Surface Water Pumps at Tims Ford Reservoir

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Objective: **Evaluate surface water pumps performance under several configuration layouts, pump sizes, and initial propeller velocities.**

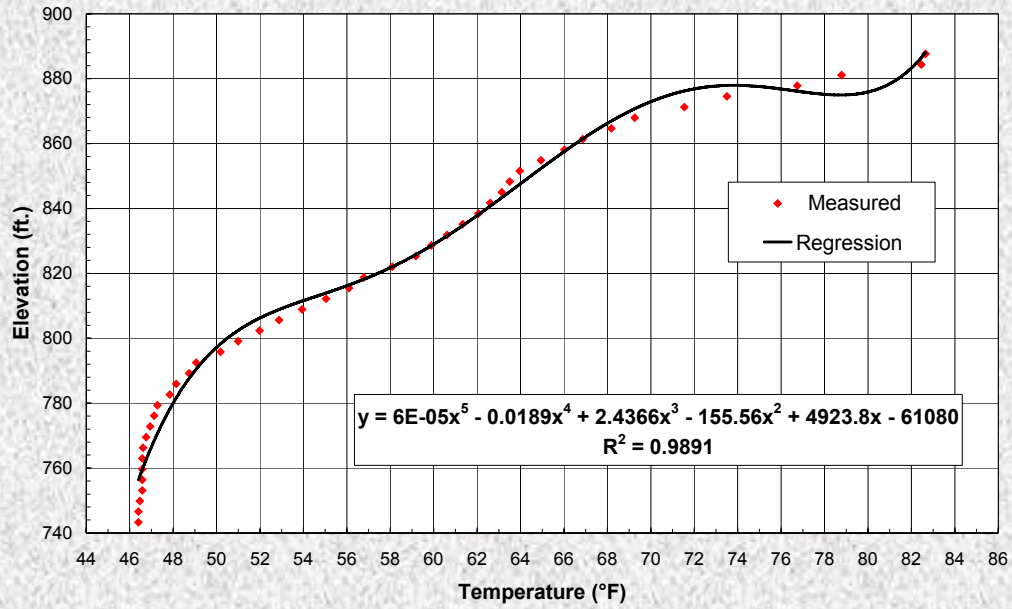
Goal: **Determine an optimum design that maximizes the improvement of water temperature and dissolved oxygen (DO) content in hydropower plant releases without disturbing reservoir bottom sediment.**

Tools: **A 3-dimensional Computational Fluid Dynamics (CFD) model, PHOENICS.**

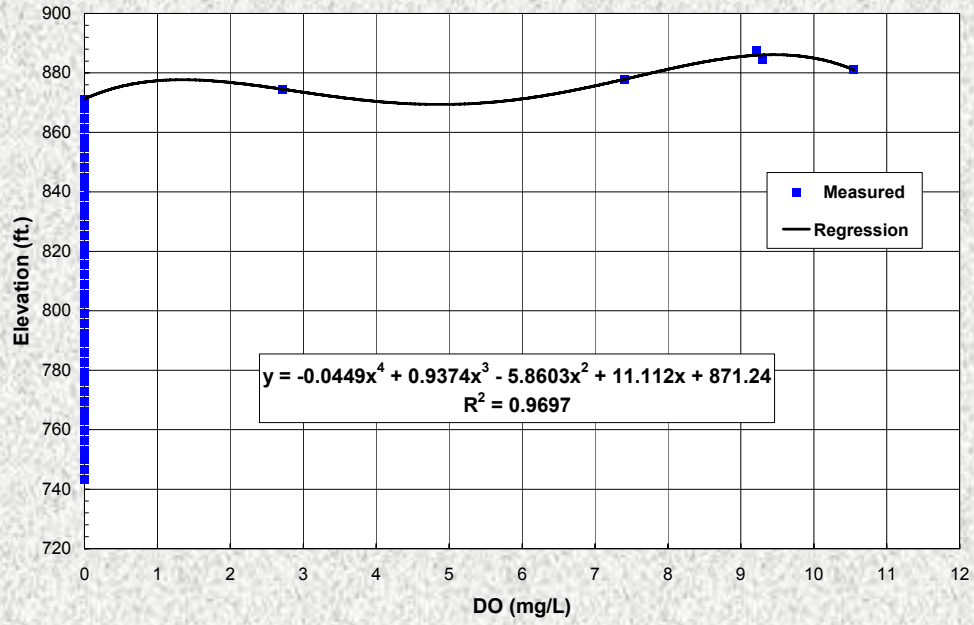
Alternatives: **Several modeling analysis for different locations, operating speed, with three and six pump layouts.**

surface-water pumps are being Used at Douglas and Cherokee Reservoirs

Impeller forces higher DO and warmer water at the surface down to the turbine intake

