A review of our compliance files indicates that this information has not been submitted to the SFWMD; however, it may have been submitted to DEP as part of DEP's required monitoring. As previously requested, please provide all data on Unit 5 dewatering effluent production rates, water levels, and salinity and water quality in these waters at the construction site and in adjacent waters of the industrial wastewater facility, wetlands, and Biscayne Bay.

In addition to the above, FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

In the response to this question, FPL stated that dewatering plans for Turkey Point Unit 5 construction activities were submitted to the SFWMD on December 21, 2004. As stated in Response 3SFWMD-B-34(27), FPL was not required by the dewatering authorization to collect and report the monitoring data requested above. Consequently, FPL did not submit monitoring data to SFWMD or DEP.

FPL's conclusions regarding the impacts of construction dewatering for the reclaimed water treatment facility do not depend on either previously submitted groundwater modeling or the revised groundwater modeling attached to this submittal.

4-3SFWMD-B-35(28)

38) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please also refer to Responses 4-SFWMD-B-15(10)(h) and 4-2SFWMD-B-26(18) above.

4-2SFWMD-B-36(29)(a)

39) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The likelihood that vertical conduits, such as solution cavities or solution-enhanced features, are present in the vicinity of the radial collector wells that could act to "short-circuit" flow from Biscayne Bay to the radial collector well laterals cannot be quantified. For this phenomenon to occur, any such feature would have to be present within the area affected by the pumping of the radial collector wells and completely penetrate the Miami Limestone to be in hydraulic connection with the upper higher flow zone. Karst-type depressions have been observed onshore at the Units 6 & 7 Site, but these depressions have filled with low permeability sediments since their formation. It is expected that any similar features that might be present offshore and within the zone of influence of the radial collector wells would also fill with sediment as a result of estuarine depositional processes. These sediments would be expected to limit short circuiting if such solution-enhanced features are indeed present.

4-2SFWMD-B-40(36)

40) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

This is a duplicate question. Please refer to Response 4-2SFWMD-B-40(36)(40) presented after Response 4-2SFWMD-B-40(35) below.

4-3SFWMD-B-40(31)

41) FPL did not provide a response to this question; therefore, this response remains incomplete.

RESPONSE:

A response to this question was provided in 2nd Round (Part A) Response 2SFWMD-B-40(31) (April 2010). Additional information is provided in Responses 4-SFWMD-B-30(26)(36) above and Responses 4-2SFWMD-B-46(46) and 4-2SFWMD-B-44(42)(49) below.

4-3SFWMD-B-40(32)

> **42) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

Please note that this comment was originally addressed in the 2nd Round Completeness Response 2SFWMD-B-40(32) (April 2010), and by reference in Response 2SFWMD-B-40(33) (April 2010). Since that time, the groundwater model has been updated and revised to include many of the changes suggested by reviewers; the model has been re-calibrated and verified using additional pump test data; and the simulations have been rerun. The results and conclusions are basically unchanged. The updated model and the modeling results are provided in the revised groundwater modeling report (Bechtel Power Corporation, 2011). Also, since the initial responses were provided, FPL has evaluated engineering solutions to significantly reduce the pumping required for construction dewatering. The amount of groundwater that will be pumped and released to the industrial wastewater facility is very small (see Responses 4-2SFWMD-B-30(26) above and 4-2SFWMD-B-46(46)(c) below for a discussion of the limited quantities and the potential for impact.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-40(33)

> **43) FPL did not provide a response to this question; therefore, this response remains incomplete.**

RESPONSE:

This question was answered in 2nd Round Response 2SFWMD-B-40(33) (April 2010).

4-3SFWMD-B-40(34)

44) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that this question was answered in 2nd Round Plant and non-Transmission Completeness Response 2SFWMD-B-40(34) (April 2010). The answer to this question did not depend on results from the groundwater modeling. Notwithstanding, the revised groundwater model report (Bechtel Power Corporation, 2011) is now available and it is on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-40(35)

45) Please provide the following regarding potential hydrological impacts:

a) All water level hydrograph data (raw and post-processed) electronically for the monitoring well pairs in Figures 7 and 8 (hydrographs for upper and lower zone monitoring locations January 2008 through January 2009) of Appendix 10.7.7 Geology and Subsurface Hydrology Data, of the Site Certification Application.

b) All electronic files for the background (pre and post-test) water levels (raw and post-processed) and APTs conducted for wells PW7U, PW7L, PW6U, and PW6L, including those listed in Appendix A, B, C and D in the May 4, 2008 MACTEC Aquifer Pumping Test Report.

In addition to the above, FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

The raw water level data files in Win-Situ format for the monitoring wells presented in Figures 7 and 8 of Appendix 10.7.7 (FPL, 2009) are included as Attachment 1 to this response. Attachment 1 includes data collected from approximately June 2008 through June 2010. Attachment 2 contains 22 post-processed data files, one per monitoring location, in Microsoft Excel® format. These files use the pressure measurements from the Win-Situ files with a well-specific water density to calculate the

water surface elevation. Attachment 3 contains all the final data in one Microsoft Excel file and does not contain any data rejected through the data evaluation process.

The raw data files listed in Appendices A, B, C and D of the MACTEC APT Report (MACTEC, 2009) are included in Win-Situ format as Attachment 4 to this submittal. The post-processed, tide corrected data in Microsoft Excel format are included as Attachment 5 to this submittal. Attachment 5 contains 4 Microsoft Excel files, one for each pumping test.

Attachments 1 through 5 can be found on the attached CD at Attachments\4-3SFWMD-B-40(35).

The answer to this question does not depend on results from the groundwater modeling. Notwithstanding, the revised groundwater model report (Bechtel Power Corporation, 2011) is now available and it is attached to this submission on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

References

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1*.

Florida Power and Light (FPL), 2009. *Site Certification Application (SCA)*, Revision 0, June 2009.

MACTEC, 2009. MACTEC Engineering and Consulting, Inc., *Final Data Report: Aquifer Pumping Tests, turkey Point COL Project, Florida City, Florida*, Rev. 000, May 4, 2009.

4-2SFWMD-B-40(36)

> **40) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-42(38)

> **47) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

This question was answered in the 2nd Round Response 2SFWMD-B-42(38) (April 2010) and 3rd Round Response 2SFWMD-B-42(38) (July 2010).

Nonetheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-42(40)

48) FPL did not provide a response to this question; therefore, this response remains incomplete.

RESPONSE:

This question was answered in 2nd Round (Part A) Response 2SFWMD-B-42(40) (April 2010).

4-2SFWMD-B-44(42)

49) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please see Responses 4-2SFWMD-B-46(46)(c) and 4-2SFWMD-B-30-(26)(36) above for a description of the proposed grouting methodology and a discussion of the impacts of dewatering.

The revised calibrated model contains all necessary layering for construction and post-construction simulations. Additional layers were added to the model to accurately reflect the vertical extent of the excavations and diaphragm walls. In revising the groundwater model, these layers were included in the model used for calibration. Therefore, it was not necessary to change the model layers for the predictive dewatering and radial collector well simulations. Consequently, the model layer geometry in the models used for calibration and prediction is identical, and model predictions should be free from any numerical artifacts that might be associated with having differing layer geometry.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-44(43)

50) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

The updated groundwater modeling report (Bechtel Power Corporation, 2011) is attached to this submittal on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011. Figure 4-2SFWMD-B-44(43) on the attached CD at Attachments\4-2SFWMD-B-44(43) shows the radial collector well area of influence or recharge zone, which is defined by the 0.5 ft drawdown contour in the production zone. Approximately 68 percent of the water withdrawn by the radial collector wells is recharged within the contour highlighted on the figure.

Regardless of property ownership, FPL has demonstrated that the radial collector wells will not have adverse impacts to natural resources.

Reference

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1.*

4-2SFWMD-B-45(44)

51) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the CD attached to this submittal.

The Turkey Point groundwater model is a steady-state model. As such, it is not able to directly simulate transient conditions associated with tidal variations, including diurnal and seasonal sea level fluctuations. To assess the impact of sea level variation on radial collector well water sources and operational effects, a sensitivity analysis was conducted with the revised groundwater model wherein the Biscayne Bay water level was varied between the seasonal high water level of 0.09 ft NAVD88 and the seasonal low water level of -1.40 ft NAVD88. This sensitivity analysis is described in Section 5.2.3 of the revised groundwater modeling report (Bechtel Power Corporation, 2011). Results of the sensitivity analysis are summarized in Table 11 of this report. The results indicate that the relative contributions from each of the water sources for the radial collector wells are relatively insensitive to sea level. For example, Biscayne Bay is predicted to contribute 97.8 percent of the water to the radial collector wells in the base case simulation where sea level is set to the long-term average (-0.81 ft NAVD88), whereas running the model using the seasonal high and low water levels results in values of 98.1 percent and 97.6 percent, respectively. These steady-state results suggest that accounting for sea level variation in a transient model would not affect conclusions regarding radial collector well water sources.

The sensitivity analysis for variable Biscayne Bay water levels is also applicable to the question regarding diurnal tidal variation. Diurnal variations due to tides are of a similar magnitude (1.78 ft) as the 1.5 ft range tested in the model sensitivity analysis. The cyclical nature of the tidal variations prevents the full effect of each high and low in Biscayne Bay water level from being realized in the groundwater system because the groundwater level response is slower and more damped than the surface water effect. Hence, the sensitivity analysis conducted for the variable Biscayne Bay water levels, which does allow the full effect of the Biscayne water level to be realized in the groundwater system, is a robust demonstration that the water level variations in Biscayne Bay will not affect hydrologic model conclusions and will not affect conclusions regarding water sources or operational effects of the radial collector well system. Note that the assumption used in the steady-state model, that diurnal variations can be averaged over time periods of interest, is consistent with other groundwater modeling conducted in the area (Dausman and Langevin, 2004; Langevin, 2001; and Hughes et al., 2009).

References

Dausman, A. and C.D. Langevin, 2004. *Movement of the saltwater interface in the Surficial Aquifer System in response to hydrologic stresses and water–management practices*, Broward County Florida. U.S. Geological Survey Scientific Investigations Report 2004-5256.

Hughes, J.D., C.D. Langevin, L. Brakefield-Goswami, 2009. Effect of hypersaline cooling canals on aquifer salinization. *Hydrogeology Journal*, August 2009.

Langevin, C.D., 2001. *Simulation of groundwater discharge to Biscayne Bay, southeastern Florida*. U.S. Geological Survey Water Resources Investigation Report 00-4251.

4-3SFWMD-B-46(46)(a)

52) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Completeness question SFWMD-B-46(46)(a) is related to the operation of the interceptor ditch. Please note that this question was answered in the 2nd Round response. The answer to this question did not depend on results from the groundwater modeling.

Notwithstanding, the groundwater model has been updated and revised to include many of the changes suggested by reviewers; the model has been re-calibrated and verified using additional pump test data; and the simulations have been rerun. The results and conclusions are basically unchanged. The updated model and the modeling results are provided in the revised groundwater modeling report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

With regard to dewatering, since the initial responses were provided, FPL has evaluated engineering solutions to significantly reduce the pumping required for construction dewatering. The amount of groundwater that will be pumped and released to the industrial wastewater facility is very small (see Responses 4-2SFWMD-B-30(26) above and 4-2SFWMD-B-46(46)(c) below for a discussion of the limited quantities and the potential for impact).

4-2SFWMD-B-46(46)(b)

> **53) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

As indicated in Response 4-2SFWMD-B-44(42) above and 4-2SFWMD-B-46(46)(c) below, grouting from the bottom of the excavation to the bottom of the diaphragm walls has been proposed. In this case, the pumping rate from each excavation is limited by the hydraulic conductivity of the grouted formation as opposed to hydraulic properties of the various layers in the model. As a result, the foundation construction dewatering requirements have been reduced substantially, by an order of magnitude, to 1,200 gpm or less. Therefore, a more conservative choice of aquifer parameters would have little to no impact on the predicted dewatering rates. A description of the grouting approach, along with the associated predicted dewatering rates, is provided in Section 5.1 of the revised groundwater modeling report.

4-2SFWMD-B-46(46)(c)

54) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

As discussed in 4th Round Response 4-2SFWMD-B-30(26) above, short-term dewatering rates may be up to 1,200 gpm. The maximum 3-month average dewatering rate, however, should be 600 gpm or less.

In 1st Round Completeness Response SFWMD-B-46 (October 2009), FPL discussed the fact that the groundwater computer model was not used to demonstrate the capacity of the industrial wastewater facility to accept the dewatering effluent quantities. In this same response, FPL provided the hydraulic analysis that was used to determine the capacity of the industrial wastewater facility. The hydraulic analysis that was provided showed that the long-term or equilibrium canal response to an additional source of water is 0.0137 ft/MGD. At the proposed maximum dewatering rate of 1,200 gpm or 1.73 MGD, water levels in the cooling canals would increase by 0.024 ft (0.29 inches) or less. This represents an order of magnitude reduction in the potential impacts. At the maximum 3-month average dewatering rate (600 gpm), the increase would be only 0.14 inch or less.

