SouthEastern Power Administration

Downstream Water Quality Improvement

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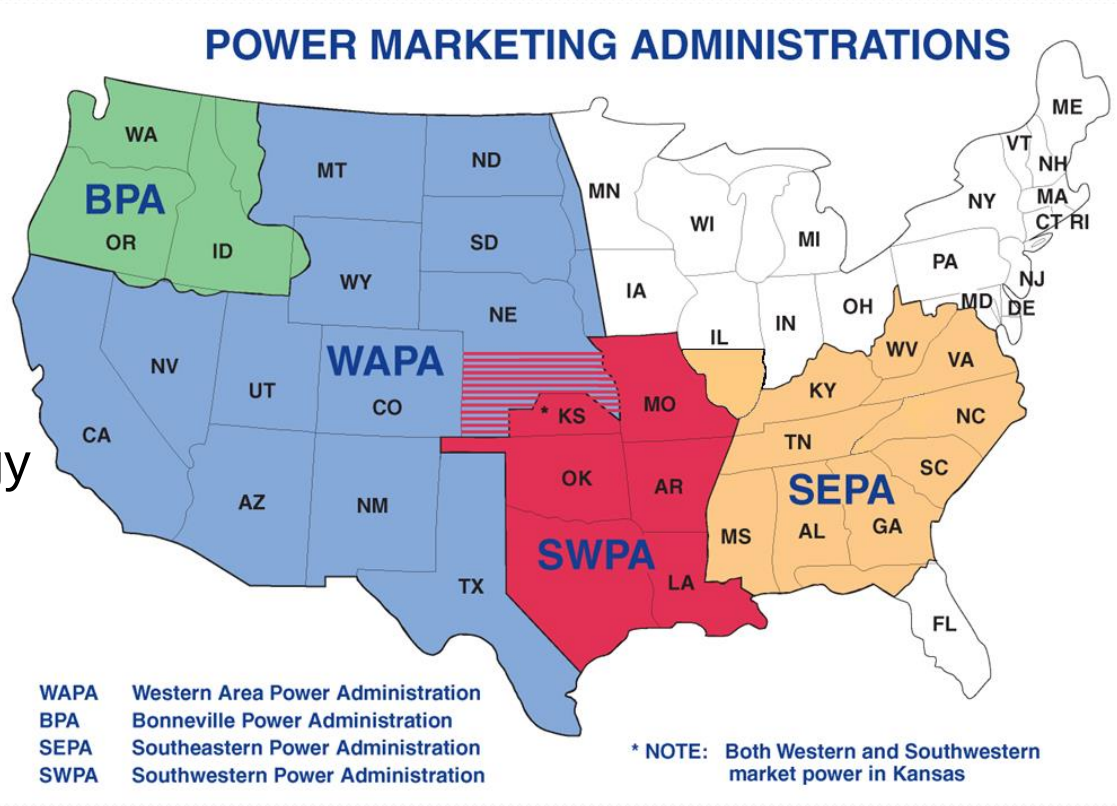
About SEPA:

- SEPA is one of four Power Marketing Administrations
  - Created in 1950
  - Under the U.S. Department of Energy since 1977
  - Headquartered in Elberton, GA
  - 44 employees



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Preference Customers: (Special legal standing allowing first option to purchase federal power. Customers distribute to end users. Small but significant portion of total customer need.)

Electric Cooperatives……196

Public Bodies……288

Investor Owned Utility (Duke Energy Florida)……1

TOTAL…… 485

Southeastern's wholesale customers serve more than 12 million consumers

Financial Data (2016):

Revenues ……$329 Million

Total Capital Investment……$ 2.7 Billion

Cumulative Investment Repaid……$ 1.1 Billion

Cumulative Interest Paid on Investment…… $ 2.2 Billion

Power sales repay an average of 67% of the total cost of 22 multi-purpose Projects

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About SEPA:

- Flood Control Act of 1944

  "…shall transmit and dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles…"

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About SEPA:

- Markets power generated at U.S. Army Corps of Engineers (USACE) multi-purpose projects:
  - Negotiate, prepare, execute and administer contracts involved in the delivery and sale of power
  - Perform balancing authority functions, water management interface, compile customer schedules and dispatch
  - Project purposes include navigation, flood control, hydropower, recreation, environmental stewardship

- Markets power to customers (public bodies and cooperatives) in 10 Southeastern States

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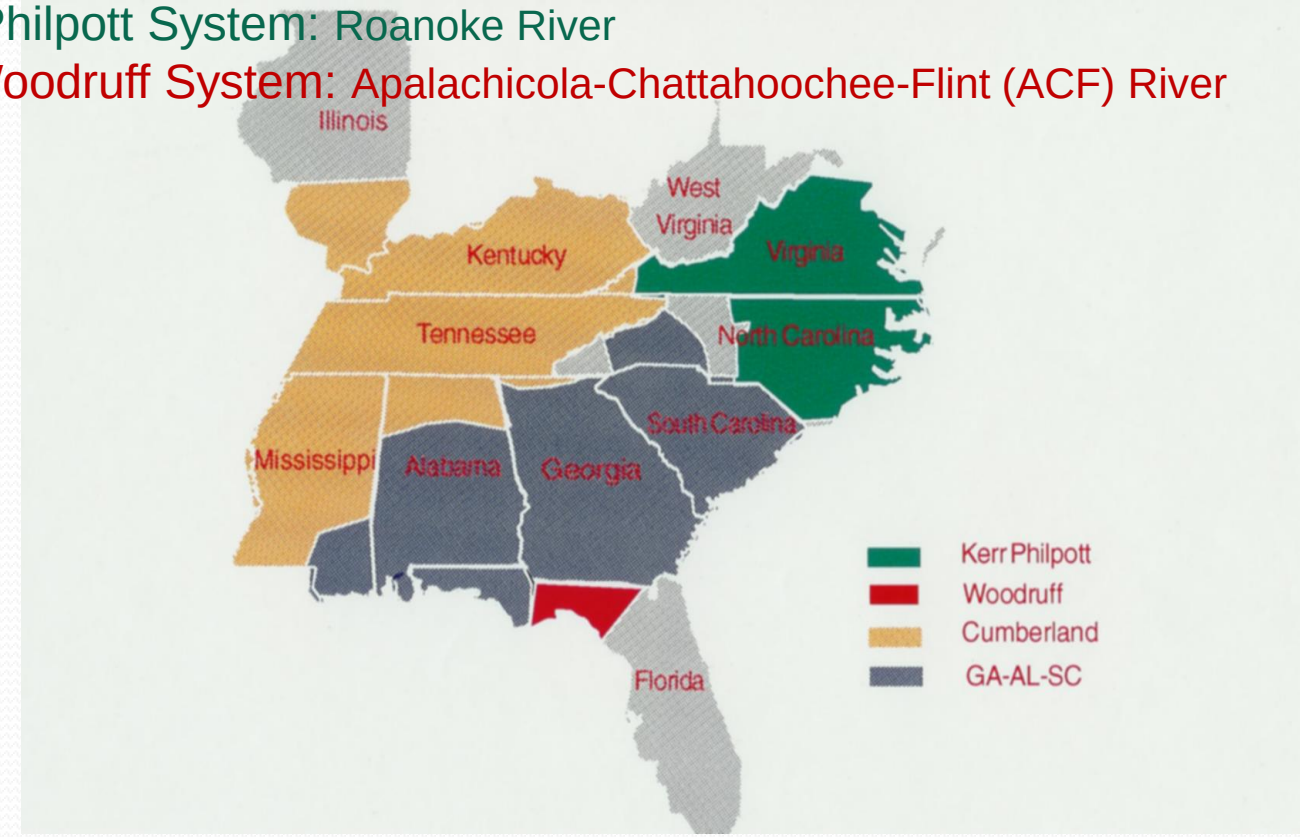
Four Marketing Systems:

- ✓Georgia-Alabama-South Carolina System: Savannah River, Alabama-Coosa-Tallapoosa (ACT) River, Apalachicola-Chattahoochee-Flint (ACF)
- ✓Cumberland System: Cumberland River
- ✓Kerr Philpott System: Roanoke River
- ✓Jim Woodruff System: Apalachicola-Chattahoochee-Flint (ACF) River



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Why improve discharge DO??