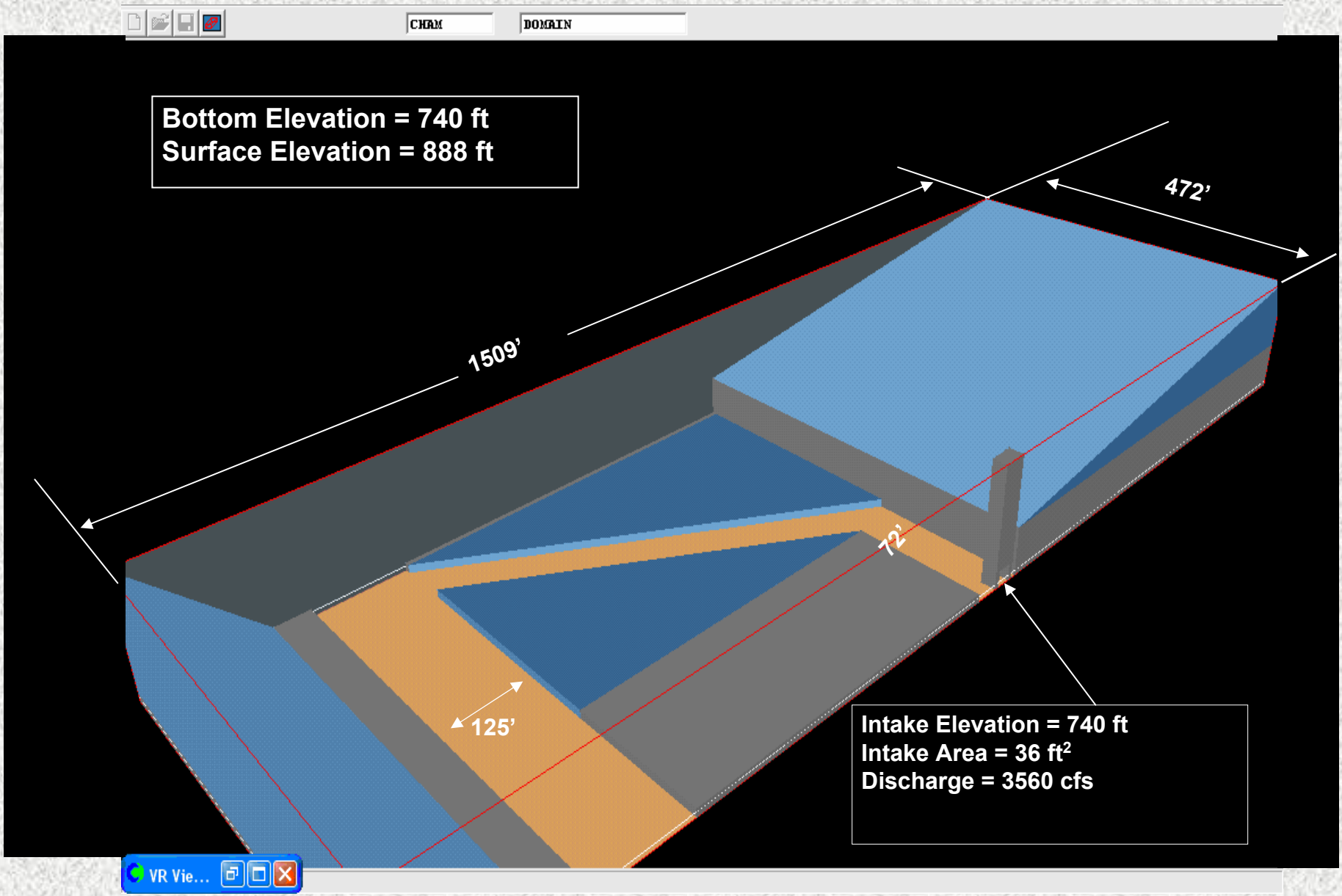


Forebay Measured Temperature

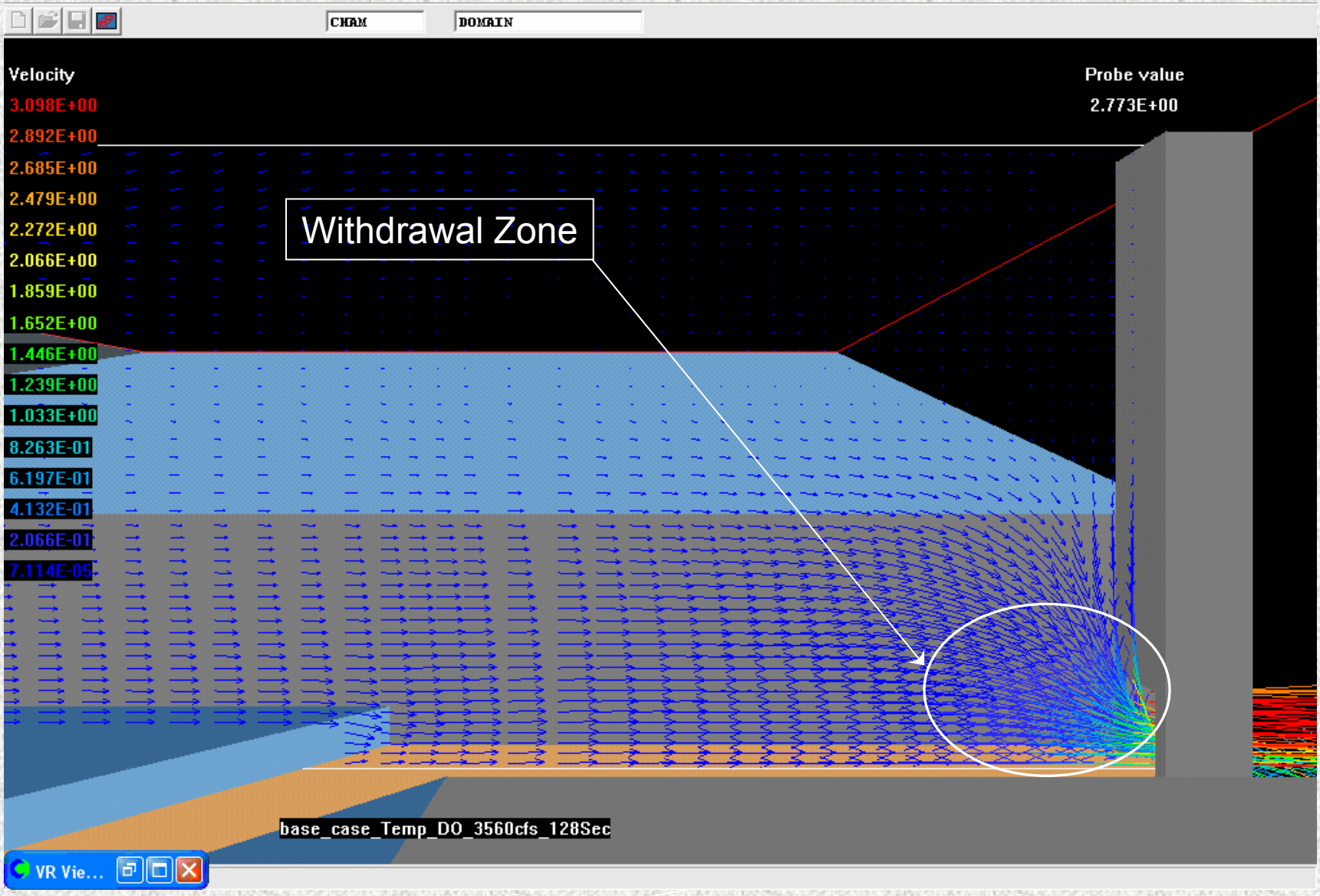