The analysis presented in the 1st Round Completeness response also concluded that the new equilibrium water level is reached within approximately 60 days. This conclusion was based on the fact that the water level response of the cooling canals is an exponential time function with a time constant (k) given by

$$k = 3.069*(C_{in} + C_{out})/A = 0.051/day$$

Where:

3.069	is a unit conversion factor (ac-ft/MG),
C_{in}	is the inflow hydraulic conductance (45 MGD/ft),
C_{out}	is the outflow hydraulic conductance (28 MGD/ft), and
A	is the water surface area of the canal system [4370 acres, (Lyerly, October 1998)].

The hydraulic conductance terms were estimated in the 1st Round Completeness Response SFWMD-B-46 (October 2009). Given the response time of the cooling canal water level to a change in the canal inflow rate, the use of monthly average values for an analysis of the dewatering impacts is both reasonable and appropriate.

To determine if the quantity of dewatering effluent released to the cooling canals is "significant," the dewatering flow rate can be compared to natural variability of canal inflows. The primary source of natural inflow variability is the variation in rainfall. If the dewatering flow rate, averaged over a specified time interval, is less than the natural rainfall variability over the same time interval, the dewatering affect should be within the natural variation and the affect would not be significant.

Rainfall data from Station S20F was used to estimate canal inflow variation from rainfall. This station was selected because of its proximity to the Site, and because it has a 40-year period of record. The station is located near the entrance to Biscayne National Park Headquarters, about 2 miles north of the

Unit 6 & 7 Site. The data was obtained from the SFWMD DBHYDRO Database. A summary table and figure showing the average monthly rainfall (mean, maximum and minimum) were provided previously in 1st Round Completeness Response SFWMD-B-17 (October 2009).

The standard deviation of the monthly rainfall was calculated for five different averaging times from the moving averages of the monthly values. The standard deviation of the cooling canal system rainfall inflow rate is calculated from the standard deviation of the monthly rainfall using a canal system surface area of 4,370 acres. The results are shown in the table below.

Averaging Time (Months)	Standard Deviation Monthly Rainfall (inches)	Standard Deviation Rainfall Inflow Rate (MGD)	Standard Deviation Rainfall Inflow Rate (gpm)
1	3.50	13.65	9,481
2	2.74	10.71	7,436
3	2.36	9.22	6,401
6	1.68	6.55	4,547
12	0.83	3.26	2,260

The table above shows that if the average dewatering rate for one month is less than 13.65 MGD (9,481gpm), the dewatering effluent will impact water levels in the cooling canal system less than natural rainfall variability. Similarly, if the average dewatering rate for one year is less than 3.26 MGD (2,260 gpm), the dewatering effluent will impact water levels less than the annual rainfall variability. Under these conditions, the potential movement of the saline interface also would be well within natural variability. Impacts of this magnitude are small and are not environmentally significant. Therefore, no adverse environmental impact is expected for dewatering quantities less than those shown in the table above.

The revised dewatering schedule provided in the 4th Round response to 4-2SFWMD-B-30(26) above shows that the maximum 3-month average dewatering rate is 600 gpm, the maximum 6-month average dewatering rate is 516 gpm and the maximum 1-year average dewatering rate is 458 gpm. Comparing these dewatering rates with the rainfall variability presented above, demonstrates that the revised dewatering rates will have no adverse environmental impact because the change in the canal inflow rate, or the resulting change in the canal water level, will be small (i.e., 20 percent or less of the standard deviation in natural variability caused by rainfall). Consequently, the substantially reduced dewatering rates will not cause an adverse environmental impact to water resources in the area.

Reference

Lyerly, R. October 1998. *The Turkey Point Cooling Canal Study*.

4-3SFWMD-B-48(48)

55) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that this question was answered in 2nd Round Plant and non-Transmission Completeness Response 2SFWMD-B-48(48) (April 2010). This question was related to the barge slip and the answer is not related to the results from the groundwater modeling. Notwithstanding, the revised groundwater model report (Rev. 1) (Bechtel Power Corporation, 2011) is now available and is on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011*)* attached to this submittal.

4-2SFWMD-B-51(51)

56) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Based on the results of the Turkey Point APT and the groundwater modeling (Bechtel Power Corporation, 2011), the average tidal groundwater fluxes (oscillatory flow) are calculated to be less than 0.1 ft/day, while the average induced flux velocity above the radial collector wells will be less than 1.73 ft/day (6.2×10^{-4} cm/sec). As discussed in the SCA on page 6-4 (June 2009), common wind waves on Biscayne Bay will induce bottom velocities that are five orders of magnitude greater than the velocity induced by the radial collector wells. Consequently, natural mixing and dispersion processes in the water above the seabed will dominate.

The downward flux of water is not expected to result in any adverse impacts to benthic communities, as no significant adverse changes in salinity, oxygen concentration, water clarity, temperature, or nutrient concentrations are anticipated. As stated in Response 2SFWMD-B-36(29)(b) (July 2010), downward advection of surface water during operation of the radial collector wells may transport more organic matter from the sediment surface than would typically occur due to normal settling processes, which may provide a larger pool of organic matter for diagenetic processes that regenerate nutrients. The potential increase in transport of detrital material, particulate organic matter, and

dissolved organic matter to the root zone may provide a beneficial increase in nutrient availability for seagrasses or benthic invertebrates, which could ameliorate the downward advection of relatively nutrient-rich porewater from the root zone. The extremely low velocity induced by the radial collector wells would not result in entrainment of biota.

Operation of the radial collector wells is not anticipated to result in significant adverse effects upon seagrasses. Seagrasses have low nutrient requirements and are able to recycle nutrients efficiently, so that they are strong competitors under low nutrient levels (Koch, 2001; Armitage et al., 2005). *Thalassia testudinum* is dominant species of seagrass in the area, and is more tolerant of low phosphorus environments as compared to other species such as *Halodule wrightii*.

An increase in anaerobic respiration, a condition associated with low oxygen, can result in an increase of hydrogen sulfide in the sediment porewater (Goodman et al, 1995). Seagrass health is compromised by anoxia and sulfide concentration in the rhizosphere (Terrados et al., 1999; Duarte et al., 2005). Oxygen released by seagrass roots may prevent the development of anoxic conditions and exposure of the seagrass rhizospheres to toxic metabolites (Marba and Duarte, 2001). The vertical flux of surface water resulting from operation of the radial collector wells is anticipated to increase oxygen concentrations within the porewater, thus increasing redox potential and reducing potential for deleterious effects related to sulfides. Due to the shallow, well-mixed surface waters of the Bay, it is unlikely that operation of the radial collector wells would result in any alteration in temperature within the rhizosphere.

There are a number of epibenthic macroinvertebrate and vertebrate species that utilize the seagrass beds of Biscayne Bay, including the area over which the proposed radial collector well laterals will be located. A summary of information regarding the baseline assessment of vegetative cover, infaunal and epibenthic species within the area of the radial collector wells was provided in the Response FDEP-VI-C-1 (October 2009). All of the fish and invertebrates captured are well adapted to living in areas of relatively swift currents associated with tidal exchange and wind and wave-driven shallow-water turbulence. There is no likelihood that they would be affected by the very minor through-substrate velocity changes expected for the radial collector well system.

The radial collector wells are not anticipated to cause adverse impacts to submerged aquatic resources in Biscayne Bay, as demonstrated in the SCA and completeness responses.

Although the radial collector wells will be a backup cooling water source, FPL's assessment of impacts of radial collector well operation has assumed that the radial collector wells will operate 100 percent of the time, at full capacity, to provide a conservative assessment of potential impacts to Biscayne Bay and regional water resources. Since no adverse impacts have been identified under the 100 percent operation scenario, there is reasonable assurance that more limited radial collector well operation (only when reclaimed water is not available in sufficient quality or quantity) will not adversely impact water quality or aquatic systems in Biscayne Bay or harm regional water resources.

Nevertheless, in recognition of the backup nature and purpose of the radial collector wells, FPL is prepared to accept an enforceable restriction on the use of this backup water supply based upon that established in the Conditions of Certification for FPL's West County Energy Center (WCEC). The WCEC condition provides an example of a recently-licensed power plant that uses reclaimed water as its primary water source. The WCEC condition allows withdrawals from the Floridan Aquifer for up to 90 days per calendar year as a temporary backup water supply source. A similar condition for

Turkey Point Units 6 & 7 would allow operational reliability in the event that reclaimed water is not available. Since the radial collector wells will be used only as a backup water supply, these wells may not be operated at all during some years other than for routine testing and maintenance.

The Project is not anticipated to cause adverse impacts to aquatic systems in Biscayne Bay, as demonstrated in the SCA and these completeness responses. FPL anticipates that monitoring may be required to confirm the analysis presented in the SCA and these responses. FPL will work with the appropriate agencies to develop appropriate monitoring plans based on expected Project impacts to Biscayne Bay.

References

Armitage, A.R., T.A. Frankovich, K.L. Jr. Heck and J.W. Fourqurean, 2005. Experimental nutrient enrichment causes complex changes in seagrass, microalgae, and macroalgae, and macroalgae community structure in Florida Bay. *Estuaries 28*:422-434.

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1.*

Duarte, C.M., M. Holmer, and N. Marba, 2005. Plant-microbe interactions in seagrass meadows. In: Kristensen, E., J.E. Kostka, and R.H. Haese (eds) Macro- and microorganisms in marine sediments. *Coastal and Estuarine Studies,* American Geophysical Union, Washington, DC, p 31-60.

Goodman, J. L., K.A. Moore, and W.C. Dennison, 1995. Photosynthetic responses of eelgrass (*Zostera marina* L.) to light and sediment sulfide in a shallow barrier island lagoon. *Aquatic Botany* 50: 37-47.

Koch, E.W. 2001. Beyond light: Physical, geological, and geochemical parameters as possible submersed aquatic vegetation habitat requirements. Estuaries 24:1-17.

Marba, N. and C. M. Duarte, 2001. Growth and sediment space occupation by seagrass *Cymodocea nodosa* roots. *Marine Ecology Progress Series 224*:291–298.

Terrados, J., C.M. Duarte, L. Kamp-Nielsen, and N.R.S. Agawin, 1999. Are seagrass growth and survival constrained by the reducing conditions of the sediment? *Aquatic Botany* 65:175-197.

4-3SFWMD-B-53(52)

57) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that the 1st Round Completeness question asked for a description of the hydrologic regime of potentially-affected areas adjacent to the Project Site, and FPL provided specific references.

The 2nd Round Completeness question asked for clarification of citations, and additional information was provided.

The only connection through this line of questioning to Part B information was the reference to the modeling report (Bechtel Power Corporation, 2009), which was provided for its background description of the regional and site hydrology; not for any modeling results. FPL has provided all the information that is available.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-55(53)

58) Please address the following items pertaining to the salinity chamber mixing model:

a) Please provide specific justification for the assumption of steady-state conditions and the basis for the estimated one to two weeks equilibrium time scale. In addition, please indicate how it relates to the proposed use of the radial wells.

The radial collector well impact on the salinity in Biscayne Bay is governed by the principle of conservation of mass, which produces a first-order system of governing equations (i.e., a system governed by first-order differential equations). A steady-state solution was used because, for a first-order system, this solution predicts the maximum impact. In first-order systems, the time-dependent storage terms act in the short term to moderate the impact. In the long-term, after steady-state conditions are reached, they have no effect. Consequently, if the steady-state solution predicts a *de minimus* impact, there is usually no need to complicate the analysis by adding time-dependent terms.

In first-order systems, the transient terms decay exponentially. Therefore, a steady-state solution is reasonable and appropriate when the averaging time or sampling interval is greater than the system response time. For a mixing chamber, the system response time (T_s) is given by the following equation

$$T_s(\text{days}) = V/Q_{out}. \quad (1)$$

Where:

V is the average volume of the mixing chamber (ft^3), and
Q_{out} is the net outflow from the mixing chamber (ft^3/day).

The mixing chamber average volume (V) is

$$V = A*(D+H/2), \quad (2)$$

Where:

A is the surface area of the mixing chamber. i.e., the area of influence (AOI),
D is the average low tide depth within the AOI, and
H is the average tidal range in the Bay.

Equation 1 shows that the system response time increases as Q_{out} decreases. In the salinity impact analysis, the net outflow from the mixing chamber is given by

$$Q_{out} = Q_T(out)*R + Q_{RCW}. \quad (3)$$

Where:

R is the tidal exchange coefficient ($0< R\leq 1$),
Q_{RCW} is the flow to the radial collector wells, and
$Q_T(out)$ is the daily average tidal flow out (ebb flow) of the AOI.

