

Additional Information in Support of Basis of Review for Cane Island Power Park Unit 4 Industrial Water Use Request

To receive an individual water consumptive use permit, the applicants (Florida Municipal Power Agency [FMPA] and Kissimmee Utility Authority [KUA]) must demonstrate that the proposed water use is a reasonable-beneficial use of water, that the use will not interfere with any presently existing legal use, and is consistent with the public interest (Section 373.223, F.S.). In order to demonstrate that a water use is reasonable-beneficial, KUA must show a “need” for the water.

The rules of the South Florida Water Management District, *Basis of Review for Water Use Permit Applications within the South Florida Water Management District*, amended February 13, 2008, write that the demonstration of “need” requires consideration of 1) legal control over the project site and 2) compatibility of the proposed water use with the land use at the project site.

KUA requests groundwater withdrawals from the Upper Floridan Aquifer to support operations at the Cane Island Power Park (CIPP) power plant, Unit 4. KUA believes that the following discussion demonstrates that the groundwater quantity requested is needed, and is a reasonable-beneficial use of groundwater

Demonstration of Need

Legal Control Over Project Site

See Attachment A, Warranty Deed.

Legal Control Over Withdrawal Facilities

There are six existing wells at the CIPP that currently provide water to Units 1 through 3. KUA proposes five new groundwater wells to the Upper Floridan Aquifer to provide groundwater for use with the addition of Unit 4. Withdrawal facilities for Unit 4 will consist of a metered groundwater pump at each of the five proposed groundwater wells. All withdrawal facilities and groundwater wells are located on the CIPP property. Except for one well and its associated well house, the withdrawal facilities and the groundwater wells will be located within the fenced confines of the CIPP property. The withdrawal facilities at each groundwater well will be secured with locks and will only be accessible by KUA or FMPA employees working at the CIPP. The withdrawal facilities and groundwater will be utilized solely by CIPP for the useful life of the CIPP. KUA and FMPA will prohibit the use of the withdrawal facilities by any other entity unless legally transferred.

Compatible Land Use

The CIPP occupies 1,027 acres of land in Section 29, as well as a portion of Section 32, Township 25 South, Range 28 East, in Osceola County. Unit 4 will be a new unit located

to the north of Unit 3. Approximately 164 acres have been permitted for power development and support facilities at the CIPP.

The CIPP was zoned for agricultural use prior to purchase by KUA. The entire property was approved for industrial use in 1993 by the Osceola Board of Commissioners, and KUA was issued a 30 year Conditional Use Permit (CU/SDP 92-86) authorizing power plant construction and operation on the property. The permit expires in 2023, however, use of the property in an industrial capacity is consistent with the current elements of the Osceola County Comprehensive Plan.

Osceola County future land use maps indicate no change in the anticipated zoning pattern for the CIPP site or the adjacent land area in the future, confirming that the CIPP site will continue to be compatible with the predominant land use in the immediate project vicinity. Because the land surrounding the site is not developed, the construction of Unit 4 will not create any negative visual impacts or disturb any residential areas

Demonstration of Demand

Groundwater Allocation Request

Listed below are the quantities of groundwater withdrawals authorized for CIPP Units 1 through 3. Also listed are the quantities of groundwater withdrawals required to support normal operation and backup cooling tower makeup operation of CIPP Unit 4. The two listings are totaled; revised withdrawal authorization numbers requested are presented.

Operating Conditions as Noted Below	Number of Days per Year	Unit 1 through 3 Daily Flow, MGD	Unit 4 Daily Flow, MGD	New Total Daily Flow, MGD
Process Flows				
1	323.25	0.22	0.134	0.354
2	12	0.55	0.134	0.684
3	30	0.78	0.134	0.914
Emergency Cooling Flows				
4	30	2.865	2.786	5.651

Operating Conditions:

1. Operation of all units on natural gas.
2. Operation of Units 1 and 2 on fuel oil and Units 3 and 4 on natural gas.
3. Operation of Units 1, 2 and 3 on fuel oil and Unit 4 on natural gas.

