



Duck River Utility Commission

Drought Mitigation Project

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General Manager

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Duck River Utility Commission

- Regional Water Authority
 - Public Agency
 - Wholesale Only to Seven Utilities
 - Consecutive/Consecutive/Consecutive Systems
- Population Served > 72,000

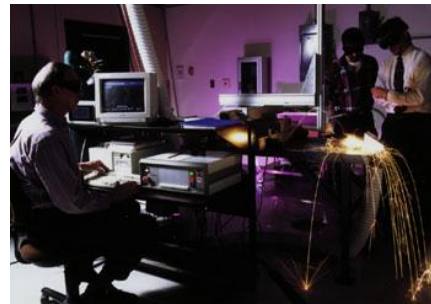


Manchester and Tullahoma, Tennessee

The logo for the Arnold Engineering Development Center, featuring two shields with various symbols and the text "Arnold Engineering Development Center".

Arnold Engineering Development Center

Arnold AFB TN
The world's premier flight simulation test facility



BONNAROO MUSIC FESTIVAL

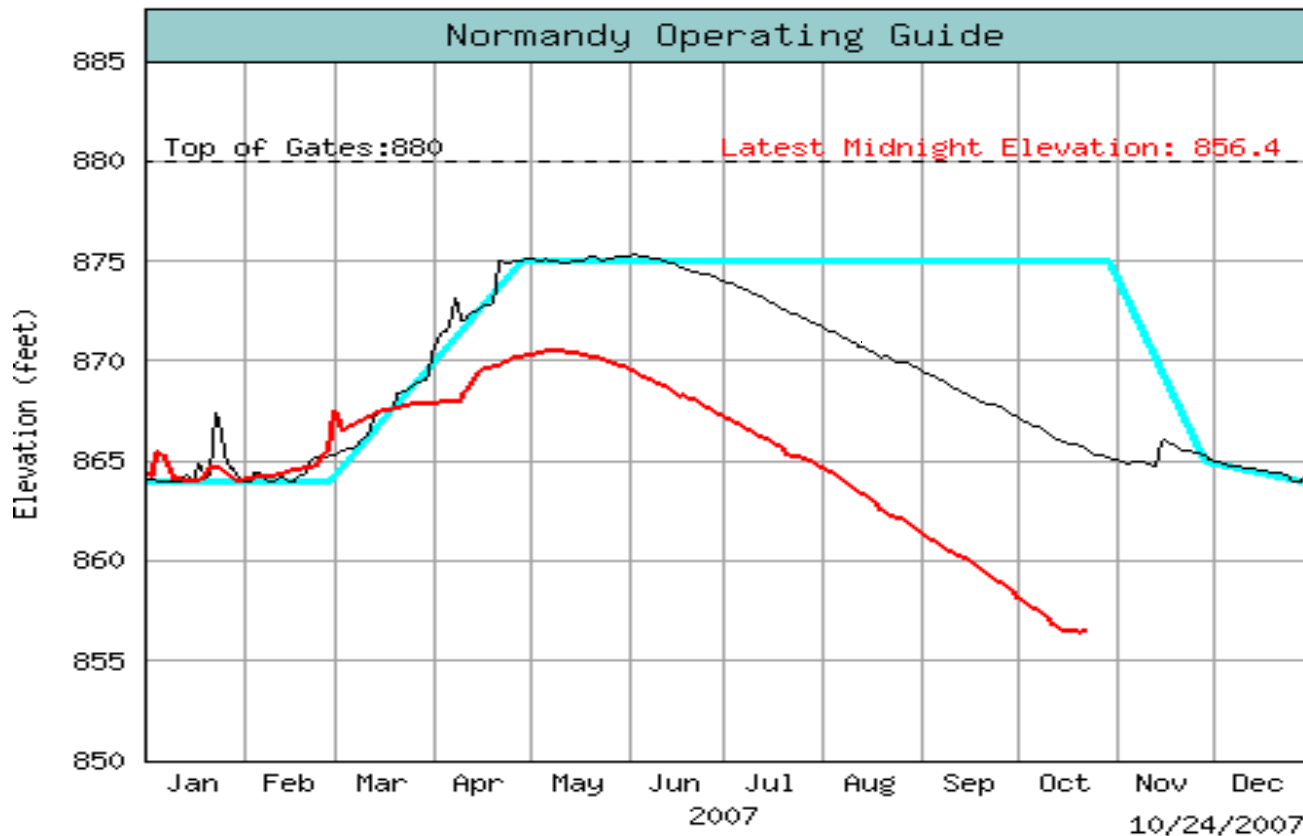


Connected Systems

- Hillsville Utility District
- Metro Moore County #2
- Shelbyville Flat Creek #2
- Town of Bell Buckle
- Town of Wartrace

