

# WASTEWATER case study 99-1

## Ocala, FL

### Spray Field Utilizes Senninger i-Wobs for Effluent Application



Project:  
Land Application  
Treatment

Engineer:  
CH<sub>2</sub>M Hill/In-House  
Ocala, FL

Products:  
• Senninger i-Wob® with  
lower threaded weight  
• Senninger PSR  
(Pivot-Special  
Regulator™)

Sprinklers Installed:  
December 1997



**P**opulation growth puts ever-increasing demands on current wastewater disposal methods. This makes the search for alternative methods a high priority. The City of Ocala, Florida was faced with this dilemma. After researching several methods, the city decided upon land application through spray irrigation.

*The City of Ocala utilizes land application technology to irrigate at the Perry spray field. Application devices include the Senninger i-Wob® with the threaded lower weight and the PSR™ pressure regulator.*



There are 8 pumps that handle all of the irrigation needs for the entire project.

# System Design

The city's engineers in cooperation with CH<sub>2</sub>M Hill, city water and sewer consultant, designed the land application system. It was designed with a daily discharge rate of 5.4 million gallons per day with the capacity to treat effluent to levels of 20 parts per million of total soluble solids and 20 parts per million biochemical oxygen demand. Currently the land application rate is about 1 to 1½ inches per week.

Effluent is pumped eight miles via 24-inch pipe from the treatment plant to the holding pond at the application site. There are a total of eight pumps to operate the solid set and center pivot systems.

Total site acreage is 917 acres with the following breakdown:  
 3.7 acres USDA Natural Resource Conservation Service  
 20.0 acres Tree Nursery  
 535.0 acres Hay Field

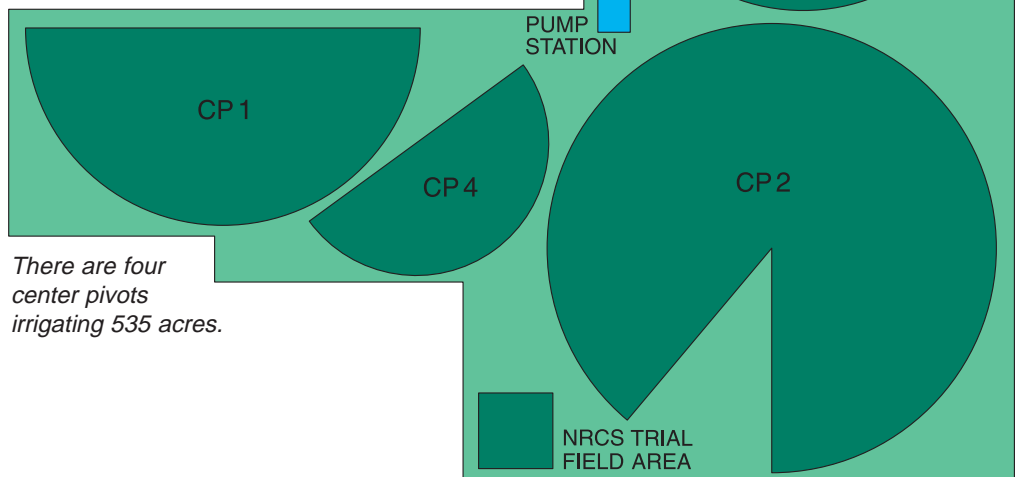
The balance of irrigated acreage is comprised of large volume fixed guns.



The holding pond capacity is 15.3 million gallons.

The Natural Resource Conservation Service (NRCS) has also established a trial field area growing various grass crops. The purpose of this trial is to determine the impact of reuse water on the nutrient value of the crops. Irrigated hay fields are planted with Bermuda grass and cattle graze them for a portion of the year. A tree farm has also been established by a local nurseryman utilizing the reuse water.

Center Pivot 1  
 10-tower machine ....irrigates 94.4 acres  
 Center Pivot 2  
 13-tower machine.....irrigates 241 acres  
 Center Pivot 3  
 12-tower machine.....irrigates 150 acres  
 Center Pivot 4  
 6-tower machine.....irrigates 50 acres



There are four center pivots irrigating 535 acres.



## Installation

The land treatment design called for the use of center pivots for application of effluent to the hay field portion of the application site. The system was installed in 1993 with 360° spray heads. The management of waterborne solids to reduce clogging is always a challenge. Nozzle clogging negatively impacts uniformity of coverage thus reducing the effectiveness of fertigation.

In 1997 the Senninger Irrigation engineering department met with the staff at the spray field. Using a computer-aided design program, they developed a sprinkler package that addressed those needs. By employing the new i-Wob and PSR regulator, this new package reduced problems with clogging and increased uniformity. An additional advantage was the reduction in labor management that was previously involved in regular sprinkler maintenance.

A total of four pivots are used to spray over 535 acres. A gooseneck is threaded into the top of the main line pipe of the center pivot. Then a rigid section of pipe is threaded into the goose neck followed by a two-foot section of flexible hose. A PSR pressure regulator is next. The i-Wob is threaded into the regulator followed by a 3/4 pound weight attached to the bottom of the i-Wob.

The i-Wob's unique off-center rotary-action provides an extremely uniform distribution pattern while maintaining a very low instantaneous application rate. It throws water much farther than spray nozzles with stationary deflector pads (nearly 60 ft. in diameter when mounted beneath the truss rods). The weight at the bottom of the sprinkling device means less stress on drops, a simplified, faster drop installation and reduced surface area requiring less weight than conventional drop weights.

The PSR regulator maintains a constant preset outlet pressure while handling inlet pressures up to 150 psi and can withstand severe water hammer. It offers improved corrosion resistance because there are no screws or exposed steel components. The PSR has a greater self-flushing design on the downstream outlet for better clog resistance when used in poor quality water conditions.



*i-Wob features:*

- △ *unique off-center rotary-action for an extremely uniform distribution pattern and a low instantaneous application rate*
- △ *resistance to the abrasive wear common to harsh land treatment environments – the moving parts are protected from abrasion by an extremely resilient wear-sleeve which cushions contact surfaces*
- △ *a unique design to accommodate a weight threaded into the lower portion of the bracket – provides less stress on drops; simplified, faster drop installation; reduced surface area meaning less weight is required*



## Summary

This facility has proved to be an excellent model for land application using Senninger i-Wob's and PSR's on center pivots. The City of Ocala has found a successful means by which to use effluent water.

Sprinklers Installed .....	December 1997	System Capacity .....	5.4 mil gal day
Crop .....	various grass crops	Storage Pond Capacity....	15.3 mil gal
Site Acreage (pivot).....	535 acres	Center Pivots .....	4 machines
Total Acreage .....	917 acres	Application.....	1 to 1 <sup>1</sup> / <sub>2</sub> " per wk



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