

# Palm Coast, FL Case Study

*“Color Reduction from RO Concentrate.  
A case study for the City of Palm Coast,  
Florida WTP #3”*



Pinnacle Ozone's Summit 10X system selected by the City of Palm Coast, FL for WTP #3 facility. RO system concentrate stream reduced from 62 true color units (TCU) to less than 30 TCU for drinking water.

**OWNER:**

Palm Coast WTP #3  
City of Palm Coast, Florida

**ENGINEER:**

CPH Engineers, Inc.

**CONTRACTOR:**

Sawcross, Inc.

**APPLICATION:**

Color Removal from RO Concentrate

**OZONE PLATFORM:**

Summit™ 10X  
160 lb./d

**SCOPE OF SUPPLY:**

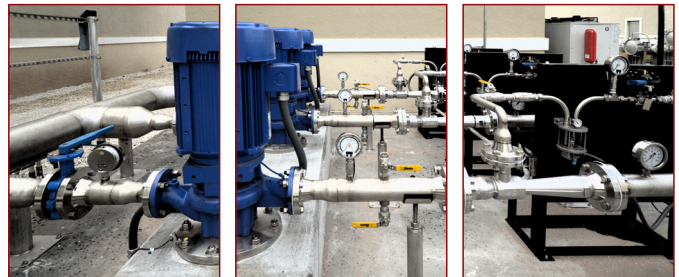
One Summit™ 10X O<sub>3</sub> Generator  
Master Control Panel  
Oxygen Generator  
10 ton chiller  
Injection System  
O<sub>3</sub> off gas destruct

**CAPACITY:**

520 GPM

**START DATE:**

February 2014



**Summary**

In the fall of 2014, the City of Palm Coast, FL installed a new Pinnacle Summit™ Series ozone system. The purpose of the system is to reduce the organic based color of the low pressure RO system concentrate stream. In an innovative and unique treatment application, this ozone pre-treated concentrate stream is directed to the City's lime softening facility and processed as an alternative water source. This process allows the recovery and treatment of up to 750,000 gallons per day of alternative water supply that otherwise would have been discharged to waste. Pinnacle technology was selected based on its ability to offer the greatest functionality and lowest total lifetime cost. In the fall of 2012 several oxidative treatment processes were piloted in an effort to reduce concentrate color. The City saw immediate results and chose Pinnacle following the pilot testing. The new system allows ozone production to precisely match real-time demand via seamless automatic control of the ozone generator platform and three injection process trains using Pinnacle's **Ozone-On-Demand™** controls. Initial testing indicates the new ozone system has exceeded performance goals and expectations.

## Background

The City of Palm Coast was experiencing elevated color in the concentrate stream being directed to the lime softening facility to recover as drinking water. In an effort to meet secondary color standards at the lime plant, this water quality issue limited the volume of the concentrate able to be recovered. City staff and CPH Engineers identified  $O_3$  as a potential method to reduce color from the concentrate stream. Pilot testing was conducted in the fall of 2012 / spring 2013. The testing demonstrated that



Figure 2 - Pinnacle Ozone pre installation site visit in 2012.

## Approach

Pinnacle worked closely with City staff and the engineers at CPH to develop a comprehensive ozone system for this project. Pinnacle provided pilot equipment and process optimization services to prove design specifications for the application. Then, Pinnacle provided an integrated design approach for the entire ozone process. The final design included an onsite oxygen generator, Pinnacle's modular Summit™ ozone generator, closed loop chiller system, venturi based ozone injection system, and ozone off gas destruct system.



Figure 4 - Process trains, chiller, VSA  $O_2$ , and ozone building.



Figure 3 - Pinnacle Ozone injector process trains in late 2014.

$O_3$  could effectively address color issues and improve concentrate quality to the lime plant and was the lowest cost alternative for treatment. Budget and schedule issues were significant challenges in the project in order for the City to receive Florida Department of Environmental Protection and St. Johns River Water Management District grant funding.

A unique aspect of the project is controlling ozone dose using both dissolved ozone and dissolved color. The dissolved ozone probes provide control of the ozone injection process, however, the dissolved color meter provides the final compliance point and allows for automatic adjustment of the ozone dose. The integrated system automatically adapts and compensates for changes in concentrate water quality from the plant.



Figure 5 - Summit 10X configured for 160 PPD production.