- Environmental Stewardship
- Maintain/Restore/Enhance
- Impoundment's Premier Environmental Target
- Private Industry FERC Relicensing
- Government’s Scrutiny Only a Matter of Time
- Positive, Proactive Strides
- Corps is #1 Environmental Electric Producer

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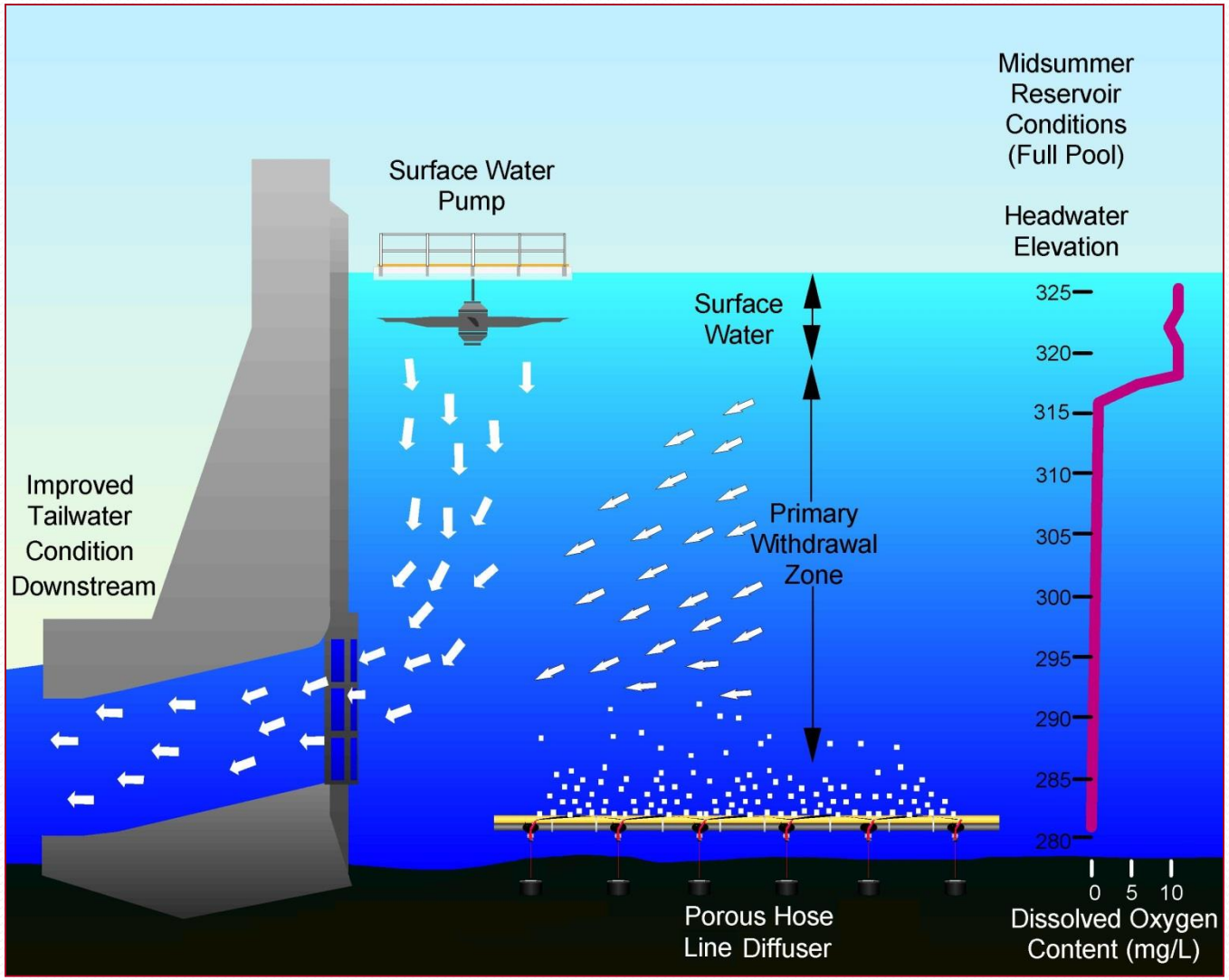

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Hartwell Lake and Powerplant

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- Hartwell
  - Four Venting Turbines Hub Baffle Installation
  - TVA R&D Studies, Engineering, Successes
  - $70,000 Military Interdepartmental Pay Request
  - Two Baffle Designs
  - Efficiency Reduction Testing
  - DO Improvement Monitoring

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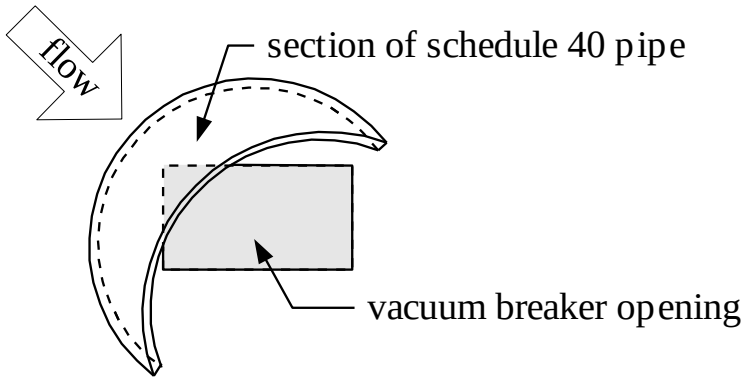

Streamlined Baffle

Venting Turbines

Hub Baffles

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- Hartwell
  - Installed by Hartwell Mechanical Staff
  - 4 of 5 Turbines Complete
  - 10” Headcover Air Admission
- John H Kerr
  - 6 of 7 Turbines Complete
  - Installed by TVA Mechanical Staff
  - Environmental Community Impressed