The revised total annual water withdrawal requested is calculated as follows (note maximum annual withdrawal will occur in a leap year):

Total maximum annual withdrawal = $0.354 \times 324 + 0.684 \times 12 + 0.914 \times 30 + 5.651 \times 30 = \underline{\underline{\mathbf{319.8\ MGY}}}$

CIPP and Industrial Groundwater Use

In a demonstration to use Florida groundwater resources efficiently and reduce the quantity of groundwater withdrawals requested for the CIPP Unit 4, KUA proposes to extend the current use of the lowest water quality possible (treated wastewater effluent) as the primary source for the major water use at the site, cooling tower makeup water. The existing Units 2 and 3 (Unit 1 does not have an evaporative cooling tower) are currently taking wastewater effluent from the Tohopekaliga (Toho) Water Authority effluent pipeline. This use will be extended to include the new Unit 4.

Many small scale independent water treatment systems serve a small network of customers within the impact area. If a customer does not have access to a small water treatment network, potable water service is typically provided by either a local municipality (e.g.: Kissimmee, Orlando, St. Cloud) or Florida Water Services, Inc. The Toho Water Authority is the local water provider serving the corporate limits of Kissimmee as well as parts of central and Northwest Osceola County. The Toho Authority produces, treats, and distributes approximately 22.5 million gallons per day of potable water and treats approximately 12 million gallons of wastewater per day for its customers. It currently serves 45,000 water, 40,000 wastewater and 7,000 reclaimed water customers. Toho Water Authority maintains 500 miles of water mains, 466 miles of sewer mains as well as 84 miles of reclaimed water mains and has a staff of 135 employees.

The Toho Water Authority owns and operates eleven water and six wastewater plants. It has distributed public access reuse water since 1992 to selected parts of the service area. As indicated on the Water Mass Balance for Units 1- 4 (Attachment B-2 and B-3), re-use water use for Units 1 through 4 totals approximately 5.9 million gallons per day (mgd). The Unit 4 cooling tower makeup water source will primarily be reuse water piped in and provided by the Toho Water Authority, as for Units 2 and 3 (Unit 1 does not have an evaporative cooling tower). However, should the Toho Water Authority supply be unavailable or inadequate, four new onsite wells are being proposed to provide backup cooling tower makeup water supply. As shown on Water Mass Balance for Unit 4 only (Attachment B-1), a maximum of approximately 2.8 mgd of cooling tower makeup is expected to be required for Unit 4.

Potable and process water (service water, evaporative cooler makeup water, demineralization system supply water, and fire protection water for Unit 4 will be supplied from the existing CIPP service water system which will be upgraded. This system currently provides chlorinated well water from two existing onsite wells that are required to meet the Units 1 through 3 potable and process water demand. The process and potable water system demand for Unit 4 will be approximately 134,000 gpd when firing natural gas. Unit 4 will not be fired on fuel oil. A new well will be provided to supplement the existing two wells, and the chlorination system capacity will be increased as required to support the addition of Unit 4 and the total process and potable water needs of Units 1 through 4.

Additional process water-related equipment and facilities will be installed with Unit 4. Fire protection water and service water will be stored onsite in two new fire water/service water storage tanks. The new fire protection water system will interconnect with the existing site fire protection system, and will include two new fire water storage tanks to provide two independent dedicated fire water supply sources, two fire water pumps, a hydrant system, dry-pipe sprinkler or foam system for the steam turbine generator lube oil piping, and other fire protection systems in accordance with National Fire Protection Association (NFPA) recommendations. The two new combined service water and fire water storage tanks will each have a capacity of 500,000 gallons and a reserve capacity of 300,000 gallons dedicated to fire water. The new fire water pumps will each be capable of supplying 2,000 to 2,500 gallons per minute (gpm) of water to the systems. Demineralized water will be provided from the existing water treatment system for steam cycle makeup. A new demineralized water tank will be installed.

Re-use water from the Toho Water Authority will normally be the source of cooling tower makeup water for Unit 4. Groundwater from four proposed wells is being requested for use as a source of temporary cooling tower makeup when the Toho Water Authority effluent pipeline is offline and when Toho Water Authority is unable to supply adequate quantities of treated effluent. The new wells will be sized to provide the normal required water flow for the cooling tower makeup for Unit 4 at full load conditions. Groundwater to serve as a backup makeup water source is being requested for up to 30 days per year, at a rate of 2.786 MGD to allow continued operation of Unit 4 if there are disruptions in the water supply from the sewage treatment plant, such as water quality upsets or outages in the transfer pump and piping system. Although these latter scenarios are highly unlikely, if they should occur, any groundwater withdrawals are required to allow continued operation of Unit 4. Groundwater modeling is discussed in Section 5.3.2 of the Site Certification Application. The anticipated groundwater quality is identified in Table 1.