Another significant challenge to the project was budget and schedule. In order to qualify for available Florida Department of Environmental Protection and St. Johns River Water Management District grant funding, the City needed to complete the entire ozone project in less than six months. Pinnacle was able to manufacture and deliver all of the equipment for the ozone process within 6 weeks of receiving the purchase order. By working closely with the contractor Sawcross, Inc, Pinnacle was able to deliver the project within the schedule needed to receive grant funding.

## Results

In preliminary startup and testing, initial results of the ozone treatment system have met and exceeded performance goals. Pinnacle provided a complete and fully integrated ozone system including an onsite oxygen generation system, side stream injection, closed loop chiller, and an off gas ozone destruct unit. The entire system was delivered and substantially completed in less than 12 weeks in order to meet the deadlines for project funding.

### Written By:

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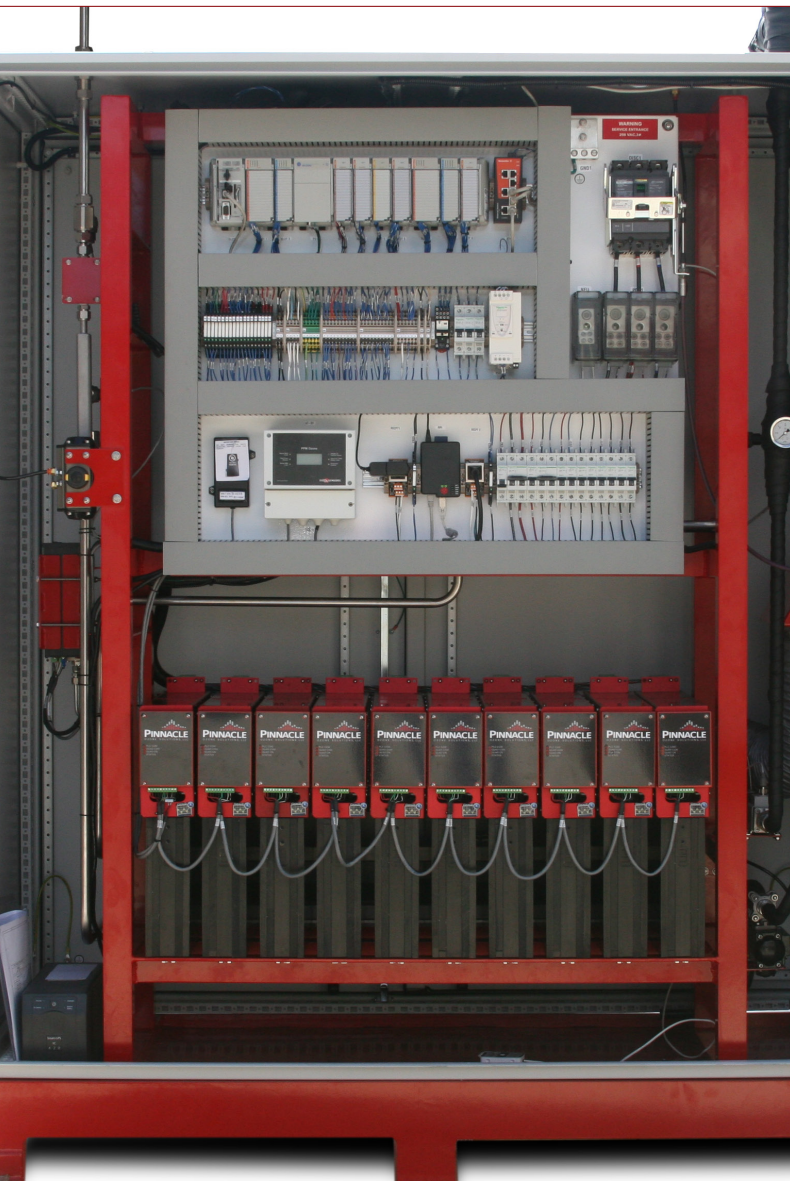
*Peter Roussell, Utility Systems Chief Operator*

*(All above with the City of Palm Coast, FL)*

*Lucida Xu, Senior Engineer, CPH Engineers, Inc.*

*Louis LeBrun, PE is Vice President of Pinnacle Ozone Solutions. Mr. LeBrun has over 20 years experience in water and wastewater process engineering across a wide range of industries and applications.*

*Thoram Charanda is the Director of Research & Development for Pinnacle Ozone's line of ozone systems. Mr. Charanda has over 22 years of experience in applied ozone chemistry research and system engineering and design.*



**Figure 6** - Ten QuadBlocks installed inside Summit 10X.