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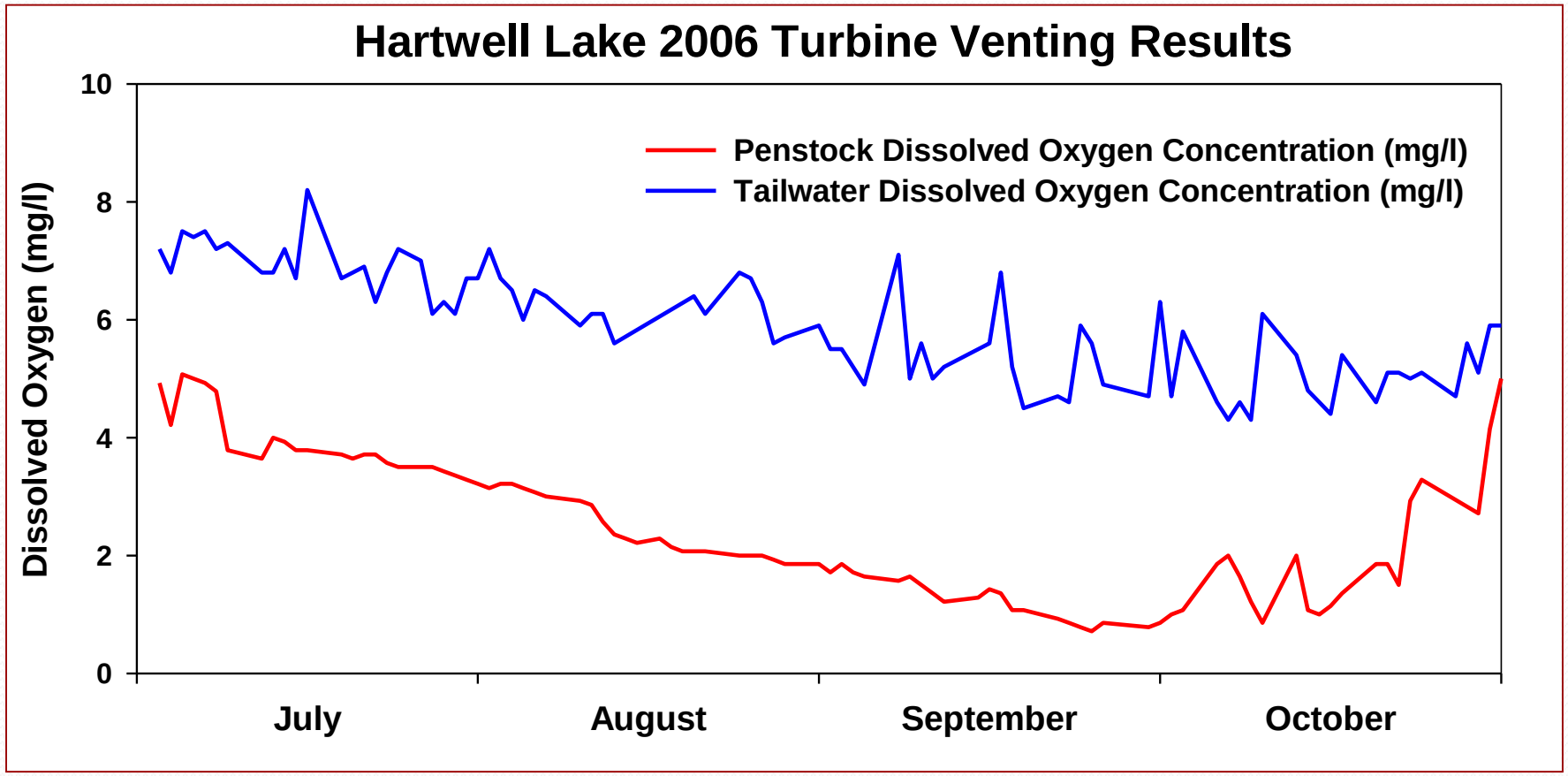

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Richard B Russell Lake and Powerplant

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- Richard B. Russell
  - Forebay Liquid Oxygen Aeration System Required
  - Original System Installed & Operational 1986
  - Efficiency Dependent on Intensive Maintenance
  - Line Diffusers, Improved Monitoring & Controls
  - Superior Efficiency, Lower O&M Cost

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Forebay Oxygen Injection Line Diffuser

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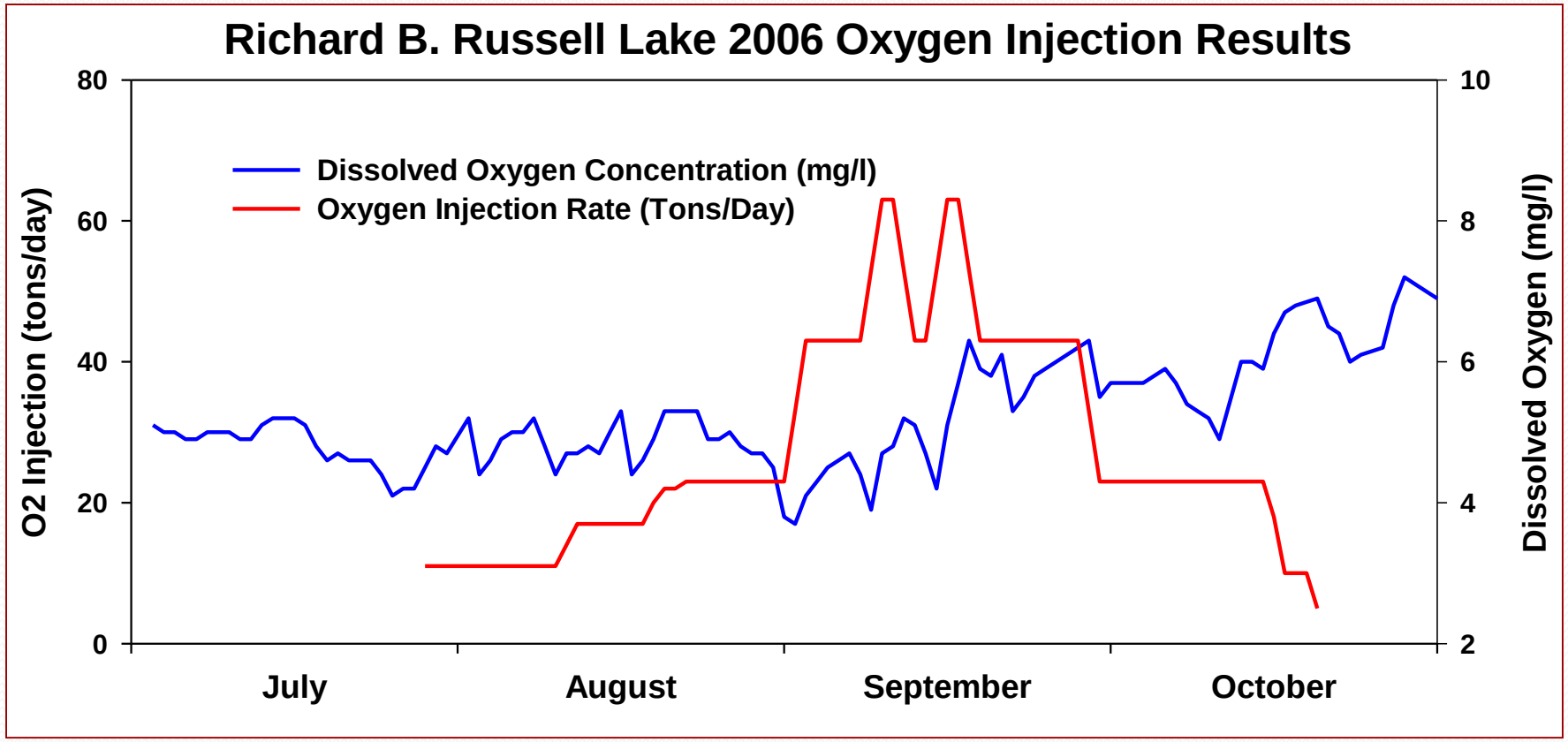

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Habitat Mitigation Oxygen Injection Line Diffuser

Upstream from Dam, 5½ miles, designed to maintain:

(1) Minimum of one mile of striped bass habitat in the system vicinity from June 1 to September 30;

(2) Minimum of four miles of enhanced deepwater habitat from June 1 to September 30; and

(3) Minimum of 3 mg/l dissolved oxygen at JST Dam intakes from June 1 until fall turnover (approximately November 1).