Table 1 Typical Water Quality Reclaimed Water and Well Water Supplies			
Constituent	Reuse Water*	Well Water**	
Calcium, mg/L as CaCO ₃	115	68	
Magnesium, mg/L as CaCO ₃	43	29	
Sodium, mg/L as CaCO ₃	156	6	
Potassium, mg/L as CaCO ₃	22	1	
Alkalinity, mg/L as CaCO ₃	131	70	
Sulfate, mg/L as CaCO ₃	35	6	
Chloride, mg/L as CaCO ₃	116	10	
Silica, mg/L as SiO ₂	21	14	
Total dissolved solids, mg/L	417	119	
* Based on samples taking of the present reuse water inflow to CIPP during June 2007.			
** Based on data from existing Floridan Aquifer wells 1 and 2 onsite.			

Water Conservation Plans

KUA will prepare a Water Conservation Plan to support the water use request post-site certification and prior to Unit 4 operation.

Demand Components

For CIPP Unit 4 individually, and Units 1, 2 3 and 4 together, the water mass balance diagrams (Attachment B-1, and Attachments B-2 and B-3, respectively) depicting the natural gas case and fuel oil case that results in maximum water consumption are discussed in Section 3 of the *Site Certification Application* for the CIPP. The water mass balances represent operation at 100 percent load at average ambient conditions and indicate the water source, system use, flow rates, and wastewater streams.

Water Resource Evaluations

Reclaimed Water Reuse Criteria

As previously discussed, the treated sewage effluent (reclaimed water) will be used for cooling tower makeup water. The reclaimed water will be provided by the Toho Water Authority Effluent Pipeline

The area in which CIPP is located has not been designated a Critical Water Supply Problem Area pursuant to Chapter 40E-23. The SFWMD rules require that when reclaimed water is readily available it must be used in place of higher quality water sources, unless it is demonstrated by the applicant that its use is either not environmentally, economically, or technically feasible. In determining whether reclaimed water is readily available, the SFWMD considers the following factors:

A. Whether a suitable source of reclaimed water exists.

A suitable source of reclaimed water exists for use as cooling tower makeup. The source is not suitable for potable water and process water without significant additional treatment.

B. Whether the source is offered to or controlled by the KUA.

The Toho Water Authority and KUA have an agreement regarding the delivery, use, and return of reclaimed wastewater for use as cooling tower makeup.

C. Whether the Applicant is capable of accessing the source through distribution lines.

The Toho Water Authority's reclaimed water supply pipeline is accessible on the CIPP project site.

Reclaimed Water Reuse Requirements

The South Florida Water Management District, *Basis of Review for Water Use Permit Applications within the South Florida Water Management District*, amended February 13, 2008, embraces the use of reclaimed water provided by domestic wastewater

treatment plants as environmentally acceptable and without threat to public health and safety. A significant portion (approximately 95%) of KUA's water use for Unit 4 will be supplied using reclaimed water.

Mandatory Reclaimed Water Zones: The CIPP is located outside of the mandatory reclaimed water zone.

Environmental Feasibility: The use of reclaimed water is environmentally feasible for the CIPP Unit 4. Secondary-level treated reclaimed water from the Toho Water Authority will be used to supply cooling tower makeup for the CIPP Unit 4. Estimated water quality of the treated effluent is provided in Table 1. The treated effluent will meet all of the requirements of Chapter 62-610, Part III, F.A.C.

Technical Feasibility: Maximum water demand for cooling tower makeup of the CIPP Unit 4 under full load and average annual conditions will be approximately 2,786,000 gpd. Estimated reclaimed wastewater flow from Toho Water Authority of 3.1 mgd is available for use during maximum load and worst case ambient conditions. Therefore adequate reuse water supplies will be available for the cooling water needs for CIPP Unit 4. It is not economically feasible to treat the reuse water for the minimal higher water quality requirements.

Economic Feasibility: Water reuse is economically feasible with the Toho Water Authority Effluent Pipeline accessible to the CIPP site.

Unanticipated Loss of Reclaimed Water Supply: Groundwater is being requested to serve as a backup makeup water source for up to 30 days per year (2.786 mgd) if there are any disruptions in the water supply from the Toho Water Authority or supply is inadequate for short periods of time. This is requested in accordance with Chapter 3.0, Section 3.2.3.3 Unanticipated Loss of Reclaimed Water Supply of the South Florida Water Management District, *Basis of Review for Water Use Permit Applications within the South Florida Water Management District*, amended February 13, 2008.