From equation 2D in 1st Round Attachment SFWMD-B-63a,

$$Q_T(out) = A*H*(24/T) + Q_{NF}/2 - Q_{RCW}/2. \quad (4)$$

Where:

T is the tidal period (12.5 hours), and
Q_{NF} is the net freshwater inflow to the AOI.

Substituting equation (4) into equation (3) gives the following:

$$Q_{out} = A*H*(24/T)*R + Q_{NF}*R/2 + Q_{RCW}*(1-R/2). \quad (5)$$

From equation 5, it is clear that Q_{out} will be minimized, and the system response time will be maximized, when Q_{NF} and Q_{RCW} are minimized.

To estimate a conservative system response time, Q_{NF} and Q_{RCW} are set to zero and equations (5) and (2) are substituted into equation (1). This gives the following estimate for the mixing chamber system response time

$$T_s \text{ (days)} \approx (D/H+1/2)/ (24/T)/ R \quad (6)$$

From the calibration process (1st Round Attachment SFWMD-B-63b, October 2009), the exchange coefficient (R) is typically between 25 and 50 percent. Estimating the average low-tide water depth within the AOI to be approximately 5 ft, the system response time is approximately one week.

Using an averaging time or sampling interval that is greater than or equal to the system response time is consistent with a steady-state solution. Using an averaging time that is less than the system response time (e.g., in this case an interval less than one week) would be inconsistent with a steady-state solution, and the results of the analysis very likely would underestimate the true impacts.

Based on this analysis of the system response time, any change in the Bay salinity that might result from operating the radial collector wells would be fully developed within two to four weeks after the

pumps are started. The quasi-steady state analyses presented to date, however, show that the magnitude of the fully-developed change will be very small and the zone of influence will be spatially limited. While the salinity change may be calculable, it likely would not be detectable by normal monitoring methods. The change in the salinity would not cause an adverse environmental impact.

b) The model description provided in Attachment "A" states the data from BB41 was manipulated to make the salinity data consistent over time and averaged to create consistency with depth. However, it is not likely that either of these assumptions represent the actual salinity conditions of the area or are consistent with proposed radial well use. Please validate the model assumption of well-mixed within the AOI's and justify that vertical gradients in salinity can be ignored utilizing data from BB41 and other stations that have multi-level depth measurements. Please also describe the analysis in the context of proposed radial well usage.

RESPONSE:

The best data for showing that these assumptions do in fact represent the actual salinity conditions of the area and for responding to this request is the salinity data collected at stations 12 and 13 by Biscayne National Park (BNP) (2008). These two stations are co-located about 1 mile east of the Turkey Point peninsula. They are the closest stations to the Turkey Point peninsula and the data were collected on a 15 minute interval. Station 12 is near the bottom and station 13 is near the surface. For the 2006-2007 monitoring year (Table 3.11-2, BNP, 2008), the annual average salinities at stations 12 and 13 were 32.51 psu and 32.29 psu, respectively. The annual median salinities were 33.09 psu and 32.75 psu, respectively. The differences between the two stations in the annual average and median salinities are 0.22 psu and 0.34 psu, respectively. The bottom station has the slightly higher average and median salinity. These results clearly show that near the Turkey Point peninsula the water column is well mixed and there is no significant quantity of freshwater entering the Bay from the groundwater below. The salinity conditions are consistent with the assumptions used in the salinity impact analysis and with operation of the radial collector wells.

Reference

Biscayne National Park, 2008. *Annual Report, Salinity Sampling in Biscayne Bay (2006-2007),* July 27, 2008.

c) Please provide justification for choosing the AOIs associated with both Scenarios 1 and 2, which represent either one square mile or four square miles of completely mixed areas with uniform salinities throughout. Please describe how the results obtained for a completely mixed "box" within the AOIs provided relates to salinity conditions at the radial well site, which is less than on-half mile away.

RESPONSE:

As discussed in the salinity impact analysis (1st Round Attachment SFWMD-B-63a, October 2009), the salinity values in the model represent a spatial average over the volume contained in the AOI. The actual salinity in the Bay does not have to be uniform throughout the AOI. The salinity impact analysis evaluates the change in the average salinity within the AOI caused by operation of the radial

collector wells. The salinity impact analysis assumes that all the water withdrawn by the radial collector wells is removed from the Bay from within the AOI. Consequently, if the selected AOI is significantly smaller than the area surrounding the radial collector wells where most of the water flows through the Bay bottom (i.e., hereafter referred to as the radial collector well radius of influence) the salinity impact analysis would overestimate the magnitude of the impact. Conversely, if the AOI is significantly greater than the radial collector well radius of influence the impact analysis would under estimate the impacts. In this context, the radius of influence is not a precisely defined term. It depends on how one defines "most of the water" (e.g., 60 to 75 percent or greater than 90 percent). Results from the initial groundwater modeling (Bechtel, October, 2009) showed that the radial collector well radius of influence likely would be between ½ mile and 1 mile. Therefore, the AOIs associated with scenarios 1 and 2 were selected to bracket the likely radius of influence and to evaluate the sensitivity of the salinity impact analysis to this variable. The results show that the impact analysis is not sensitive to this variable. The results and conclusions are similar for both scenarios.

c) Please provide derivations with appropriate references for the input drainage inflow volume/day/mile of shoreline parameter (10,000,000 ft3/day/mile).

RESPONSE:

The required model input is the net freshwater inflow to the AOI. The net freshwater inflow includes direct precipitation minus evaporation plus freshwater drainage from the upland areas via surface and/or groundwater discharge. The freshwater drainage inflow was estimated from an independent reference (*Simulation of Submarine Ground Water Discharge to Marine Estuary: Biscayne Bay, Florida,* Christian D. Langevin, Ground Water, November-December 2003, pages 758-771, Figure 8). Figure 8 from the Langevin report shows the measured surface water discharge (m^3/day) and the simulated groundwater discharge to Biscayne Bay for the period from 1989 to 1998. Langevin indicates that ground water discharge to the Bay is about 10 percent of the surface water discharge. He also states that nearly 100 percent of the fresh groundwater is discharged to the Bay north of structure S-123. The distance from S-123 to the northern extent of Biscayne Bay is approximately 20 miles. Therefore, the values shown in Figure 8 (Langevin, 2003) were divided by 20 to obtain an estimate of the discharge per mile of shoreline. Estimates made in this manner may be high for the southern part of Biscayne Bay, especially the area south of Homestead Bayfront Park. However, as discussed in the sensitivity section of 1st Round Attachment SFWMD-B-63a (October 2009), there is a small but positive relationship between the net inflow and projected salinity impact. Therefore, these estimates are environmentally conservative because they represent the upper end of a reasonable range.

In the Excel® spreadsheet provided as 1st Round Attachment SFWMD-B-63b (October 2009), the worksheet tab had the value 10,000,000 ft^3/day/mile in the cell for the drainage inflow. This input value was used in the sensitivity analysis to show that a 33 percent reduction produced only a 2 percent reduction in the predicted salinity impact. The drainage inflow value used for this salinity in developing the impact regression equation was 15,000,000 ft^3/day/mile.

Reference

Langevin, C. D. 2003. Simulation of submarine ground water discharge to a marine estuary: Biscayne Bay, Florida. *Ground Water 41, no. 6*: 758-771.

d) Please provide documentation that shows the variation in all inputs due to seasonal fluctuation.

RESPONSE:

The salinity impact analysis is not based on inputs that are specified seasonally. The historical variation in surface water discharge, however, is shown in Figure 8 (Langevin, 2003) and the historical monthly average rainfall for station S-20F was provided in 1st Round Response SFWMD-B-17a (October 2009).

Reference

Langevin, C. D. 2003. Simulation of submarine ground water discharge to a marine estuary: Biscayne Bay, Florida. *Ground Water 41, no. 6*: 758-771.

e) Please explain the rationale for expressing the inputs for bay rainfall and evaporation on different time scales (expressed as per year basis) than the rest of the inflow and outflow terms in the model (expressed as either per day or per hour). The mathematical conversion of these inputs to a daily basis masks potential variability in these terms which is significant on a daily basis, as well as a monthly and seasonal basis.

RESPONSE:

The reason for expressing the rainfall and evaporation rates on an annual basis is that these values are often reported on an annual basis and the author thought that most people would relate more easily. Since the analysis is based on steady-state conditions, the time scale used does not affect the calculation as long as consistent units are used in the calculation and the averaging time is appropriate [see discussion in paragraph (a) above].

f) Please describe the derivation of the net freshwater inflow estimate for each scenario. The description provided should include the reference for "nominal rainfall and evaporation estimates for South Florida" stated in Attachment A and the method by which these values were adjusted to reflect each salinity condition.

RESPONSE:

The salinity impact analysis is based on a simple concept: at a given location within the Bay, the salinity will be high when the net freshwater inflow to the area is low and vice versa. In other words, there is a negative correlation between the salinity and the net freshwater inflow to the area. Therefore, given an estimate of the salinity (without the radial collector wells operating) at the location of interest and an estimate of the corresponding freshwater inflow to the area of interest, the tidal exchange coefficient can be calculated (the tidal exchange coefficient is the only remaining unspecified variable in the conservation equations). Then, holding the tidal exchange coefficient and the net freshwater inflow constant, the salinity can be recalculated with the radial collector wells operating to estimate the salinity impact.

When the salinity in the Bay without the radial collector wells operating ($C_{w/o}$) equals the ocean salinity (C_o), the net inflow to the area must be zero. This is a mathematical identity discussed in the 1st Round Attachment SFWMD-B-63a (October 2009). Under this salinity condition, it is reasonable to assume that rainfall equals evaporation and freshwater drainage from the land (via surface and/or groundwater) is zero. However, any combination of the three components of freshwater that add up to zero (evaporation is the only component that can be negative) will produce the same result. The radial collector wells have no impact because the makeup flow from the ocean that is induced by the radial collector wells has the same salinity as the Bay water. From the cumulative probability distribution for the baseline salinity this condition corresponds to about the 60th to 65th percentile.

When $C_{w/o} > C_o$, the net freshwater inflow must be negative. At times, the Bay salinity can exceed 40 ppt (98th percentile). Under this very dry condition, rainfall and freshwater drainage were set to zero and evaporation was increased to a rate equivalent to 90 inches per year (0.25 inches per day), which is at the upper end of a reasonable range for evaporation.

For the very wet condition (i.e., very low salinity percentile (<1), $C_{w/o}$ = 20 ppt) the total freshwater inflow was maximized. The freshwater drainage was set to a value of 17.5×10^6 ft^3/day/mile; a value that corresponds approximately to 10,000,000 m^3/day on Figure 8 from Langevin (2003). The rainfall was set to 3 inches per day and the evaporation was reduced to 0.1 inch/day.

For the intermediate salinity condition ($C_{w/o}$ = 30 ppt), an average freshwater drainage value was visually estimated using Figure 8 from Langevin (2003). The average discharge selected from Figure 8 was 4.2×10^6 m^3/day , which converts for use in the salinity analysis to 7.5×10^6 ft^3/day/mile. For the salinity condition $C_{w/o}$ = 26 ppt, the freshwater drainage was proportioned between the next higher and the next lower salinity condition based on the salinity percentiles.

Clearly, the freshwater inflows used in the salinity impact analysis are approximations using professional judgment and available data from a reputable source. Therefore, a sensitivity analysis was done to evaluate the uncertainty posed by this approximation. As discussed in Attachment SFWMD-B-63a (October 2009), the results are not sensitive to the exact value used for the net freshwater inflow. The sensitivity analysis showed that a 33 percent reduction in the freshwater inflow produced only a 2 percent reduction in the predicted salinity impact. Furthermore, since the relationship between net freshwater inflow and salinity impact is positive (i.e., the greater the estimated freshwater inflow the greater the projected salinity impact), the net freshwater inflows that were used in the salinity impact analysis were selected to be at the upper end of a reasonable range based on the available data from Langevin (2003). Therefore, the results presented are environmentally conservative.

Reference

Langevin, C. D. 2003. Simulation of submarine ground water discharge to a marine estuary: Biscayne Bay, Florida. *Ground Water 41, no. 6*: 758-771.

g) Please provide the definition of "baseline salinity" on Attachment A. Is this the term "e w/o", or something else?

RESPONSE:

Yes, the term "baseline salinity" refers to the salinity without the radial collector wells operating. It is the same as the term $C_{w/o}$.

> **h) Please provide a specific reference which demonstrates that the chamber mixing model has been used to show salinity changes in estuarine environments from radial wells. If this model was specifically developed for this application, please reference the author (developer) of the model and the date of development.**
>
> **In addition to the above, FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

The salinity impact analysis was specifically developed for the Turkey Point Units 6 & 7 Project to evaluate the radial collector well impacts. The 2nd Round Part B responses (July 2010) and revised groundwater model results did not change the salinity impact analysis, because the salinity impact analysis assumes 100 percent of water withdrawn by the radial collector wells is from Biscayne Bay.