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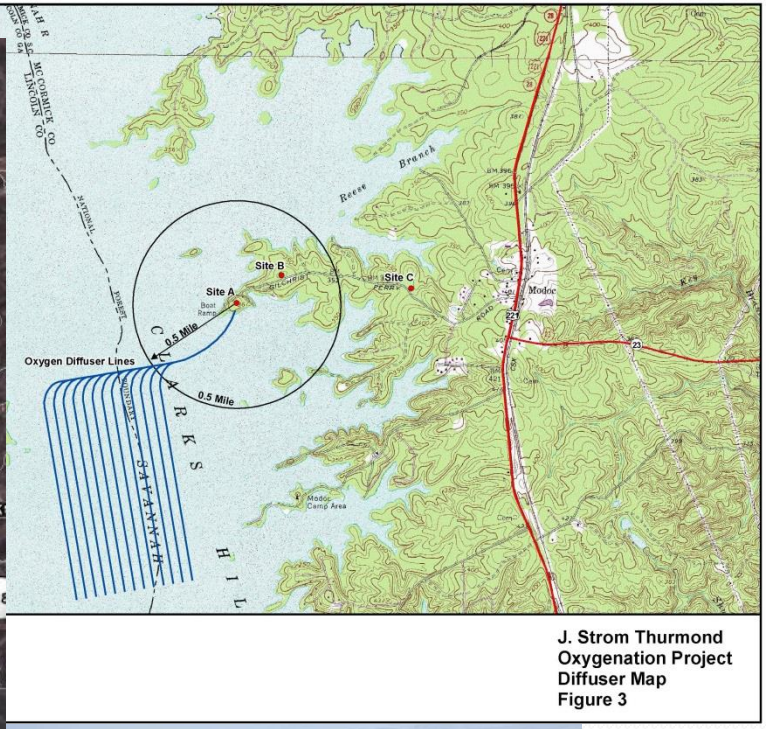

J. Strom Thurmond
Oxygenation Project
Diffuser Map
Figure 3

Habitat Mitigation

Oxygen Injection Line Diffuser

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J Strom Thurmond Lake and Powerplant

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- J. Strom Thurmond Rehabilitation
  - Efficiency Loss Justifies Replacement Turbines
  - Conventional Turbine Contract Awarded
  - Contractor Submits Aeration Proposal
  - Stop Work Order Issued
  - SAD & HQUSACE Approvals
  - Modification: Auto-Venting Turbine

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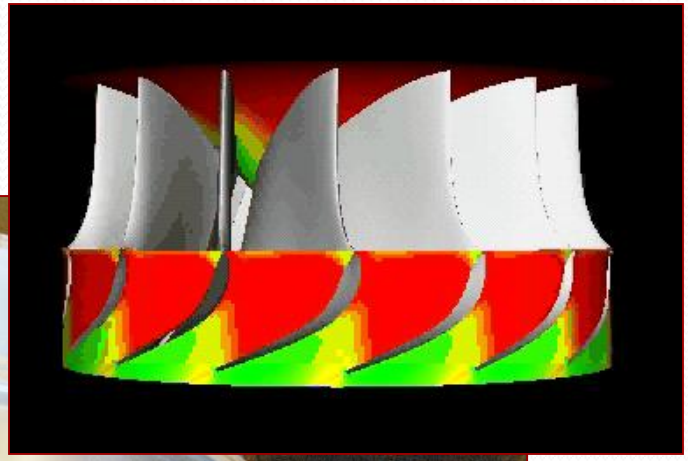