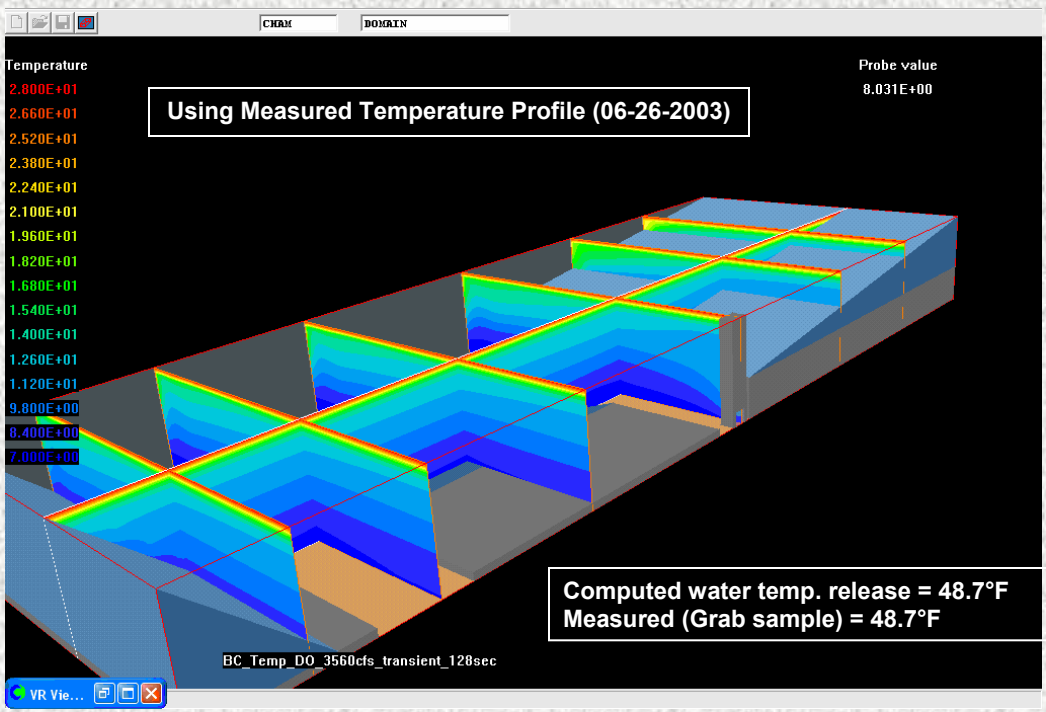
Forebay DO Profiles (6-26-03)