The calculation was developed by Gregory M. Powell, Ph.D., P.E. (Golder Associates Inc.) concurrent with development of the SCA.

4-3SFWMD-B-60(57)

> **59) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

This 1st Round Completeness question asked for salinity analyses at stations other than BB41. In response, FPL provided a comparative analysis of salinity data from several stations and provided the salinity impact analysis using data from BISC101.

The 2nd Round Completeness question made reference to the groundwater model (it should have referenced the salinity impact analysis) and suggested that the documentation and sensitivity analysis had not been provided. The question also asked for information on estuarine biota in the area. In the 2nd Round Part A response, FPL provided another copy of the documentation and provided references on the biota in the area. The question was therefore answered.

The 2nd Round Part B responses and revised groundwater model results did not change the salinity impact analysis, because the salinity impact analysis assumes 100 percent of water withdrawn by the radial collector wells is from Biscayne Bay.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has

subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011 on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-60(58)

60) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that the 2nd Round Completeness comment requested the salinity analysis using data from monitoring station BISC122. FPL provided the analysis with the 2nd Round Part A Completeness Response 2SFWMD-B-60(58)(April 2010).

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011. The revised groundwater model results do not change the salinity impact analysis.

4-3SFWMD-B-61 (59)

61) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL provided the documentation for the salinity impact analysis, including copies of the spreadsheets that were used for the calculations, in the 2nd Round Part A Completeness Response 2SFWMD-B-61(59) (April 2010). The 2nd Round Part B responses and revised groundwater model results change nothing related to this line of questions, because the groundwater model has no effect on the salinity impact analysis.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial*

Collector Well Simulations, Rev. 1 (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-B-62(60)

62) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL provided the documentation for the salinity impact analysis, including copies of the spreadsheets that were used for the calculations, in the 2nd Round Part A Completeness Response 2SFWMD-B-61(59) (April 2010). The 2nd Round Part B responses and revised groundwater model results change nothing related to this line of questions, because the groundwater model has no effect on the salinity impact analysis.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Please also refer to Response 4-3SFWMD-B-61 (59) above.

4-3SFWMD-B-63(61)

63) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

The 2nd Round Part B responses and revised groundwater model results did not change the salinity impact analysis, because the salinity impact analysis assumes 100 percent of water withdrawn by the radial collector wells is from Biscayne Bay.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-64(62)

64) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

Sensitivity analyses have been performed with the revised groundwater model to establish that selected parameters do not result in underestimation of impact. The sensitivity cases investigated varied the vertical location of the radial collector well laterals, the water levels in Biscayne Bay, the vertical conductivity of the hydrogeologic units underlying Biscayne Bay. The sensitivity of the radial collector well location, the origins of the water supplying the radial collector wells, and the approach velocity to the Bay floor to these parameters and boundary conditions were assessed. Results are summarized in Tables 11 and 12 of the revised groundwater modeling report.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized.

The groundwater model has been revised such that the vertical anisotropy (K_h:K_v) of the hydrogeologic units represented in the base model now ranges from 8:1 to 15:1, with the upper two hydrogeologic units underlying the Bay having an anisotropy of 15:1. Previously, these two units were assigned vertical anisotropy values of 1:1 with the lower units having values of 10:1. As part of the sensitivity analyses described above, the vertical anisotropy of the upper two units underlying the Bay was varied between 30:1 and 7.5:1 to examine impacts associated with radial collector well operation. The results of these sensitivity analyses are provided in Tables 11 and 12 of the revised groundwater modeling report (Bechtel Power Corporation, 2011) provided on the attached CD.

4-3SFWMD-B-70(69)

65) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

This question was answered in the 1st Round Response SFWMD-B-70 (October, 2009) and 2nd Round Response 2SFWMD-B-70(69) (April 2010). This question is not related to the groundwater modeling.

Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the first round of completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-81(71)

66) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

Please note that the 1st Round response was simply commenting on the magnitude of the adjustments to the potentiometric maps as a result of converting to an equivalent head based on the density of the reference fluid. The attached Excel® file (contour map data.xls) on the attached CD at Attachments\4-2SFWMD-B-81(71) includes data from each monitoring location, specifically,

- The date/time of the transducer measurement
- Density applied to the transducer measured pressure
- Point head value (observed water level)
- Calculated reference head value
- Summary of calculated water densities (contained in separate worksheet).

For the wells that are 20 ft deep, labeled "U", the concentrations in the Excel file (contour map data.xls) result in an average adjustment of 0.24 ft; for the wells that are 40 ft deep, labeled "L", the concentrations in the Excel file (contour map data.xls) result in an average adjustment of 0.84 ft. Even though the adjustments were made and incorporated into the potentiometric maps, the magnitude of the adjustments is considered relatively small.

Referencing the 2nd Round Completeness comment to 2SFWMD-B-81(71) (April 2010), the part of the groundwater model that is affected by drawdown due to the radial collector wells is shown in Figures 59 and 60 of the revised groundwater modeling report (Bechtel Power Corporation, 2011) on

the attached CD at \Groundwater Modeling Report, Rev. 1, 2011. This area is predominantly offshore, and groundwater in this area would have a concentration similar to that of seawater. Therefore, the area that is affected by the radial collector wells has a relatively constant density, and would not require adjustment of heads to account for variable density.

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-2SFWMD-B-82(72)

67) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The part of the groundwater model that is affected by drawdown due to the radial collector wells is shown in Figures 59 and 60 of the revised groundwater modeling report. This area is predominantly offshore, and groundwater in this area would have a concentration similar to that of seawater. Therefore, the area that is affected by the radial collector wells has a relatively constant density, and would not require adjustment of heads to account for variable density.

4-3SFWMD-B-83(73)

68) Please provide a signed and executed copy of the Joint Partnership Agreement between Miami-Dade County and FPL for delivery of reclaimed water.

RESPONSE:

Please see the signed and executed Joint Partnership Agreement on the attached CD at \4-3SFWMD-B-83(73).

Note: this is the same question as 4-3SFWMD-K-169(106)

4-2SFWMD-B-87(75)

69) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

As indicated in Responses 4-2SFWMD-B-30(26) and 4-2SFWMD-B-46(46)(c) above**,** grouting from the bottom of the excavation to the bottom of the diaphragm walls has been proposed. In this case, the pumping rate from each excavation is limited by the hydraulic conductivity of the grouted formation as opposed to hydraulic properties of the other layers in the model. Sensitivity analysis has been performed to determine how the dewatering rate varies with the hydraulic conductivity of the grouted formation. A description of the grouting approach, predicted dewatering rates, and results of the sensitivity analysis are provided in Section 5.1 of the revised groundwater modeling report.

4-2SFWMD-B-89(76)(a)

70) FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The groundwater model has been revised such that the vertical anisotropy (K_h:K_v) of the hydrogeologic units included in the model now ranges from 8:1 to 15:1 as described in the revised groundwater modeling report (Bechtel Power Corporation, 2011). The Miami Limestone, in particular, now has an anisotropy of 15:1.

4-2SFWMD-B-89(76)(b)

71) The SFWMD has completed its review of all geophysical logs submitted to date and has identified the following issues:

- **The "pslog" program supplied by FPL (a DOS version program) was able to open individual trace files (.org extensions), but not the SPS files which are the combined well files. The program does not allow for export of data to other formats, thus it is limited from an analysis standpoint. For the acoustic image data, the raw data-sets appear to be complete; however, for many boreholes, only half the borehole has processed images. Attached to this letter (see Attachment 1) is a table with notes in the far right column showing which wells are not complete for the processed data.**
- **The header's portion of the geophysical log *.Ias files are not complete (with the exception of the Diversified Drilling geophysical logging file "Main. las" file). This header data sheet indicates the cased depth for that particular logging run, as well as the caliper data which reduces the usefulness of the file (i.e. , there are many negative numbers at the top of the hole rather than a true value or standard no-data value).**

With respect to the above, please address the following:

a) Please provide the final Full Wave Sonic data in SEG2 format or a format that is readable by standard geophysical packages.

b) Please correct or explain the header's portion of the geophysical log *.Ias files and re-submit the final corrected files.

RESPONSE:

The response to this question is provided in parts as follows:

- ***The "pslog" program supplied by FPL (a DOS version program) was able to open individual trace files (.org extensions), but not the SPS files which are the combined well files.***

The individual ORG files are "gathered" into the SPS file. There is an SPS file for each borehole. The SPS file is only velocity data. It does not combine any other data, and it collects all velocity data for a specific borehole. PSLOG will only open the SPS file. If one runs PSLOG and then "gather" an ORG file, an SPS file is actually created. If a PSLOG file is saved, an SPS file is also saved. Once the SPS file is opened, one can go to different depths and open individual .ORG files. If PSLOG is run in DOSBOX one is able to perform screen grabs, and these can be put into MSPowerPoint®, MSWord®, etc. Instructions for running PSLOG are included on the attached CD at Attachments\ 4-2SFWMD-B-89(76)(b).

• ***The program does not allow for export of data to other formats, thus it is limited from an analysis standpoint.***

Comment noted.

• ***For the acoustic image data, the raw data-sets appear to be complete; however, for many boreholes, only half the borehole has processed images. Attached to this letter (see Attachment 1) is a table with notes in the far right column showing which wells are not complete for the processed data.***

The Acoustic Televiewer probe needs a hard reflective surface to contrast borehole features for imaging and will only produce usable images in sufficiently hard material such as rock. It is intended for use in rock, not soil. The stratigraphy of the Turkey Point site is such that variably indurated limestone (rock) extends from the near surface to approximately 120 feet below ground surface. Below 120 feet the stratigraphy changes to nonindurated soils consisting of sand, silt, and clay, which do not produce usable images. This is why there is no processed image data below approximately 120 feet in the borings, with the exception of boring B-701(DH), which went back into limestone at a depth of approximately 459 feet. It should be noted that borehole deviation (using the acoustic televiewer probe), mechanical 3-arm caliper, suspension P-S velocity logging, and E-log were provided to the full depth of borings, with the exception of boring B-640(DHT) where only down-hole velocity logging was performed.

• ***The header's portion of the geophysical log *.Ias files are not complete (with the exception of the Diversified Drilling geophysical logging file "Main. las" file). This header data sheet indicates the cased depth for that particular logging run, as well as the caliper data which reduces the usefulness of the file (i.e. , there are many negative numbers at the top of the hole rather than a true value or standard no-data value).***

It is assumed the reviewer is referring to "LAS" files not Ias. Several files were checked, and the header sections were complete. It should be noted that for the E-Log probe, there is an insulated grounding cable that does not allow data collection in the uppermost 30 feet of the boreholes (see Appendix D page 15 of the MACTEC Geotechnical Report). This affects the resistivity and natural gamma logs. The full description of logging depths is described in the report, Appendix D Table 3, page 41. The negative numbers in the casing are artifacts of conversion from the manufacturer's format to the LAS format.

• ***Please provide the final Full Wave Sonic data in SEG2 format or a format that is readable by standard geophysical packages.***

Please refer to the initial response to this comment. The final Full Wave Sonic data is available for review using PSLOG and DOSBOX as described above.

• ***Please correct or explain the header's portion of the geophysical log *.Ias files and re-submit the final corrected files.***

As discussed on October 28, 2010 with SFWMD representatives, several files were checked, and the header sections were complete.

4-2SFWMD-B-92(78)

72) Please address the following items pertaining to nutrient release from muck excavation and related dewatering:

a) It seems likely that nearly 100% of porewater nutrients will either be initially drained or exported by percolating rainwater. Please clarify the basis for using 8% to 12% "drainable" water volume from the muck. What is the percent water in each of the cores and the area weighted average? How long will muck be stored in the plant area and then along the Industrial Wastewater Facility (IWF) canal sites?

b) In addition to instantaneous leaching, longer term organic matter decomposition and nutrient release via leaching will also take place. Knowledge of the bulk density of the muck, along with the sediment nutrient concentration, will be needed to estimate the total potential nutrient release from the entire muck layer that will be excavated. Please report these values and estimate total nutrient loads to the IWF from the muck. In addition, please revise the calculations regarding rainfall infiltration. While the annual differential between rainfall and evapotranspiration may be small over periods of days to months (with pulse rainfall events), the differential affecting percolation rates can be quite large.

c) The existing nutrient concentrations in the IWF are already high. Changing stages within the IWF associated with dewatering and use of radial well operation could potentially affect nutrient transport and loading. Therefore, please include muck decomposition and leaching processes in the estimates of potential inputs to the IWF as part of or in addition to the groundwater modeling.

d) Biscayne Bay is likely sensitive to TP concentrations that are two orders of magnitude lower than the minimum detection limit used for leachate analysis. Please re-analyze the samples using more sensitive methods.