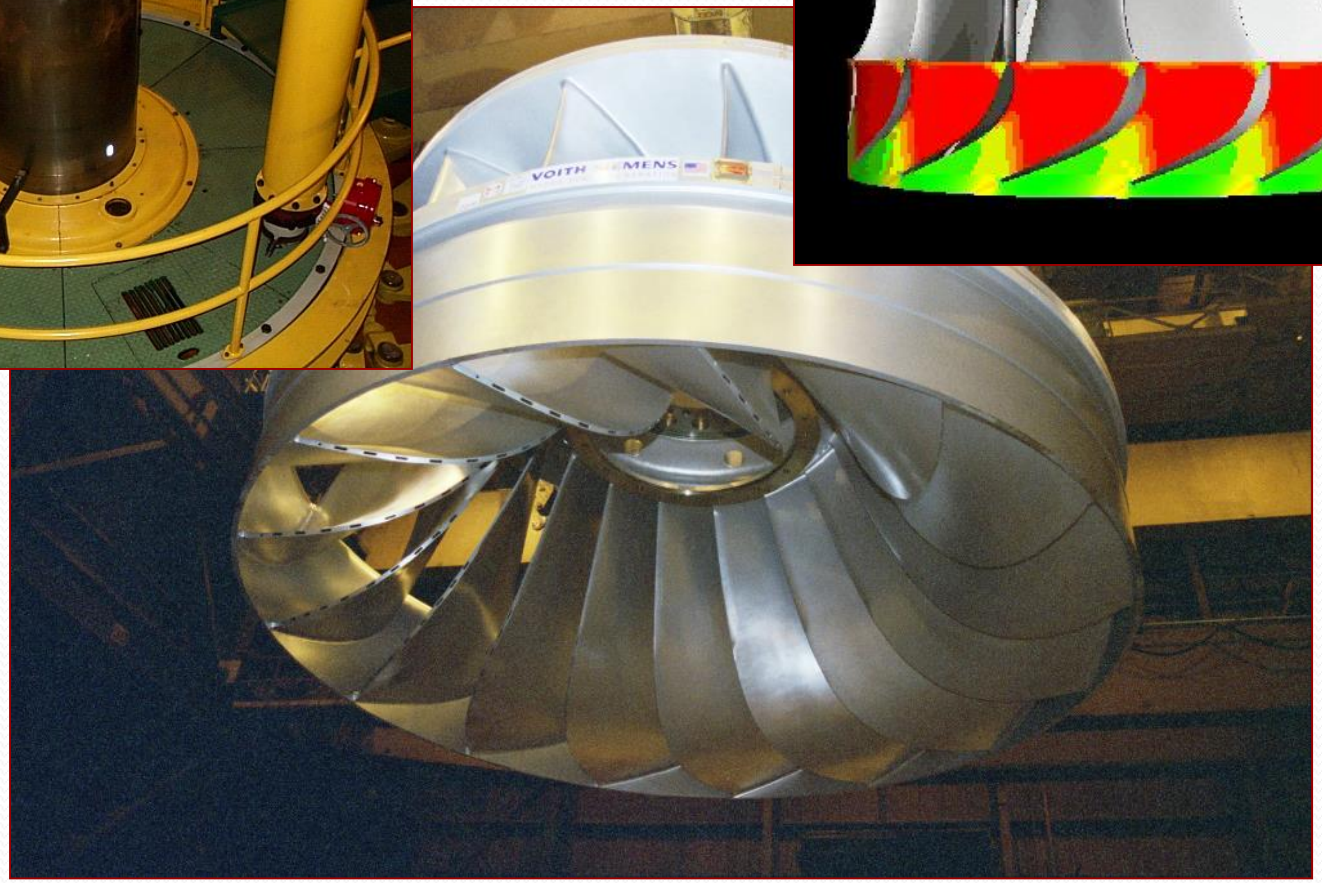

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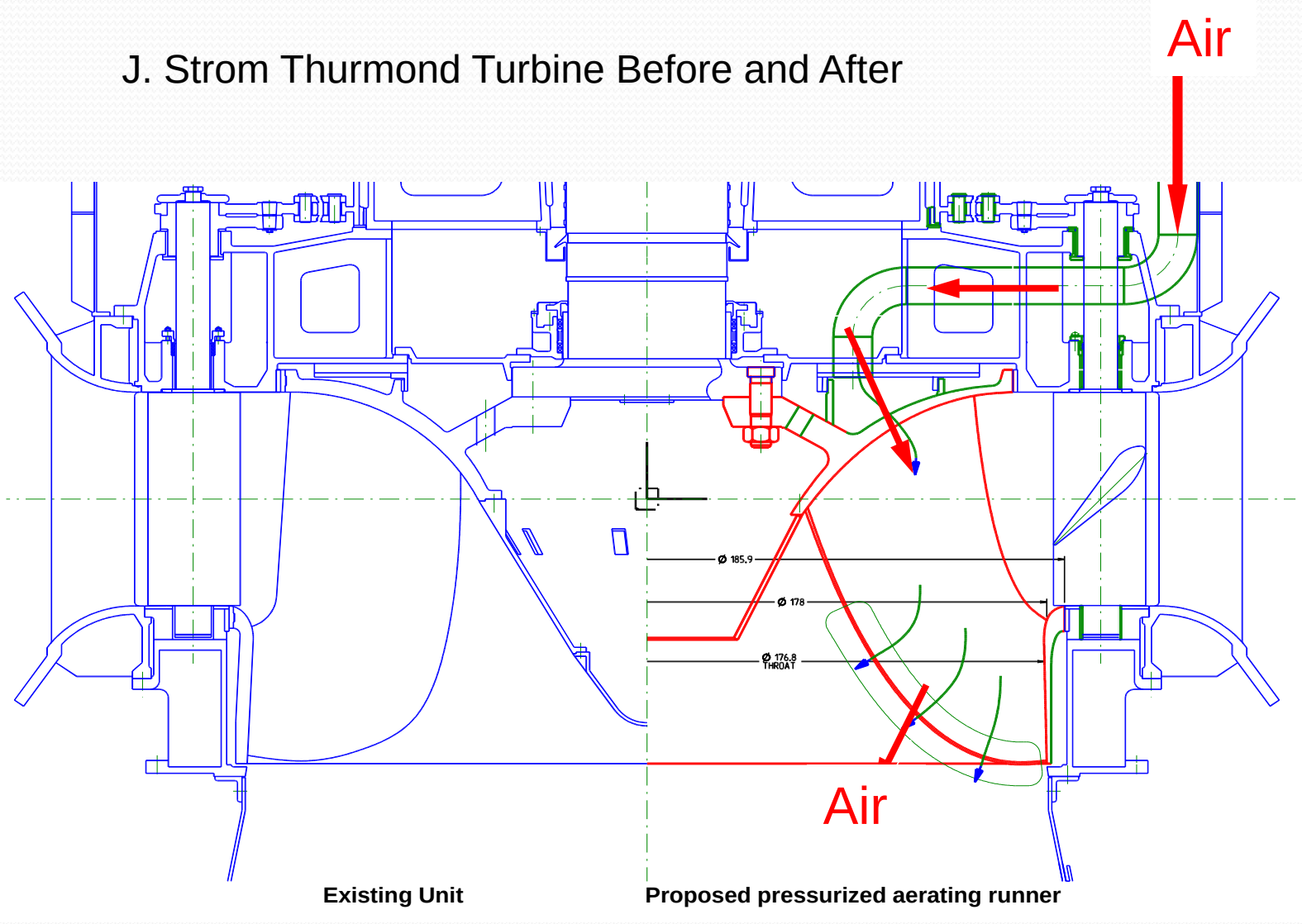
J. Strom Thurmond Turbine Before and After



Existing Unit **Proposed pressurized aerating runner**

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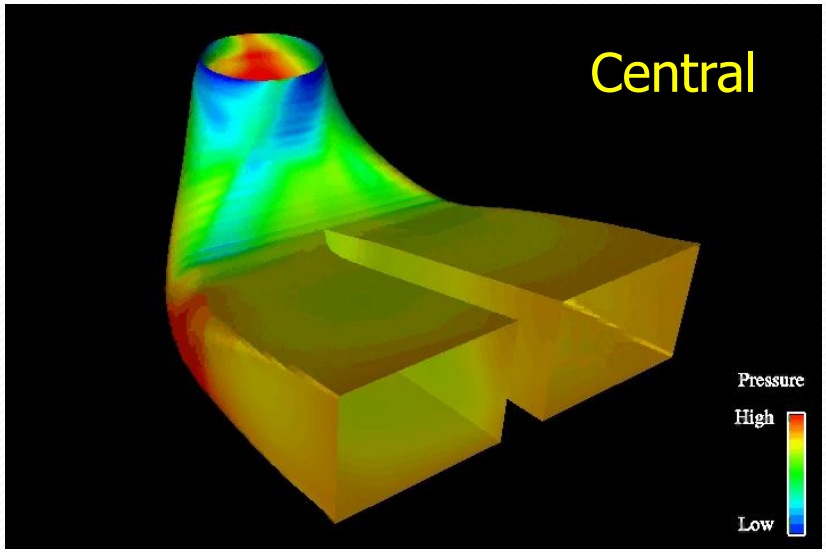
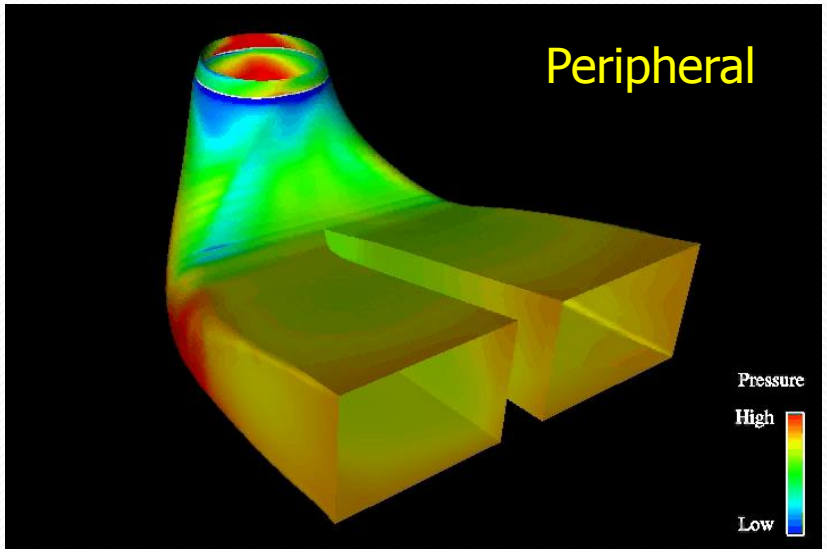
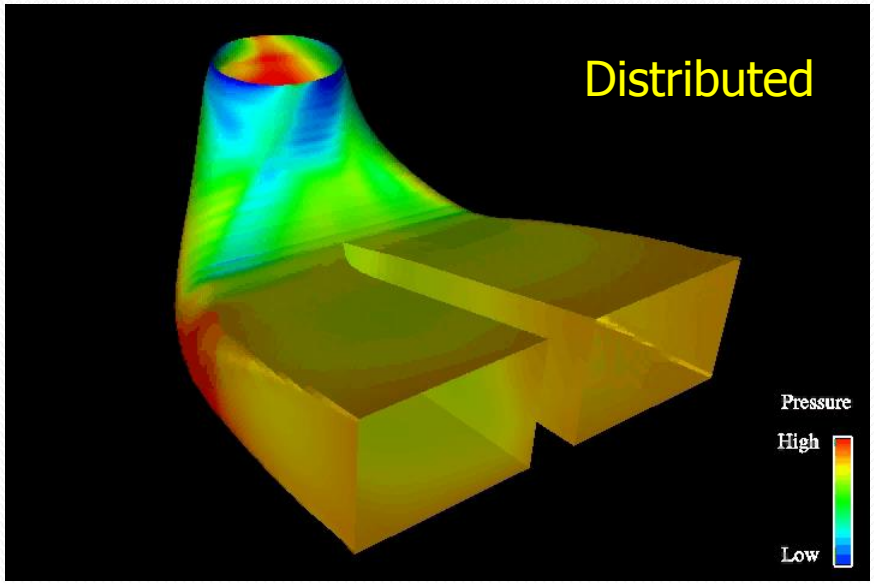




