An Integrated Water Management Strategy for Power Generation: A Central Georgia Case Study

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Proposed Plant Washington

- 850-megawatt, coal-fired, base-load power plant
- Sponsored by Power4Georgians, a consortium of Georgia EMCs
- High-efficiency, “supercritical” thermodynamic design…more power and lower emissions per pound of coal burned
- 1600-acre plant site in Washington County about 5 miles northeast of Sandersville, Georgia…just below the “fall line”
2010 Population Density (Total Population: 9,687,653)
2050 Projected Population Density
Data Source: U.S. Census Bureau Data and State Projections (Total Population: 18,908,864)
Washington County, Georgia
Water Use Strategy

Innovative “conjunctive use” of surface water from the Oconee River with backup groundwater use from the Cretaceous aquifer system during seasonal low-flow periods

Water permits issued and finalized:
1. River withdrawal,
2. Groundwater withdrawal, and
3. NPDES discharge for non-contact cooling-tower blowdown

Plant-site wastewater and stormwater are captured and reused on site…no stormwater discharges
Water Use Strategy

Surface Water
Oconee River
(as available)

Groundwater
Cretaceous Aquifer

Dedicated Boiler Feed Water
and Potable Water
(0.12 MGD continuous)

Raw water storage basins

Water Treatment

Plant Washington
13.62 MGD avg.
16.12 MGD pk.

Discharge
Equalization Basin

Cooling Towers
(13.5 – 16.0 MGD)

Steam

Return 1.5 MGD

Oconee River
Oconee River Streamflow Availability

Streamflow in Cubic Feet per Second (cfs)

Month
Plant operation will depend on groundwater when storage volume is depleted to 60% capacity (~750 ac-ft).
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Groundwater Use Frequency Duration Analysis (Avant Mine gage record)
Water Supply “Yin and Yang”

- Average annual water withdrawal of 13.5 MGD with 1.5 MGD of cooling-tower blowdown continuously returned to the river for net consumptive use of 12 MGD but…
- River flows are not adversely impacted during critical drought conditions when groundwater is the backup source of plant water supply and…
- Groundwater aquifer storage recovers when river water is the source of supply, most of the time.
At the 3:40 PM session this afternoon, Neven Kresic will present the regional three-dimensional transient groundwater flow model developed to evaluate impacts of the proposed groundwater withdrawals and to select optimum locations and design parameters for the 16 Plant Washington water supply wells.