RESPONSE:

a) The water content or percent moisture of the soil/sediment samples, as reported by the laboratory, are provided in Response 4-SFWMD-B-29(23) above. As described in Response 2SFWMD-B-29(23) (July 2010) and in 4-SFWMD-B-29(23)(a), the parameter list for the muck sampling and analysis was selected based on input from SFWMD representatives in a meeting with FPL on 3/31/2010. Bulk density and percent moisture were not on the agreed upon parameter list. Consequently, the soil/sediment samples were not collected with the intent of determining either of these parameters under *in situ* conditions. As discussed in Response 2SFWMD-B-92(78) (July 2010), the soil/sediment samples were collected from two depths and composited for laboratory analysis. Therefore, the sample percent moisture does not reflect *in situ* moisture conditions. The drainable water content of the muck, by volume, (i.e., saturation minus field capacity) was estimated using the USDA Soil Water Characteristics -- Hydraulic Properties Calculator (http://hrsl.arsusda.gov/soilwater/Index.htm). The site-specific muck characteristics that were used in the calculation, as described in the 1st Round response SFWMD-B-29 (October 2009), are unit weight (i.e., bulk density) of 80 lbs/ft^3, 55 to 60 percent clay, 8 percent organic content and normal compaction. The drainable water content used in the nutrient loading calculation is 12 percent. The

muck from the plant area will be stockpiled temporarily within the plant area only long enough to drain the porewater within it. This is not anticipated to be a long period of time and is only a step taken prior to moving the muck to its final storage location in the spoils area.

b) Response 2SFWMD-B-92(78) (July 2010) included nutrient loading calculations for both the instantaneous nutrient releases caused by porewater drainage during muck removal and placement, and the longer term releases due to leaching by rainfall runoff/infiltration. The total nutrient load is required only for the instantaneous loading calculation; it is not required for the long-term leaching calculation. The long-term leaching calculation is a rate dependent process that depends on the loading rate (i.e., nutrient concentrations multiplied by the inflow rate) and the canal flushing rate. The nutrient concentrations in the runoff/leachate were determined by laboratory analysis of the porewater and SPLP analyses of the muck. The inflow rate was calculated as the annual average precipitation minus annual average evapotranspiration. The use of annual average values for the inflow rate is both reasonable and appropriate because the flushing time of the canal system, based on the canal system flow rate to groundwater of 27,756 ac-ft/year and the canal system volume of 12,236 ac-ft, is approximately one year [flushing time (yrs) = -ln(0.1)*12,236 ac-ft/27,756 ac-ft/yr]. Therefore, the calculations regarding rainfall infiltration do not require revision.

c) The analyses provided, which likely overestimate the real impact, show that nutrient concentrations in the industrial wastewater facility will increase only a small amount due to muck removal, placement and storage. Previous responses, including but not limited to Response SFWMD-B-40 (October 2009), have discussed why construction activities within the industrial wastewater facility will not affect surface water resources, including Biscayne Bay and adjacent coastal wetlands. Therefore, including muck decomposition and leaching processes as part of or in addition to the groundwater modeling are not necessary.

d) The detection limits used for the nutrient analyses were appropriate for their intended use. The sensitivity of Biscayne Bay to total phosphorus is irrelevant to the analysis of the impacts of the muck excavation and storage on the concentration in the industrial wastewater facility. The nutrient loading analyses, which likely overestimate the real impact, show that nutrient concentrations in the industrial wastewater facility will increase only a small amount due to muck removal, placement and storage. Therefore, FPL will not re-analyze the samples using more sensitive methods because it is not necessary. The increase in the nutrient concentrations within the industrial wastewater facility will be small.

4-2SFWMD-B-93(79)

> **73) Please provide an approximation of the likely quantity (per unit time) of ammonia use for PH control, based on other similar facilities.**
>
> **FPL indicates that they will provide revised ground water modeling at a later date; therefore, this response remains incomplete.**

RESPONSE:

Ammoniated water, (i.e., aqueous ammonia) may be used during the construction of Turkey Point Units 6 & 7 for pressure testing and flushing of equipment, pipes and tanks. FPL will reuse the ammoniated water to the maximum degree practical. When the ammoniated water can no longer be

reused, it may be released to the industrial wastewater treatment facility. Alternatively, if the injection wells are operational the ammoniated water may be released to the boulder zone through the deep injection wells.

The following assumptions were used to calculate the final concentration of ammonia and the pH level in the industrial wastewater treatment facility after release of the ammoniated water. The values presented below represent a maximum bounding condition for pH, and ammonia concentration since they assume no reuse of the ammoniated water.

- Based on information provided by Westinghouse, the total volume of ammoniated water that could be used during construction is approximately 10.4 million gallons (MG) per unit. The maximum total ammonia (NH_3 plus NH_4^+) concentration in the ammoniated water could be 95.7 Lbs/MG (11.467 mg/l); and the maximum pH could be 10.0.
- The aqueous ammonia required for construction of each unit will be released to the industrial wastewater treatment facility over a period of at least 50 days. Since the impacts are inversely proportional to the release time, 50 days represents a bounding condition that was used for the following analyses.
- Based on recent sampling of the industrial wastewater treatment facility (Industrial Wastewater Facility permit sampling) results submitted to FDEP on September 15, 2010, the pH of the canal system is 8.03 SU and the ammonia concentration is 0.022 mg/l.

The maximum total ammonia concentration at the end of the 50-day release period would be 0.0267 mg/l. After this time, ammonia concentrations will decrease to background levels within 30 days. At a pH of 8.03 SU, the unionized fraction would be approximately 8 percent of the total (EPA 1985) or 0.0021 mg/l. The EPA water quality limit for unionized ammonia [national standard based on chronic toxicity in saltwater (EPA 1989)] is 0.035 mg/l. There is no toxicity limit for ammonium (NH_4^+). Furthermore, the release of the ammoniated water will not significantly impact pH, dissolved oxygen, nitrite or nitrate concentrations in the industrial wastewater treatment facility. Therefore, the small temporary increase in the ammonia concentration in the industrial wastewater treatment facility will not cause an adverse environmental impact.

The analysis above is not dependent upon groundwater modeling. Nevertheless, FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel Power Corporation, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

4-3SFWMD-D-119(87)

74) FPL has indicated that it is their intent to design and construct the reclaimed water pipeline so as to avoid SFWMD CERP Biscayne Bay Coastal Wetlands parcels to the greatest extent practicable and has stated that the temporary impact associated with installation of the reclaimed water pipeline will not impact the CERP Biscayne Bay Coastal Wetlands Project or other SFWMD projects that may be

proposed on these lands. As previously requested, please provide documentation that demonstrates that avoidance of these parcels is unavoidable. If FPL is unable to narrow the proposed corridor in this area to avoid the BBCW parcels, please provide documentation that clearly demonstrates that the BBCW project will not be impacted by the temporary construction impacts or the permanent installation of the pipeline within the proposed corridor.

RESPONSE:

FPL will avoid the SFWMD CERP Biscayne Bay Coastal Wetlands parcels and the L-31E Canal right-of-way within the reclaimed water pipeline corridor, with the exception of subaqueous crossings of canals as necessary. As illustrated in SCA Figure P9.0.0-3, preliminary Route B is located west of the L-31E Canal and SFWMD parcels GZ100-001 and GZ100-002.

The installation of an underground pipeline west of the L-31E Canal will not have any adverse impact on the L-31E Flowway plans involving installation of culverts in the L-31E to discharge water eastward. The reclaimed water pipeline right-of-way will be located primarily within and/or adjacent to existing roads and rights-of-way. SCA Figures P9.3.2-1 and P9.3.2-2 (June 2009) show typical details for construction within paved and unpaved roads. Open cutting or trenching will be utilized for the majority of the reclaimed water pipeline installation. Large tracked-hoe machines are typically utilized to excavate the trench to the design depth of approximately 11 ft, top width of approximately 28 ft, and bottom width of approximately 10 ft. Once a section of trench has been excavated, the pipe is installed in the trench. The remaining part of the trench will be backfilled and compacted with native soil or clean fill, and any excess spoils material will be spread within the limits of construction in the upland areas or removed to an approved area. Where the pipelines are installed in existing roadways, the roadways will be restored (see SCA Figures P9.3.2-1 and P9.3.2-2 for paved and unpaved roadway restoration).

4-3SFWMD-E-131 (90)

75) In the response, FPL confirms that they are seeking a waiver of SFWMD right-of-way occupancy criteria set forth in Rule 40E-6.091, F.A.C., which prohibits transmission line facilities parallel to and within SFWMD canal right-of-way. In order for the SFWMD to prepare its agency report and formulate a recommendation for approval or denial of FPL's waiver request for placement of the proposed reclaimed water pipeline parallel to and within the L-31 E Canal right-of-way, FPL must provide the following information that the SFWMD requested during previous completeness reviews:

a) Please provide responses to items (6) and (7) on pages 2 and 3 of the SFWMD's Checklist of Required Information (see Attachment 2). Please note that the attached checklist is part of the package provided to an applicant for petition of a waiver/variance to SFWMD right-of-way occupancy criteria.

b) Please provide documentation demonstrating that the use of the L-31 E Canal right-of-way is unavoidable and that the pipeline will be designed,

installed, operated, and maintained in such a way as to avoid impacts to SFWMD operational and maintenance needs and the CERP Biscayne Bay Coastal Wetlands Project, or other SFWMD projects that may be proposed on these lands.

RESPONSE:

FPL will install the reclaimed water pipeline outside of SFWMD rights-of-way; no waiver request is being proposed. Please see Response 4-3SFWMD-D-119(87) above.

4-2SFWMD-F-145(92)

76) The response references the response to 2SFWMD-B-36(29)(b) which addresses the potential effects of radial well operations on seagrasses via changes in root zone chemistry. However, this question is broader, concerning impacts on "benthic organisms" (including fauna, flora, and microbiota). Please respond to this question. Please note that part of the response to 2SFWMD-B-36(29)(b) was a statement that one positive aspect of the radial wells is that they may pull organic materials from surface water toward the seagrass bed root zone. Please address the broader effects of such an entrainment process.

RESPONSE:

The velocity at the sediment-water interface anticipated from the radial collector well system is negligible compared to prevailing environmental currents encountered in Biscayne Bay and Card Sound. Based on the results of the groundwater modeling (Bechtel Power Corporation, 2011), the average tidal groundwater fluxes (oscillatory flow) are calculated to be less than 0.1 ft/day, while the average induced flux velocity above the radial collector wells will be less than 1.73 ft/day (6.2×10^{-4} cm/sec). The flux velocity is not expected to result in any adverse impacts to benthic communities, as no adverse changes in salinity, oxygen concentration, water clarity, or nutrient concentrations are anticipated. Furthermore, as discussed in the SCA on page 6-4 (June 2009), common wind waves on Biscayne Bay will induce bottom velocities that are five orders of magnitude greater than the velocity induced by the radial collector wells. Consequently, natural mixing and dispersion processes in the water above the seabed will dominate.

As stated in the response to 2SFWMD-B-36(29)(b) (July 2010), downward advection of surface water during operation of the radial collector wells may transport more organic matter from the sediment surface than would typically occur due to normal settling processes, which may provide a larger pool of organic matter for diagenetic processes that regenerate nutrients. The potential increase in transport of detrital material, particulate organic matter, and dissolved organic matter to the root zone may provide a beneficial increase in nutrient availability for seagrasses or benthic invertebrates, which could ameliorate the downward advection of relatively nutrient-rich porewater from the root zone. The extremely low velocity induced by the radial collector wells would not result in entrainment of biota.

There are a number of epibenthic macroinvertebrate and vertebrate species that utilize the seagrass beds of Biscayne Bay, including the area over which the proposed radial collector well laterals will be located. A summary of information regarding the baseline assessment of vegetative cover, infaunal

and epibenthic species within the area of the radial collector wells was provided in 1st Round Response FDEP-VI-C-1 (October 2009). All of the fish and invertebrates captured are well adapted to living in areas of relatively swift currents associated with tidal exchange and wind and wave-driven shallow-water turbulence. There is no likelihood that they would be affected by the very minor through-substrate velocity changes projected for the radial collector well system.

The radial collector wells are not anticipated to cause adverse impacts to submerged aquatic resources in Biscayne Bay, as demonstrated in the SCA and completeness responses. FPL anticipates that monitoring may be required to confirm the analysis presented in the SCA and the completeness responses. FPL will work with the appropriate agencies to develop appropriate monitoring plans based on expected project impacts to Biscayne Bay.

4-3SFWMD-H-159(104)

77) Has FPL considered other information, such as the U.S. Army Corps of Engineers Circular, regarding sea level rise projections for the associated facilities (radial wells, new electrical transmission lines, new roads, reclaimed water pipeline, wastewater treatment facility) which will likely be constructed at lower base elevations than the power block area?