Air Distribution

Cross Sections



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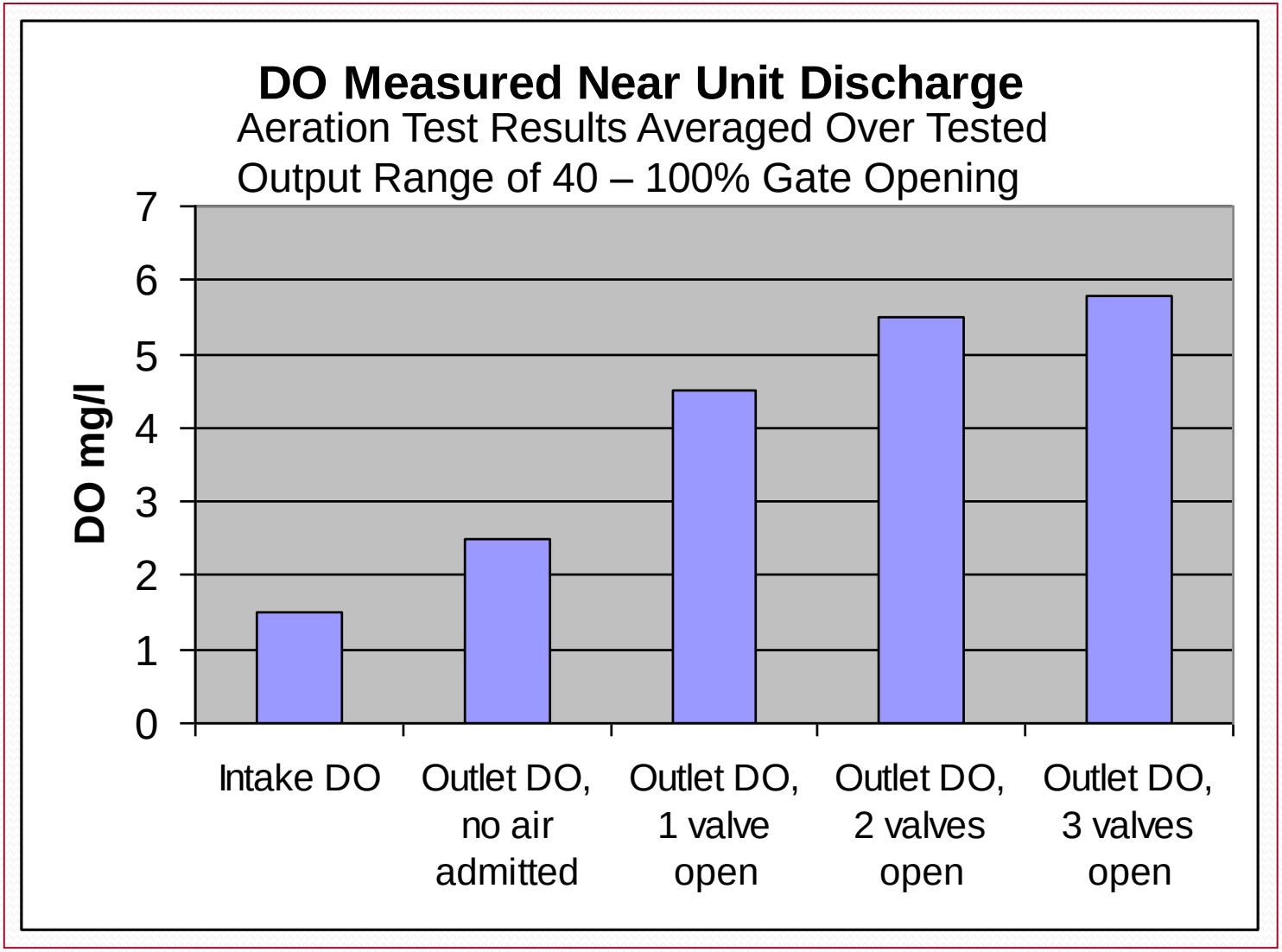

