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Cayce, South Carolina Waste Water Treatment Plant Mem-TAD™ Case Study

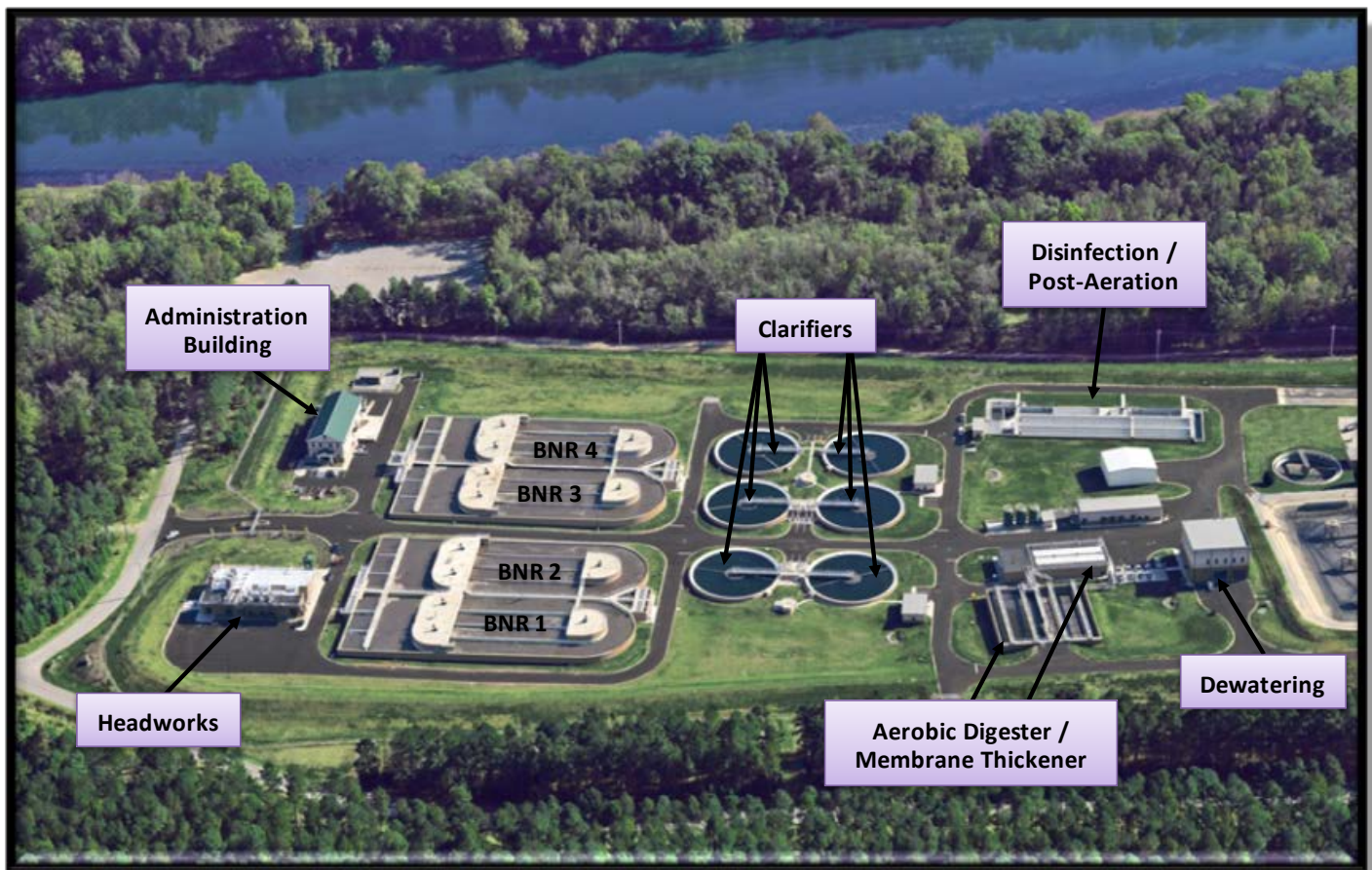
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Background

American Engineering Consultants, Inc. was contracted by the City of Cayce, South Carolina to design a new 25 MGD wastewater treatment facility. The construction of this plant began on December 2009 and commissioned on October 2012. The Cayce WWTP is obligated to meet a total Phosphorus NPDES effluent limit of 1 mg/L. The liquid treatment process is a Biological Nutrient Removal (BNR) Carrousel® system and is followed by a membrane thickening aerobic digestion solids handling process. The total construction costs for this facility was \$54 Million (\$2.17 per gallon treated).

Figure 1: Cayce, SC WWTP



Design Criteria of the Solids Handling System

The design criteria of the solids handling process was to complement the BNR Carrousel system, minimize phosphorus release in side stream flow, and the expense to remove it twice, reduce operating cost, and to minimize chemical. The **Membrane Thickening Aerobic Digestion (Mem-TAD™)** system met all of these objectives and was selected. Other solids handling systems that were

considered were anaerobic digestion and conventional aerobic digestion. There were concerns with biological phosphorus release during decant cycles in a conventional aerobic digestion process and high phosphorus in side streams from anaerobic digestion systems.

Membrane Thickening Aerobic Digestion System

The advantages of the Mem-TAD system are as follows: thickening to 4% solids substantially reduced the footprint of process tanks, thickening is done continuously without polymers or other chemicals minimizing operating costs, the process provides Class B sludge stabilization, the process permits continuous aeration which eliminates decant cycles thus minimizing biological phosphorus release, and the permeate extracted from the membranes can be reused.

The Mem-TAD system at the Cayce WWTP consists of six membrane thickening basins, and two aerobic digestion tanks. The sludge is stabilized to Class B levels and is used as a soil conditioner and fertilizer. The permeate extracted from the membranes of this system is a source of non-potable water for use in irrigation and process applications. This eliminates chemical phosphorus removal from side stream flow. Since the membrane thickening aerobic digestion system was commissioned in October 2012 the phosphorus concentration in the permeate has been consistently 2 mg/L or less.

Figure 2: Cayce, SC WWTP Mem-TAD™ System