RESPONSE:

Yes, FPL has considered other information, including the U.S. Army Corps of Engineers Circular regarding sea level rise. If it is demonstrated that significant sea level rise will affect South Florida and accessibility to Turkey Point 6 & 7, associated facilities, or operations in any way, FPL will have the opportunity to address these in an effective manner to allow the continued operations of plant facilities as planned by the Company. FPL will comply with all applicable regulatory requirements to maintain safe and continuous operation of the facility and associated features.

4-3SFWMD-J-165(105)

78) In addition to the information that FPL indicates they will providing at a future date, please also provide a copy of previously requested FDEP form 62-602.910(4)2CG.

RESPONSE:

FDEP Form 62-602.910(4)2CG data are provided on the attached CD at \4-3SFWMD-J-165(105). Please note, there are two internal outfalls to the industrial wastewater treatment facility. Outfall I-001 is the internal outfall that releases non-contact once-through condenser cooling water, non-contact auxiliary equipment cooling water, and other wastestreams to the onsite feeder canal within the industrial wastewater treatment facility. Outfall I-002 is the internal outfall that releases process wastewater and stormwater to the facility's onsite industrial wastewater treatment facility.

4-3SFWMD-K-169(106)

79) Please provide a signed and executed copy of the Joint Partnership Agreement between Miami-Dade County and FPL for delivery of reclaimed water.

RESPONSE:

Please see attached Joint Partnership Agreement in hard copy and at 4-3SFWMD-B-83(73) on the attached CD.

Note: Same question as 4-3SFWMD-B-83(73) above.

SFWMD Comment

Regarding FPL's request in the "Introduction" section of the responses that the FDEP, SFWMD, and MDC advise whether a durational restriction can be applied to use of the radial collector wells, please be advised that, prior to consideration of condition, FPL must first provide the SFWMD with reasonable assurances that the operation of the radial well system, as either a primary or a secondary/emergency back-up source for 90 consecutive days, will not result in harm to regional water resources, pursuant to Section 3.0 (Water Resource Evaluations) of the SFWMD's Water Use Basis of Review.

RESPONSE:

Although the radial collector wells will be a backup cooling water source, FPL's assessment of impacts of radial collector well operation has assumed that the radial collector wells will operate 100 percent of the time, at full capacity, to provide a conservative assessment of potential impacts to Biscayne Bay and regional water resources. Since no adverse impacts have been identified under the 100 percent operation scenario, there is reasonable assurance that more limited radial collector well operation (only when reclaimed water is not available in sufficient quality or quantity) will not adversely impact water quality or aquatic systems in Biscayne Bay or harm regional water resources.

Nevertheless, in recognition of the backup nature and purpose of the radial collector wells, FPL is prepared to accept an enforceable restriction on the use of this backup water supply based upon that established in the Conditions of Certification for FPL's West County Energy Center (WCEC). The WCEC condition provides an example of a recently-licensed power plant that uses reclaimed water as its primary water source. The WCEC condition allows withdrawals from the Floridan Aquifer for up to 90 days per calendar year as a temporary backup water supply source. A similar condition for Turkey Point Units 6 & 7 would allow operational reliability in the event that reclaimed water is not available. Since the radial collector wells will be used only as a backup water supply, these wells may not be operated at all during some years other than for routine testing and maintenance.

FPL proposes that the following language be considered for inclusion in a possible SFWMD Condition of Certification for Turkey Point Unit 6 & 7.

> Although reclaimed water will be the primary water source for Turkey Point Units 6 & 7, there may be temporary interruptions in the delivery of reclaimed water supply to the Site. Consequently, utilizing a reliable, backup supply source for the Project is in the public interest and is consistent with the criteria set forth in Section 2.2 of the Basis of Review for Water Use Application within the SFWMD. Therefore, this Certification authorizes a maximum withdrawal of 125 million gallons per day (MGD) from the radial collector wells, and a maximum annual withdrawal of 11,250 million gallons per year (MGY) for Units 6 & 7.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) COASTAL AND AQUATIC MANAGED AREAS (CAMA)

4-FDEP-VI(CAMA)-1: Thank you for providing the electronic water level data files for the aquifer performance tests (APTs) conducted on the Turkey Point peninsula and data from the Aqua Troll data loggers. However, a review of the data indicates a discrepancy between the salinity and water quality values obtained via the Aqua Troll data loggers and the water quality analyses completed in the laboratory as well as significant variation between the slug tests and results from the APT conducted on the peninsula. Please provide an interpretation of the data provided in the July 2010 response to this question.

In reviewing the data provided, Table 5.4 in the APT Report indicates a positive upward seepage of groundwater to the bay, which is an important source of freshwater for benthic communities. However, Table 5.4 further indicates a reverse in seepage with the operation of the radial collector wells (RCWs); a net negative downward seepage is reported based on the difference in observed seepage rates prior to and during the APT. At what rate is surface water from Biscayne Bay being drawn down into the bay bottom as reverse seepage and what are the potential impacts of a different ionic suite, varied nutrient load, and varied amounts of oxygen being received by the root systems of submerged aquatic vegetation in the footprint of the RCWs?

RESPONSE:

Salinity reported from the Aqua TROLL® 200 is determined based on troll sampling every 15 minutes in accordance with the algorithm presented in *Technical Note: Aqua TROLL® 200 Measurement Methodology* on the attached CD at Attachments\4-FDEP-VI(CAMA)-1. Salinity reported by the laboratory is based on method SM 2520B on grab samples collected in the field. The dates for the grab samples were presented with the results on the attached CD at Attachments\4-FDEP-VI(CAMA)-1 in the file entitled *Genapure Sample Analysis Report*. In order to avoid interference with the level measurements of the trolls, grab samples for the monitor wells were collected before the background sampling of the trolls was initiated. The troll measurements continued through the recovery period following the completion of the pumping test. Grab samples were collected in the monitoring wells after the recovery period. It is not unusual for different sampling and testing methods to provide somewhat different results. Please see 4-SFWMD-B-15(10)(h).

Grab samples from the production well were also collected during the pumping test. There was no statistically significant trend in the production well data.

In an environment such as Biscayne Bay, with tidal currents and wave activity, seepage meter data can be positively biased due to the airfoil (Bernoulli) effect. This effect has been documented in the scientific literature and is discussed in Section 5.4 of the APT Report (HDR, August 2009). Therefore, the absolute seepage values reported in Table 5.4 are not a reliable measure of the actual seepage rate. Furthermore, monitoring well data, which are not subject to this bias, show a downward hydraulic gradient at the Turkey Point peninsula. Therefore, the statement above that this data "indicates a positive upward seepage of groundwater to the bay" is not correct.

During radial collector well operation, the average rate at which surface water from Biscayne Bay directly above the laterals would be drawn towards the Bay bottom has been estimated as part of the

groundwater modeling effort and is less than 1.73 ft/day (6.2×10^{-4} cm/sec; Bechtel Power Corporation, 2011). Table 12 of this report summarizes the approach velocities averaged over the entire radial collector well catchment (the total area within Biscayne Bay contributing water to the radial collector wells), the immediate radial collector well area, and the laterals. The same table includes the results of analyses used to determine the sensitivity of seabed approach velocity to key hydrogeological parameters and boundary conditions. Figure 64 of the report illustrates the spatial distribution of the seabed approach velocity for the base case model.

Model simulations used several bounding conditions to maximize the calculated hydrologic and environmental impacts. As stated in the SCA, each caisson could have up to 12 laterals and the laterals may be up to 900 ft long. The model simulations use eight laterals per collector well, and the laterals are 700 ft long. This design configuration maximizes the flow per unit area of the aquifer, which in turn maximizes the calculated drawdown and the seabed approach velocity caused by pumping the radial collector wells. In addition, the radial collector well system will have 4 collector wells, each capable of providing one-third of the required flow. The model simulations use the three collector wells closest to the shoreline. This operational configuration maximizes the calculated impacts to the near shore areas west of the Bay. Finally, the laterals will be installed at a depth of approximately 25 to 40 ft below the Bay. Within this zone, the model sensitivity analysis shows little sensitivity to the depth of the laterals. Nevertheless, the model simulations placed the laterals in the upper higher flow zone located approximately 25 ft below the Bay. This was done to ensure the lateral extent of the calculated area of influence and the calculated seabed velocities would be maximized. The steady-state, constant-density and three-dimensional groundwater model and the operational design configurations discussed above produce an environmentally conservative assessment of potential environmental impacts.

As described in Response 2SFWMD-B-36(29)(b) (July 2010):

> Operation of the radial collector wells is not anticipated to result in significant adverse effects upon seagrasses. The modeled effects of radial collector well operation upon salinity in the Bay indicate a moderating effect upon high and low salinity conditions, and no significant difference in average conditions. Seagrasses have low nutrient requirements and are able to recycle nutrients efficiently, so that they are strong competitors under low nutrient levels (Koch, 2001; Armitage et al., 2005). *Thalassia testudinum* is dominant species of seagrass in the area of radial collector wells recharge, and is more tolerant of low phosphorus environments as compared to other species such as *Halodule wrightii*. Chapin (1980, 1988) indicated that plants of nutrient-poor environments have several effective strategies to overcome periods of nutrient stress, such as luxury consumption, reduced growth rates, increased leaf longevity, reduced leaching, and nutrient uptake by leaves. Often, one or more of these strategies co-occur with nutrient resorption (Chapin, 1980; Li et al., 1992; Reich et al., 1992). Stapel and Hemminga (1997) measured nutrient resorption efficiency in seagrasses up to 28 percent for nitrogen and 51 percent for phosphorus. The plants may optimize their leaf uptake capacity according to the relative nutrient availability in the water column and the porewater (Stapel et al. 1996). Additionally, the downward advection of surface water during operation of the radial collector wells may transport more organic matter from the sediment surface than would typically occur due to normal settling processes, which may

provide a larger pool of organic matter for diagenetic processes that regenerate nutrients.

An increase in anaerobic respiration, a condition associated with low oxygen, can result in an increase of hydrogen sulfide in the sediment porewater (Goodman et al, 1995). Seagrass health is compromised by anoxia and sulfide concentration in the rhizosphere (Terrados et al., 1999; Duarte et al., 2005). Oxygen released by seagrass roots may prevent the development of anoxic conditions and exposure of the seagrass rhizospheres to toxic metabolites (Marba and Duarte, 2001). The vertical flux of surface water resulting from operation of the radial collector wells is anticipated to increase oxygen concentrations within the porewater, thus increasing redox potential and reducing potential for deleterious effects related to sulfides. Due to the shallow, well-mixed surface waters of the Bay, it is unlikely that operation of the radial collector wells would result in any alteration in temperature within the rhizosphere.

The Project is not anticipated to cause adverse impacts to aquatic systems in Biscayne Bay, as demonstrated in the SCA and these completeness responses. FPL anticipates that monitoring may be required to confirm the analysis presented in the SCA and these responses. FPL will work with the appropriate agencies to develop appropriate monitoring plans based on expected project impacts to Biscayne Bay.

Although the radial collector wells will be a backup cooling water source, FPL's assessment of impacts of radial collector well operation has assumed that the radial collector wells will operate 100 percent of the time, at full capacity, to provide a conservative assessment of potential impacts to Biscayne Bay and regional water resources. Since no adverse impacts have been identified under the 100 percent operation scenario, there is reasonable assurance that more limited radial collector well operation (only when reclaimed water is not available in sufficient quality or quantity) will not adversely impact water quality or aquatic systems in Biscayne Bay or harm regional water resources.

Nevertheless, in recognition of the backup nature and purpose of the radial collector wells, FPL is prepared to accept an enforceable restriction on the use of this backup water supply based upon that established in the Conditions of Certification for FPL's West County Energy Center (WCEC). The WCEC condition provides an example of a recently-licensed power plant that uses reclaimed water as its primary water source. The WCEC condition allows withdrawals from the Floridan Aquifer for up to 90 days per calendar year as a temporary backup water supply source. A similar condition for Turkey Point Units 6 & 7 would allow operational reliability in the event that reclaimed water is not available. Since the radial collector wells will be used only as a backup water supply, these wells may not be operated at all during some years other than for routine testing and maintenance.

Please see 4th Round Completeness Response SFWMD Comment for additional detail on proposed condition language.

References

Armitage, A.R., T.A. Frankovich, K.L. Jr. Heck and J.W. Fourqurean, 2005. Experimental nutrient enrichment causes complex changes in seagrass, microalgae, and macroalgae, and macroalgae community structure in Florida Bay. *Estuaries 28*:422-434.

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1.*

Chapin, F.S. III, 1980. The mineral nutrition of wild plants. *Annual Review of Ecology And Systematics 11*:233-260.

Chapin, F.S. III, 1988. Ecological aspects of plant mineral nutrition. *In:* Tinker B, Lauchli A (eds) Advances in plant nutrition Vol 3. Praeger, New York, p 161-191.