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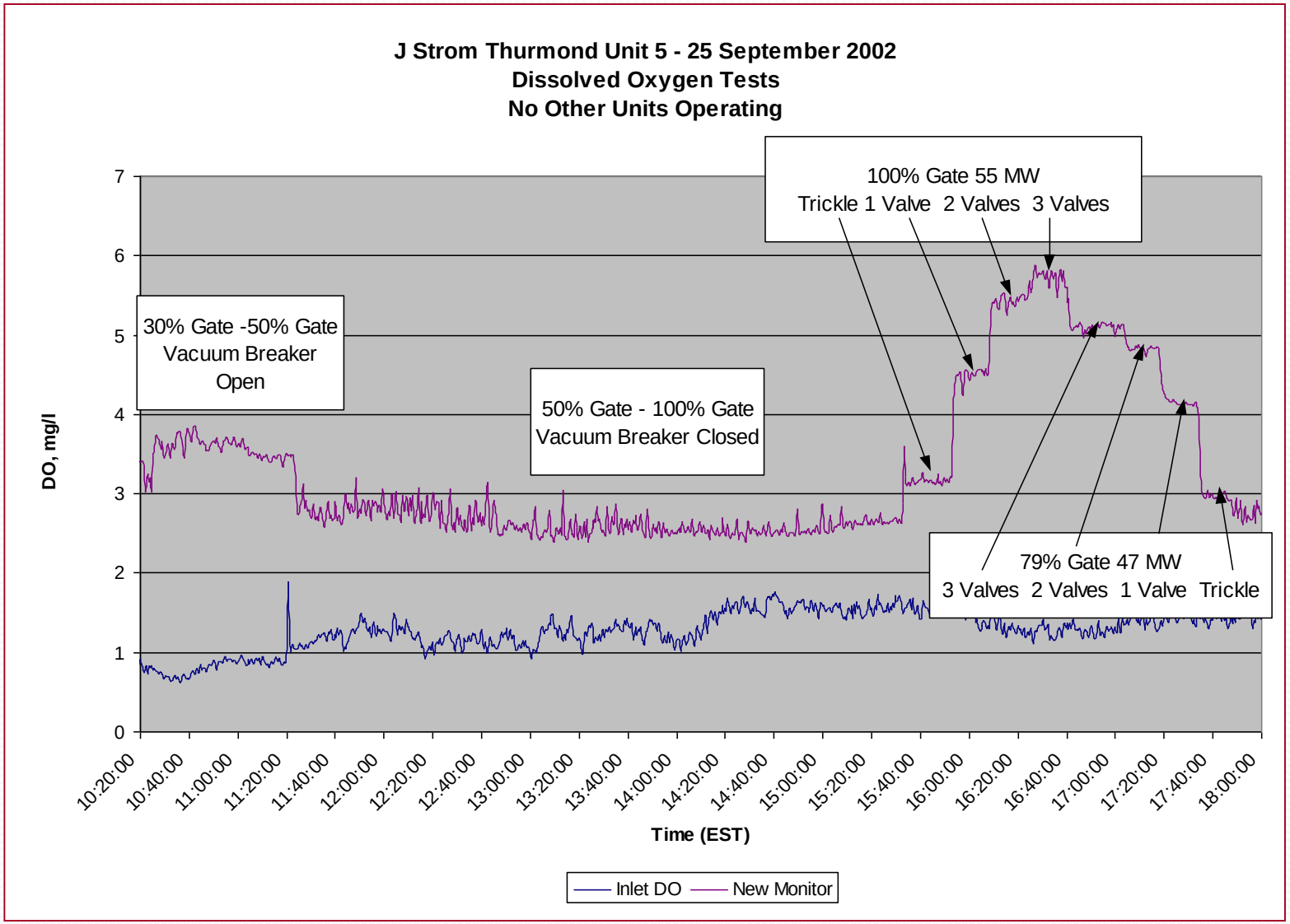

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J. Strom Thurmond Tailrace – To Aerate or Not To Aerate

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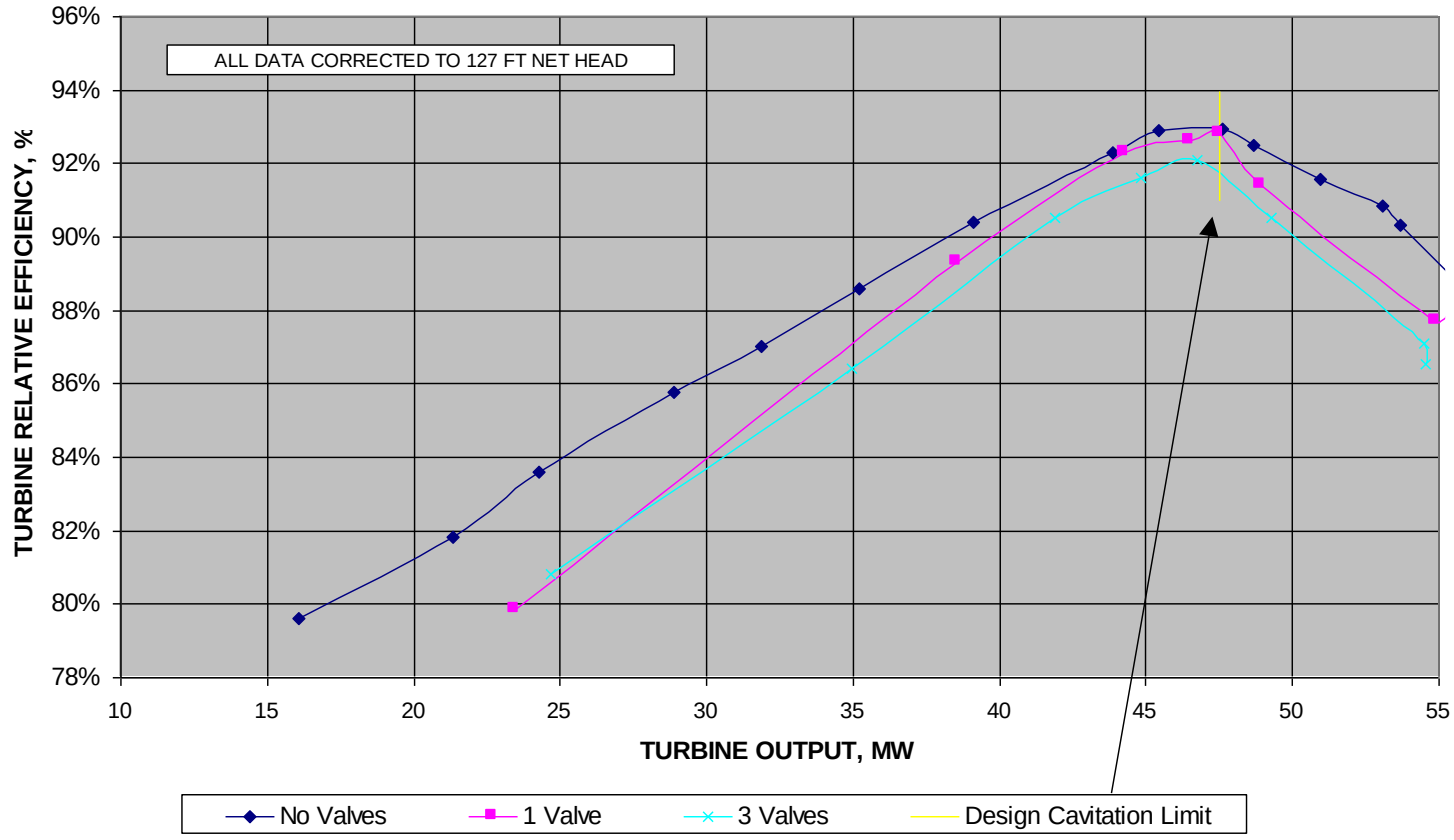
US ARMY CORPS OF ENGINEERS - J STROM THURMOND POWER PLANT
DISSOLVED OXYGEN INDEX TESTS - 25-27 SEPTEMBER 2002
TURBINE OUTPUT vs TURBINE RELATIVE EFFICIENCY
PERFORMANCE COMPARISON FOR VARIOUS AIR SETTINGS