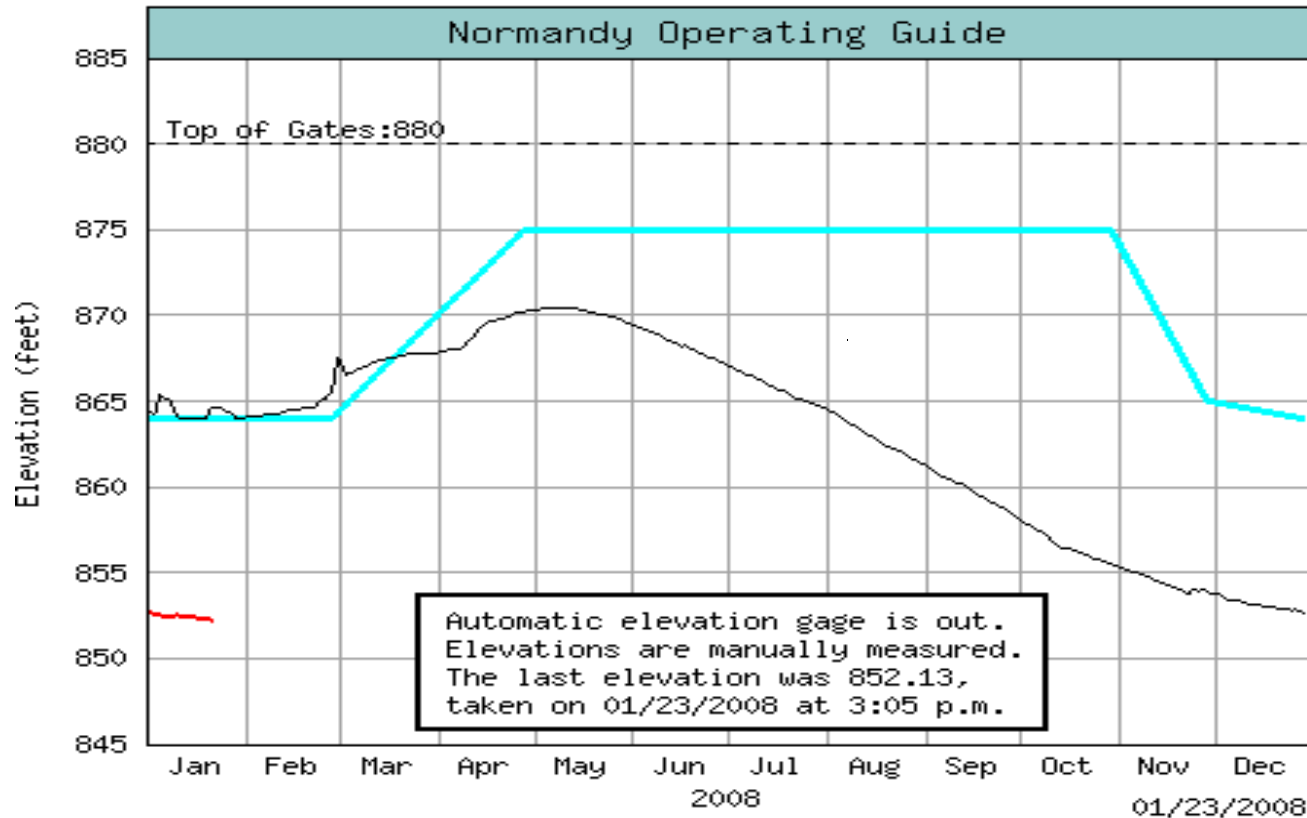


Normandy Reservoir Operating Guideline As of October 2007



— Guide Curve — 2006 Observed Midnight Elevations — 2007 Observed Midnight Elevations