Duarte, C.M., M. Holmer, and N. Marba, 2005. Plant-microbe interactions in seagrass meadows. *In*: Kristensen, E., J.E. Kostka, and R.H. Haese (eds) Macro- and microorganisms in marine sediments. *Coastal and Estuarine Studies,* American Geophysical Union, Washington, DC, p 31-60.

Goodman, J. L., K.A. Moore, and W.C. Dennison, 1995. Photosynthetic responses of eelgrass (*Zostera marina* L.) to light and sediment sulfide in a shallow barrier island lagoon. *Aquatic Botany* 50: 37-47.

HDR, Inc. 2009. *Florida Power & Light Exploratory Drilling and Aquifer Performance Test Program, August 9, 2009.*

Koch, E.W. 2001. Beyond light: Physical, geological, and geochemical parameters as possible submersed aquatic vegetation habitat requirements. *Estuaries 24*:1-17.

Li, Y.S., R.E. Redmann, and C. Van Kessel, 1992. Nitrogen budget and 15N translocation in perennial wheatgrass. *Functional Ecology 6*:221-225.

Marba, N. and C. M. Duarte, 2001. Growth and sediment space occupation by seagrass *Cymodocea nodosa* roots. *Marine Ecology Progress Series 224*:291–298.

Reich, P.B., M.B. Walters, and D.S. Ellsworth, 1992. Leaf life-span in relation to leaf, plant, and stand characteristics among diverse ecosystems. *Ecological Monitoring 62*:365-392.

Stapel, J., T.L. Aarts, B.H.M. van Duynhoven, J.D. de Groot, P.H.W. van den Hoogen, and M.A. Hemminga, 1996. Nutrient uptake by leaves and roots of the seagrass *Thalassia hemprichii* in the Spermonde Archipelago, Indonesia. *Adapted* from: *Marine Ecology Progress Series 134*:195-206. Chapter 6 In*:* Nutrient dynamics in Indonesian seagrass beds: factors determining conservation and loss of nitrogen and phosphorus.

Stapel, J. and M.A. Hemminga, 1997. Nutrient resorption. *Adapted* from: *Marine Biology 128(2)*:197-206. Chapter 5 In*:* Nutrient dynamics in Indonesian seagrass beds: factors determining conservation and loss of nitrogen and phosphorus.

Terrados, J., C.M. Duarte, L. Kamp-Nielsen, and N.R.S. Agawin, 1999. Are seagrass growth and survival constrained by the reducing conditions of the sediment? *Aquatic Botany 65*:175-197.

4-FDEP-VI(CAMA)-2: Per FPL's response, CAMA is aware that FPL is continuing to work on addressing hydrologic impacts and that additional groundwater modeling and therefore additional time is necessary to respond to some questions. For that reason, CAMA maintains that FPL's response to this question thus far does not adequately address some outstanding concerns regarding the operation of the RCWs, including the frequency at which the following readings will be collected; pumped water volume rates, vertical recharge from Biscayne Bay, water elevations inside the caissons, and water sample parameters, including a map to scale showing the layout of the RCW laterals and the Biscayne Bay Aquatic Preserve boundaries including the proposed coordinates of the position of the RCWs and the projected cone of influence of the full-scale operation of the RCWs, and a definitive depth at which the laterals will be placed as well as their length and diameter.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011) on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The "cone of influence" of the full-scale operation of the radial collector wells is shown in Figure 60, which is titled RCW *Drawdown within the Pumped Layer (Upper Higher Flow Zone).* The spatial distribution of the seabed velocity is shown in Figure 64.

The laterals will be located between 25 feet and 40 feet below the seabed. Laterals will project from the caissons below Biscayne Bay. The laterals will be advanced horizontally a distance of up to 900 feet beneath Biscayne Bay. The laterals will not extend beneath Biscayne National Park. The sensitivity analysis discussed in Section 3.1.1.5 and Tables 11 and 12 of the groundwater modeling report (Bechtel Power Corporation, 2011) shows that between these depths, the depth of the laterals make little or no difference in the seabed velocity or the source water distribution (i.e., the percentage of the water originating from the Bay and from other areas is unchanged). Similarly, the diameter of the laterals will make no significant difference in the environmental impact. As described in SCA Section 4.5 (June, 2009), the maximum length of the radial collector well laterals is expected to be 900 feet. Please note that to provide a conservative estimate, the groundwater model was run using a lateral length of 700 feet, with a screened interval (or open hole interval) of 300 feet, because the shorter length increases the predicted environmental impact. The exact length and screened intervals will be determined based on field conditions during construction and final engineering. Final design

details for the radial collector wells will be available during the post-certification review process authorized by Section 403.5113(2), F.S., and Rule 62-17.191, F.A.C.

FPL is willing to discuss a condition requiring monitoring of radial collector well pumping rates, water levels in the caissons and temperature, conductivity and salinity of the pumped water during operation of the radial collector wells.

Reference

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1.*

4-FDEP-VI(CAMA)-4: In the references and/or supporting documentation provided in response to question 2FDEP-VI(CAMA)-4, there was an explanation offered of each constituent in the equations applied in the mixing chamber model. However, there are assumptions made in the conditions of the model, according to the Salinity Impact Analysis, that are not explained or verified. For example, one condition of the mixing chamber model is "Equilibrium or Steady State" which is defined as "no change in flow or concentration with time. In other words, salinity concentrations, freshwater inflow and tidal flow are averaged over several days. The equilibrium time scale in Biscayne Bay near Turkey Point is estimated to be one to two weeks, based on semi-diurnal tide range of 1.6 ft and a mean low water depth of 4 to 6 ft." Please provide justification for the assumption of steady-state conditions. Also, please define "freshwater flow" and "tidal flow" and specify what sources of freshwater are included under the term "freshwater flow" as well as define "baseline salinity" as noted in Attachment A that was previously provided to DEP. "Well Mixed" is defined as "within the 'Area of Interest' …gradients in the salinity are small. Alternatively, the salinity concentration represents a spatial average over the volume contained within the 'Area of Interest.'" Please explain what is meant by "gradients in the salinity are small." The last condition of the model is "Constant Tidal Range" which is defined as "the tidal range in the bay is not significantly impacted by the net freshwater inflow or the radial collector well flow. "Please clarify what is meant by "freshwater inflow."

The data entered into the model were collected by Biscayne National Park between March 20, 1979 to March 5, 2003, and according to the Salinity Impact Analysis, "during some sampling events, the salinity was measured at mid-depth. While during other events, the salinity was measured at three depths: near the surface, at mid-depth and near the bottom. On a few other events, the sampling was done at two depths. To make the salinity data consistent over time, the multi-depth sampling values were averaged to give a depth-averaged value for each sampling event, hereafter referred to as the 'average salinity'. The data shows that the average salinity in the bay is stable, with no statistically significant trend in the average salinity over time." Please justify why it is appropriate to average together salinities at various depths in order to "make salinity data consistent over time" and how vertical gradients in salinity can be disregarded even when stations have expressly captured multi-depth measurements. Conditions including equilibrium or steady-state, and well-mixed may be components of a mixing chamber model but these do not seem to accurately reflect the actual conditions in Biscayne Bay, such as salinities that are not "steady-state" but rather vary by depth as well as seasonally and spatially. Please validate the assumption that the areas being assumed as "well-mixed" are in fact well-mixed. Please provide a specific reference to demonstrate that the

chamber mixing model has been used to illustrate salinity changes in estuarine environments specifically caused by RCWs. Also, please provide references for all inputs used in the model and explain how season and spatial variation are accounted for by these inputs.

RESPONSE:

For a discussion of the justification for the assumption of steady-state conditions and the calculation of the 1- to 2-week time scale, please see Response 4-3SFWMD-B-55(53)(58)(a).

The required model input is the net freshwater inflow to the area of interest (AOI). The net freshwater inflow includes direct precipitation minus evaporation plus freshwater drainage from the upland areas via surface and/or groundwater discharge. See Responses 4-3SFWMD-B-55(53)(58)(d) and (g) for a discussion of how the freshwater inflow was determined and estimated for each scenario.

The term "baseline salinity" (or $C_{w/o}$) refers to the salinity without the radial collector wells operating.

The term "tidal flow" refers to the daily average flow into and out of the mixing chamber (i.e., the AOI) that is induced by tides.

Salinity gradients are considered small when the pressure gradient or flow produced by a baroclinic density field is small relative to the pressure gradient or flow produced by the water surface slope. One criteria for a well mixed estuary is given in Chapter 16 of the Engineering Societies Monograph titled *Estuary and Coastline Hydrodynamics*, edited by Arthur T. Ippen Ph.D., P.E., (1966). If the freshwater discharge entering the estuary per tidal cycle divided by the tidal prism is 0.1 or less, the estuary is considered well mixed. Biscayne Bay is over 5 miles wide (east to west). The freshwater inflow per mile of shoreline is less than 17.5×10^6 ft^3/mile/day (based on Langevin, 2003). The tidal range in the Bay is approximately 1.6 feet and the tides are semi-diurnal. Therefore, the ratio defined above is less than 0.044.

$$0.044 = [17.5 \times 10^6 (ft^3/mile/day) \times (12.5(hrs/tidal\text{-}cycle)/24\ (hrs/day))/(1.5\ ft \times 5\ miles \times 5280\ ft/mile \times 5280\ ft/mile)]$$

According to Dr. Ippen (1966) and based on the calculation above, the estuary is well mixed.

The data from station BB41 was averaged when multiple readings were collected on the same day for several reasons. First, as discussed above, the Bay should be well mixed. Therefore, salinity differences between the surface and the bottom should be relatively small, and the multi-depth data from Station BB41 supports that conclusion. Second, as discussed in the documentation provided, the analysis is based on a spatial average salinity. Therefore, small vertical gradients in salinity are not important for the purpose of this analysis. Third, one of the products produced from the measured data is a cumulative probability curve for the salinity. The cumulative probability curve would be distorted if data collected on one day were given more weight because more data were collected on that specific day.

Please see Response 4-3SFWMD-B-55(53)58)b) for a discussion of independent data that validates the assumption that Biscayne Bay in the area of the Turkey Point peninsula is well mixed. Please see Responses 4-3SFWMD-B-55(53) 58) d) and g) for a discussion of how the freshwater inflow was determined and estimated for each scenario. Specific literature references for the mixing chamber analysis and similar uses in estuarine environments were provided in the 3rd Round response to this

question. FPL is not aware of a specific case in which mixing chamber analysis has been used to evaluate salinity changes in estuarine environments specifically caused by radial collector wells. The underlying principles of conservation of water and mass are indisputable; the input data were developed from independent sources and the mixing chamber approach has been used many times to evaluate other mass-balance processes and environmental issues. The application may be new, but the science is well-established.

References

Ippin, A. T. (ed.) 1966. Chapter 16: Estuary and Coastline Hydrodynamics, *Engineering Societies Monograph*, McGraw-Hill, 1966.

Langevin, C. D. 2003. Simulation of submarine ground water discharge to a marine estuary: Biscayne Bay, Florida. *Ground Water 41, no. 6*: 758-771.

4-FDEP-VI(CAMA)-5: In the documentation pertaining to the Scenario 1 & 2 table which were used to obtain the linear regression equations that predict the one square mile and four square mile impact, it is stated that "within ½ mile of the intake (blue line), the RCWs have a slight moderating effect on the salinity (i.e., low salinities are not as low and high salinities are not as high)," but then it is stated that "at 1.0 mile from the intake (green line), there is no measurable impact from the RCWs." This is indicated in the figure by the fact that the green and black lines separate only in a few locations.

It was stated in the July 2010 response that "salinity changes attributable to the radial collector wells (changes that are calculable, but not likely measurable), tend to moderate the extreme salinity variations. Because the radial collector wells reduce the salinity extremes, they tend to move the system toward the more natural salinity condition that existed before development." Please define "natural salinity condition" in the project area. How will salinity changes "that are calculable, but not likely measurable" move the system "back toward the more natural salinity conditions…?" Also, please justify using an area of interest that is a one mile by one mile scenario (one square mile) and one that is a four mile by four mile scenario (16 square miles) when the impact to the benthic resources would be localized, likely within the footprint of the RCWs. Please describe how the results obtained for the "box" model, assumed to be "well-mixed," within the Area of Influence depicted relates to salinity conditions at the RCW sites less than a half mile away which is a distance orders of magnitude smaller than the area analyzed for salinity changes. Please provide a summary of the number of caissons, number of lateral wells to extend from caissons, and how far these wells will extend within the aquifer.