Model Layout (Base Case)

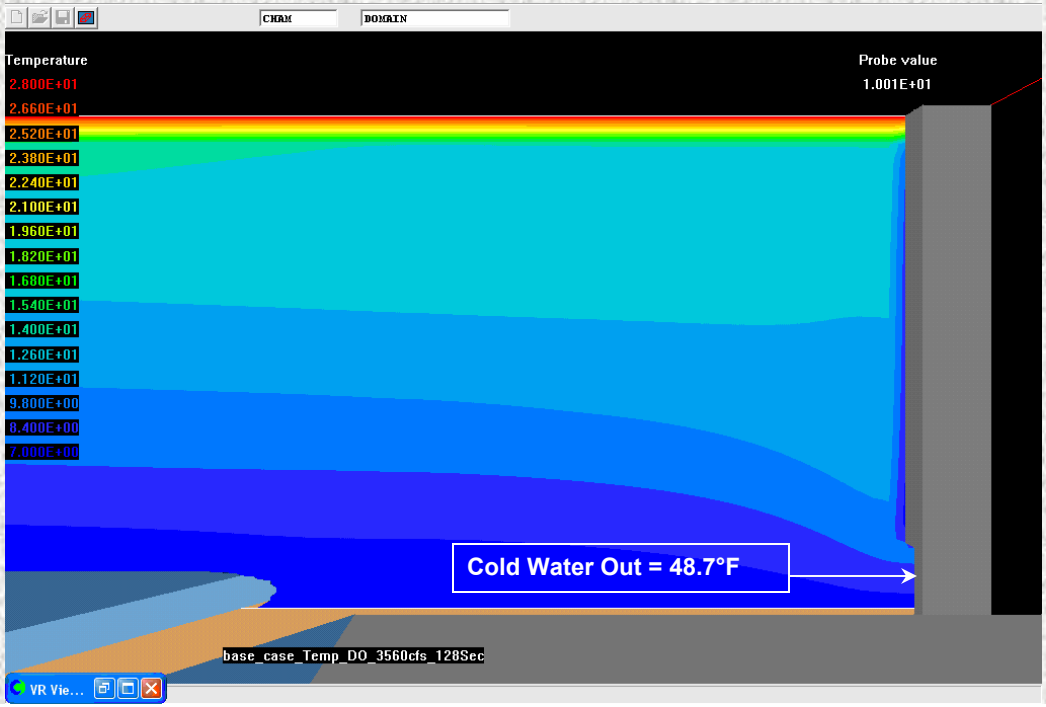


Velocity Vectors (Base Case)