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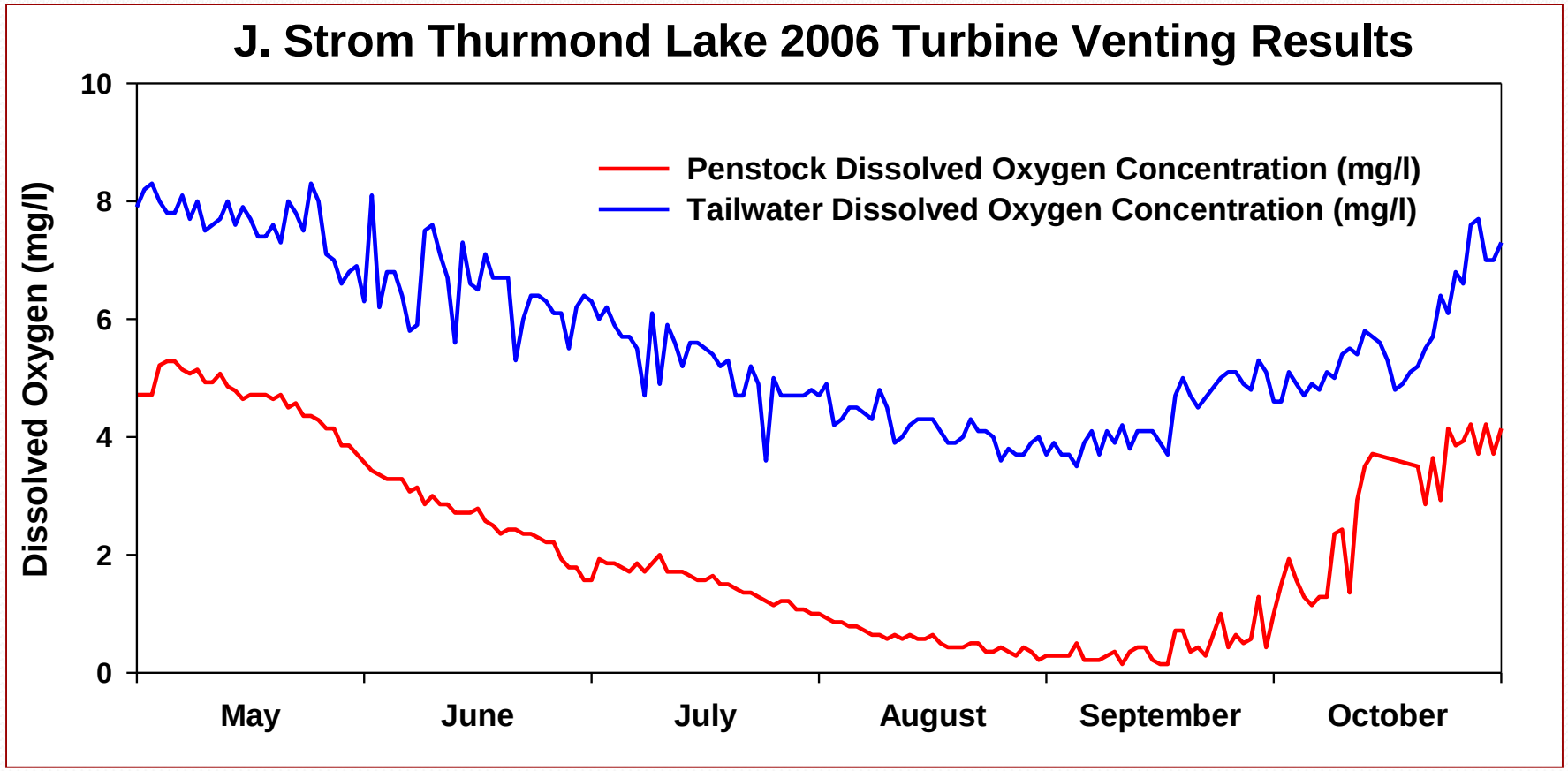

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- John H Kerr Rehabilitation
  - Discharge Ring Diffuser Aeration
  - Proved Less Efficient Compared to Auto-Venting Turbine
  - Circular Manifold Excavated Below Stay Ring
  - Piped To Transformer Deck
  - Nine Deflectors Admit Air

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- Center Hill Rehabilitation
  - Replacement Auto-Venting Turbines
  - Limited To 1 Of 3 Unit Summer Generation
  - First Turbine To Be In Service In August
  - Rehab To Be Complete Summer 2018
  - Contract Specifies 6 mg/L
  - Turbine Price: $3,016,000

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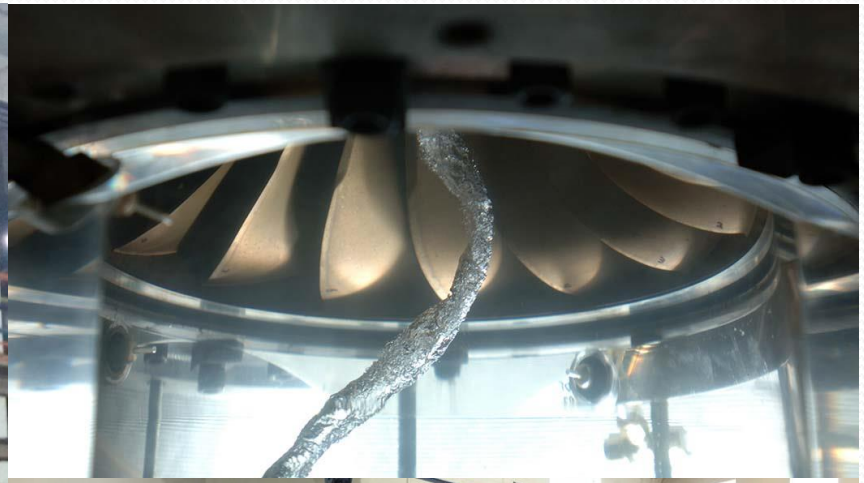

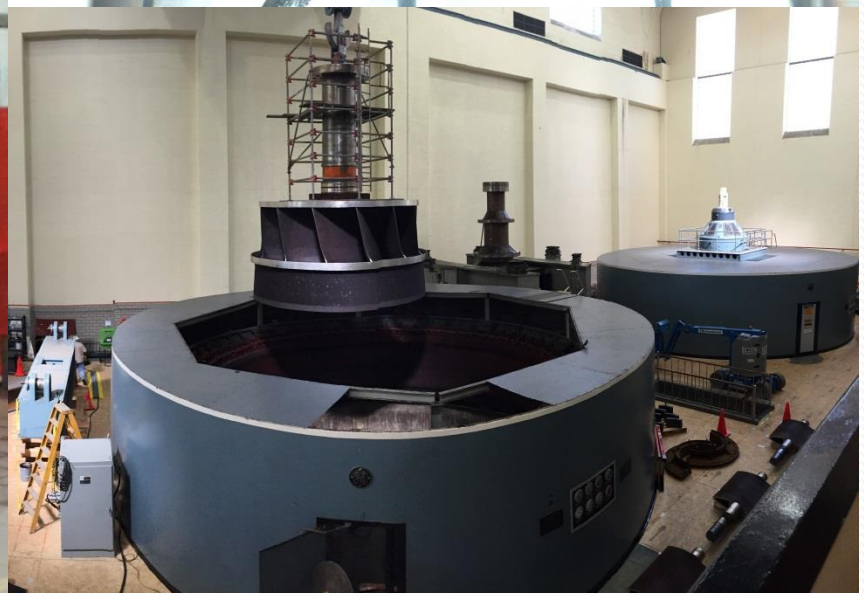

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- Future Aeration Efforts
  - Wolf Creek Rehabilitation
    - Limited To 2 of 6 Unit Summer Generation
    - Six Replacement Auto-Venting Turbines
    - Scheduled 2020 - 2026
  - Allatoona Turbines
  - Dale Hollow & J. Percy Priest DO Restrictions
  - Where Else ??

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Questions