In regard to the statement that "'Essentially natural condition' is not a non-procedural standard," it should be stated that Biscayne Bay Aquatic Preserves have been designated Outstanding Florida Waters (OFW). Per Florida Statutes, Section 403.061, Subsection 27, grants powers to DEP to establish rules which provide for a special category of water bodies within the state, to be referred to as OFW, which shall be specially protected because of their natural attributes. Furthermore, 62 302.700 F.A.C., Special Protection, OFW, Outstanding National Resource Waters states that "(1) It shall be the Department policy to afford the highest protection to Outstanding Florida Waters and Outstanding National Resource Waters. No degradation of water quality, other than that allowed in subsections 62-4.242(2) and (3), F.A.C., is to be permitted in Outstanding Florida Waters and Outstanding National Resource

Waters, respectively, notwithstanding any other Department rules that allow water quality lowering."

RESPONSE:

As discussed in the 3rd Round Completeness Response to this question (July 2010), it is widely recognized that cumulative urban development and channelization of the drainage basins around Biscayne Bay have increased variability in freshwater flow to the Bay. More freshwater enters the Bay in rapid response to storm events and less enters the Bay as a steady base flow. The increased temporal variability in the freshwater inflow causes a corresponding increased variability in the Bay salinity, especially near the shoreline. Consequently, a "more natural salinity condition" in the Bay would include fewer salinity extremes (high or low). The changes that would be caused by the radial collector wells would be very small (likely not measureable), but the salinity changes that are calculated tend to moderate (i.e., reduce) the extremes.

The areas of influence (AOIs) that were used in Scenarios 1 and 2 are 1 square mile and 4 square miles, respectively. The salinity impact analysis did not present a 16 square mile scenario because the impacts at 4 square miles are already *de minimus*, and the impacts at 16 square miles would be even smaller. The statement above that refers to a 16 square mile area is incorrect. The areas enclosed by Scenarios 1 and 2 bracket the radial collector well AOI (i.e., the area surrounding the radial collector wells where most of the water flows through the Bay bottom). Please see Response 4-3SFWMD-B-55(53)58)(c) for more discussion on the reasons for selecting the areas used in Scenarios 1 and 2.

As discussed in SCA Section 4.5.1.2 (June 2009), there will be four 33 1/3 percent radial collector wells [30,000 gallons per minute (gpm) capacity per well]. Three wells would meet the makeup water requirements for the circulating water systems; the fourth would be an installed spare. Laterals will project from the caissons below Biscayne Bay. The laterals will be advanced horizontally a distance of up to 900 feet beneath Biscayne Bay. The laterals will not extend beneath Biscayne National Park. A conceptual design for a typical radial collector well is illustrated in SCA Figure 4.5-2 (June 2009). The wells will be designed and sited to induce recharge from Biscayne Bay. The radial collector wells area is shown in SCA Figure 4.5-3 (June 2009).

Further, the Outstanding Florida Waters (OFW) standards found in Rule 62-4.242(2) only apply to surface water discharges to OFWs or to dredge and fill activities that occur within an OFW. Rule 62.4.242(2(a) provides that "[n]o Department permit or water quality certification shall be issued for any proposed activity or discharge within an Outstanding Florida Waters, or which significantly degrades, either alone or in combination with other stationary installations, any Outstanding Florida Waters," unless the applicant makes certain specified showings [emphasis added]. In its 1998 Final Order regarding FPL's Manatee Orimulsion Project, the Siting Board adopted the following conclusion of law, in which the assigned state Administrative Law Judge rejected the argument that OFW requirements of FAC Rule 62-4.242 apply to withdrawals from surface waters: the intervenors "attempt to read subsection (2)(a) of F.A.C. Rule 62-4.242 out of context to suggest that the term 'activity' includes atmospheric deposition from air emissions and surface water withdrawals. But such a reading ignores subsection (2)(d), which clearly indicates that the rule applies only to 'dredge or fill' activities and to 'discharges.' When subsections (2)(a) and (2)(d) are read together, the general term 'activity' in (2)(a) is restricted to a sense analogous to the specific term 'dredge and fill activity' in (2)(d)." Id., Recommended Order, at ¶282 (citing State ex rel. Wedgworth Farms, Inc. v. Thompson, 101 So.2d 381, 385 (Fla. 1958)).

The predicted salinity changes caused by the radial collector wells, however, are very small and they do not represent a "degradation of water quality" by any reasonable standard.

3DEP-VI(CAMA)-6: In FPL's response to this question, it is noted that additional salinity data was obtained from Biscayne National Park from Site 12B, a bottom station located one mile east of Turkey Point from a period of record between May 7, 2004 to December 31, 2009, recorded every 15 minutes. It is also stated that the "Salinity Impact Analysis was rerun using weekly average values calculated from this data set." The use of weekly average values is justified as a "reasonable and appropriate" time interval because of the "estimated flushing time (several days to more than a week) for the Bay volume contained within the radial collector wells area of influence." Please cite references or provide other scientific documentation as to why flushing time was used as a barometer to select a weekly time interval to average data for the use in the analysis.

RESPONSE:

Please see Response 4-3SFWMD-B-55(53) (58) (a) for a discussion of why flushing time is used and why 1 week is a reasonable and appropriate time interval.

Surface Water and Benthic Resources

4-FDEP-VI(CAMA)-7: CAMA understands that FPL is continuing to work on addressing hydrologic impacts and that additional groundwater modeling and therefore additional time is necessary to respond to some questions. For that reason, CAMA maintains that FPL's response to this question thus far does not adequately address how benthic resources in the footprint of the RCWs and adjacent areas will not be significantly affected given the fact that at least 3% of the water will come from the Biscayne Aquifer, a source of freshwater inputs to the bay bottom, helping to support the benthic community.

RESPONSE:

FPL submitted the report entitled *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 0* (Bechtel, 2009) with the 1st Round Completeness responses in October 2009. The groundwater model has subsequently been revised to incorporate additional suggestions made by the reviewing agencies, to refine and enhance the model. A description of the changes and the results of the revised model are presented in *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1* (Bechtel Power Corporation, 2011), on the attached CD at \Groundwater Modeling Report, Rev. 1, 2011.

The revised model indicates similar results as the prior model with regard to the source of water reporting to the radial collector well system: approximately 97.8 percent of the aquifer recharge will originate from boundaries representing Biscayne Bay, approximately 1.9 percent will originate from boundaries representing the cooling canal system and approximately 0.3 percent will be from boundaries representing precipitation onshore.

Please see the 2nd and 3rd Round Plant and non-Transmission Completeness Responses to 3SFWMD-B-57(55) (July 2010) for a discussion of quantitative estimates of the freshwater contribution to Biscayne Bay in the area of the Turkey Point peninsula. As discussed in these responses, the fresh groundwater component of the Bay water around the Turkey Point peninsula, as estimated by Stalker (2008), is most likely transported into the area from the north by surface currents in the Bay. It likely does not come from local discharges of fresh groundwater to the Bay bottom.

Salinity data collected at Stations 12 and 13 by Biscayne National Park (BNP) (2008) in *Annual Report, Salinity Sampling in Biscayne Bay (2006-2007)* provides additional evidence that there is no significant quantity of fresh groundwater flowing to Biscayne Bay in the area of the Turkey Point peninsula. These two stations are co-located about 1 mile east of the Turkey Point peninsula. They are the closest stations to the Turkey Point peninsula and the data were collected on a 15-minute interval. Station 12 is near the bottom and Station 13 is near the surface. For the 2006-2007 monitoring year (Table 3.11-2, BNP, 2008), the annual average salinities at Stations 12 and 13 were 32.51 practical salinity units (psu) and 32.29 psu, respectively. The annual median salinities were 33.09 psu and 32.75 psu, respectively. The differences between the two stations in the annual average and median salinities are 0.22 psu and 0.34 psu, respectively. The bottom station has the slightly higher average and median salinity. These results demonstrate that near the Turkey Point peninsula the water column is well mixed and there is no significant quantity of fresh groundwater entering the Bay from the aquifer below.

Please also see Response 4FDEP-CAMA-1 above.

References

Bechtel Power Corporation, 2011. *Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Rev. 1*.

Biscayne National Park, 2008. *Annual Report, Salinity Sampling in Biscayne Bay* (2006-2007), July 27, 2008.

Stalker, J. C. 2008. *Hydrological Dynamics Between a Coastal Aquifer and the Adjacent Estuarine System, Biscayne Bay, South Florida*. Ph.D. Dissertation.

Five (5) Conditions of Certification were listed in CAMA's December 15, 2009 2nd round of completeness review questions for FPL Units 6 and 7 site certification application response. CAMA reiterates the need to have such conditions considered in future review of this application.

RESPONSE:

FPL recognized the five Conditions of Certification suggested by FDEP-CAMA in the 2nd Round Plant and non-Transmission Completeness Questions that were reiterated in the 3rd Round of Plant and non-Transmission Completeness Questions. As discussed in the Responses to the 2nd and 3rd Round Completeness Questions, the items listed under the heading "Conditions of Certification" are not completeness questions and therefore no action by FPL is required at this time for a determination of completeness under the PPSA process. Nonetheless, FPL recognizes that under the PPSA process, it is appropriate for the agencies to propose conditions of certification in the agency report. FPL will

continue to work with the appropriate staff of the Department during the preparation of the agency reports to determine if there is a need for and the scope of appropriate and acceptable conditions of certification.

Sea Level Rise

SFRPC staff continues to believe that it is essential to include analysis of the potential impacts of sea level rise at levels higher than the one-foot standard used by FPL, and considers the application to be incomplete without this additional analysis. This is especially important because of the possible impacts to support facilities other than the reactors. This includes the possibility that, while the pad on which the reactors would be built may remain above sea level, much of the area surrounding Turkey Point could be under water. The analysis should address the impact of sea level rise and corresponding surge on critical support facilities and services that would be affected by the range of potential increases adopted by the Miami-Dade County Climate Change Advisory Task Force.

On January 6, 2010, South Florida Regional Planning Council staff requested that FPL provide a revised analysis of the possible impacts of sea level rise on the proposed project with all of its associated facilities, consistent with the range of potential increases adopted by the Miami-Dade County Climate Change Advisory Task Force (see Appendix 3 of the 2010 Annual Report, located at www.miamidade.gov/DERM/climatechange/library/ccatf_recommendations junel0.pdf). In its response dated April 10, 2010, FPL did not address the impacts of that significantly higher range of sea level rise.

On May 28, 2010, South Florida Regional Planning Council staff requested again that FPL revise the analysis of the possible impacts of sea level rise on the proposed project with all of its associated facilities, using the most current Sea, Lakes and Overland Surge from Hurricanes (SLOSH) data available from NOAA. In its response, dated July 2010, FPL indicated that it saw no need to revise the analysis since " the change in surge elevation at the site, if any, would be small and well within the range of SLOSH model uncertainties applied for the Turkey Point site." The most recent SLOSH modeling not only uses updated elevation data and an enhanced SLOSH grid, but also includes a substantially larger variety of simulations (14,700), which generally produced higher levels of Maximum of Maximums (MoMs) for Biscayne Bay. Surge modeling carried out as part of the Statewide Regional Evacuation Study Program shows that an extensive area surrounding the Turkey Point site, excluding the main facilities themselves but including the access roads and cooling canals, would be affected by surge for a Category 1 storm or higher, and water depths under the surge from a Category 5 storm would be in excess of 7 feet.

RESPONSE:

As indicated in the above SFRPC 4th round question, the SFRPC accepts that "the reactor pads may remain above sea level" even when including the potential sea level rise at rates higher than one foot over plant design life.

FPL acknowledges that the land surrounding the plant area may become inundated by storm surges from hurricanes. Updated SLOSH model simulations show that the areas surrounding the site, including parts of Homestead and Florida City, could be inundated with various water depths during a Category 5 hurricane. However, plant procedures would be in place to address actions to be taken in advance of hurricanes that could impact the operation of the plant and associated facilities. These procedures would include provisions for placing and maintaining the plant in safe shutdown mode and evacuating support personnel as necessary. The design of the access to and from the plant and

other ancillary services will be developed during the detail design phase. At that time storm surge effects that must be considered to facilitate post storm access and recovery from the storm event will be fully developed and incorporated into the detail design. It should be noted that following the requirements of emergency plant procedures, the existing plants were safely shutdown and maintained in a safe mode in advance of the passage of Hurricane Andrew, a Category 5 hurricane.

Therefore, sea level rise at levels higher than one foot over the design life of the plant on plant access and support facilities would be accommodated through plant procedures and detail design considerations focused on nuclear and personnel safety during the storm and post-storm recovery. Plant safety-related functions would not be adversely affected and impacts on support facilities and services would be managed through pre-planning for storm effects.

References

NOAA, 2010a. Digital Coast: Data Access Viewer, website http://csc-s-maps-q.csc.noaa.gov/dataviewer/viewer.html, access date 6/18/2010.

NOAA, 2010b. SLOSH Display Package, National Weather Service, MDL Evaluation Branch, website http://slosh.nws.noaa.gov/sloshPriv/download.php?L=6, access date 6/17/2010.