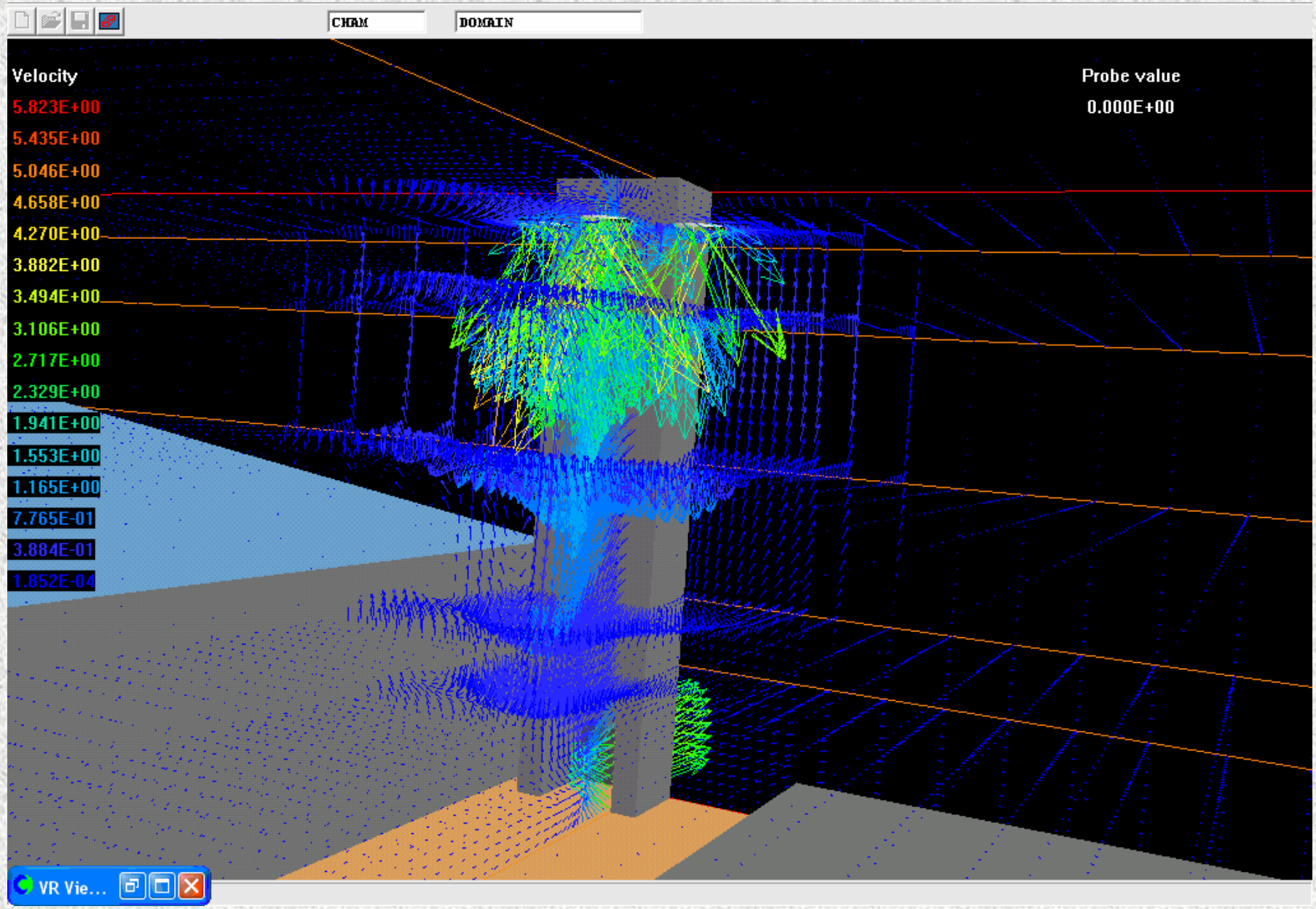


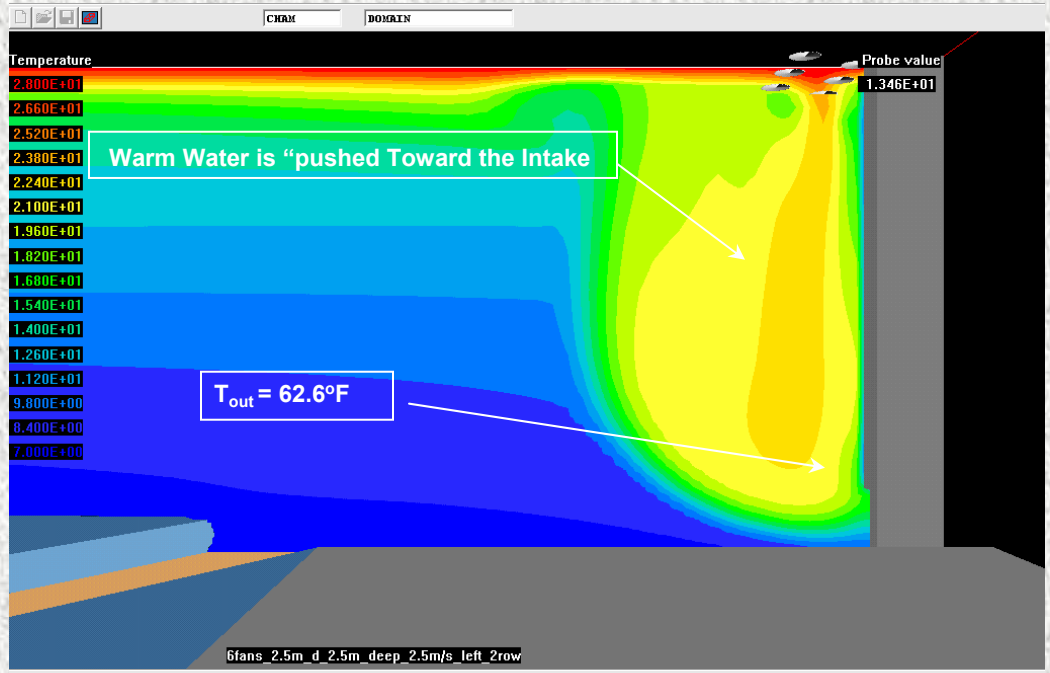
Numerical Domain

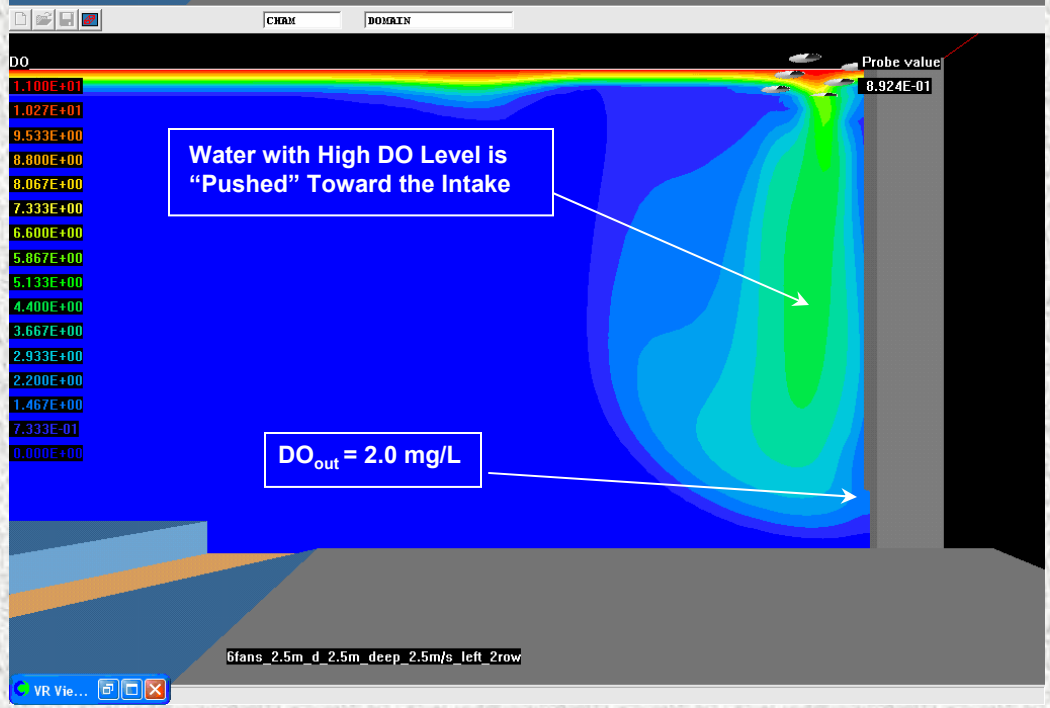


Close-Up

Velocity Vectors with Three Pumps







Computed Temperature at Intake Vertical Centerline (Six Pumps)

Computed DO at Intake Vertical Centerline (Six Pumps)

Recommendation

The option recommended is six 8-ft pump layout. Under the June 26, 2003, forebay profile, the water temperature release was improved by 10.3°F and the DO by 2.0 mg/L.