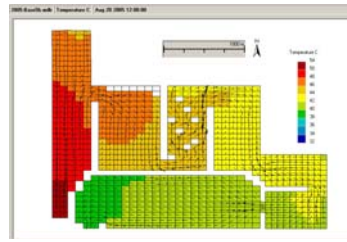


Intake Water Temperature Reduction Options Evaluation

Progress Energy, Hines Energy Complex, Florida



Situation

Hines Energy Complex currently consists of three natural gas-fueled combined-cycle power blocks to generate electricity. Three additional blocks are planned. Each block recirculates 120,000 gpm of cooling water and adds 20°F at their peak capacity to the adjacent cooling pond. Due to the condenser back pressure limitations at high intake temperatures and inadequate natural cooling in the pond, a supplemental cooling option (FSC) was designed to bring the intake water temperature down to below 97 F. The purpose of this study was to evaluate the cooling pond's performance under current and increased loads. Possible cooling pond modifications included pond expansion and the use of Fountain Spray Cooling (FSC) modules. Several simulations were performed to predict the pond's response to the possible addition of power blocks and to estimate the required number of FSC modules.

Approach

The Generalized Environmental Modeling System for Surfacewaters (GEMSS®) was used to model the cooling pond's response to the waste heat load. The modeling effort consisted of calibrating the model-predicted temperature to field data taken during the summer of 2005 and designed specifically for the modeling effort. The calibrated model was then used to predict the cooling pond's response to full capacity operations of the existing three power blocks and the addition of one, two, or three new power blocks.

Hines already owned 30 FSC modules placed near the discharge into the pond. Each FSC is capable of pumping 1000 gpm of water for supplemental evaporative cooling. Simulations were performed using the design parameters of

these existing FSCs to estimate the number of modules required to maintain intake water temperatures below 97 F under the increased heat loads provided by each additional power block.

Results

Under current conditions, the existing 30 FSC modules were found to lower the intake temperature to below 97 F when they are moved to the intake side of the pond with three power blocks in operation. For only one day during the simulation period did the intake water temperature surpass 97 F. Additional power blocks required additional modules to be placed near the intake to meet the temperature limit. The addition of one power block required a total of 280 modules, while the addition of three power blocks required a total of 560 modules.

The next phase of the project (on-going) is to perform a cost/benefit evaluation of the proposed expansion and to evaluate other supplemental cooling systems.