Normandy Reservoir Operating Guideline As of January 2008



— Guide Curve

— 2007 Observed Midnight Elevations

— 2008 Observed Midnight Elevations

DROUGHT CONDITIONS



DROUGHT CONDITIONS



Normandy Reservoir - 2007



DROUGHT CONDITIONS



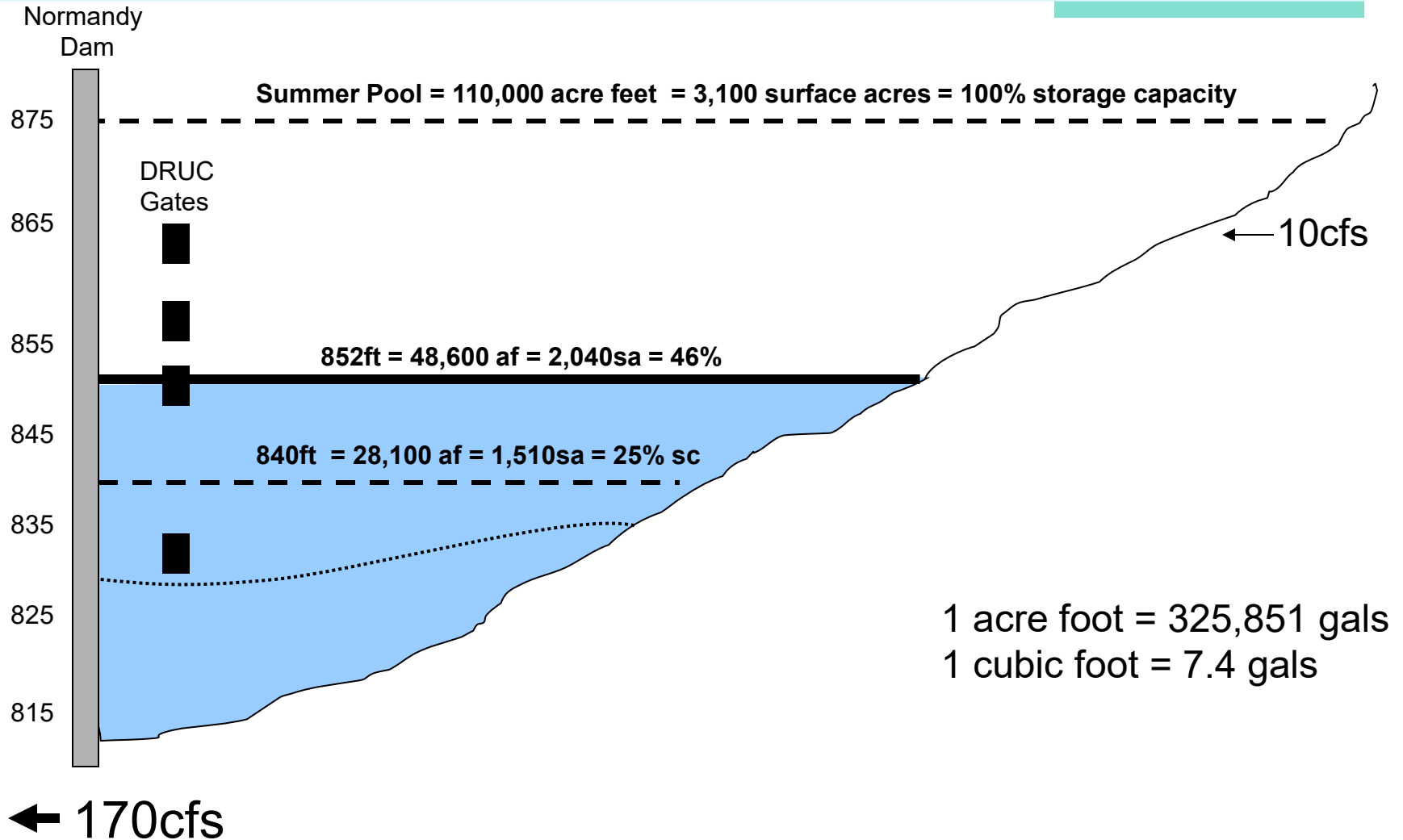


Water Intake Station - 2007





Normandy Reservoir Storage Capacity



Reservoir Storage Capacity



Elevation	Acre Feet	Surface	% Storage
875	110,000	3,100	100
870	94,600	2,880	86
860	68,000	2,400	62
850	45,800	1,980	42
840	28,100	1,510	25
830	18,800	1,200	17
810	3,300	400	3



Post Drought Response

- DRUC expressed concern to TVA
- DRA regional drought management plan under development
- Optimization of releases under consideration
- TVA Intake Reliability Study - 2018

Using dendrochronology-based and observed precipitation data applied to TVA's suite of hydrologic and reservoir models, the pool elevation of Normandy Reservoir never fell below the Duck River UC assumed minimum operating intake elevation. This resulted in a no days of shortage and a modeled intake reliability of 100%. These findings indicate that the water supply reliability for this intake is very strong.

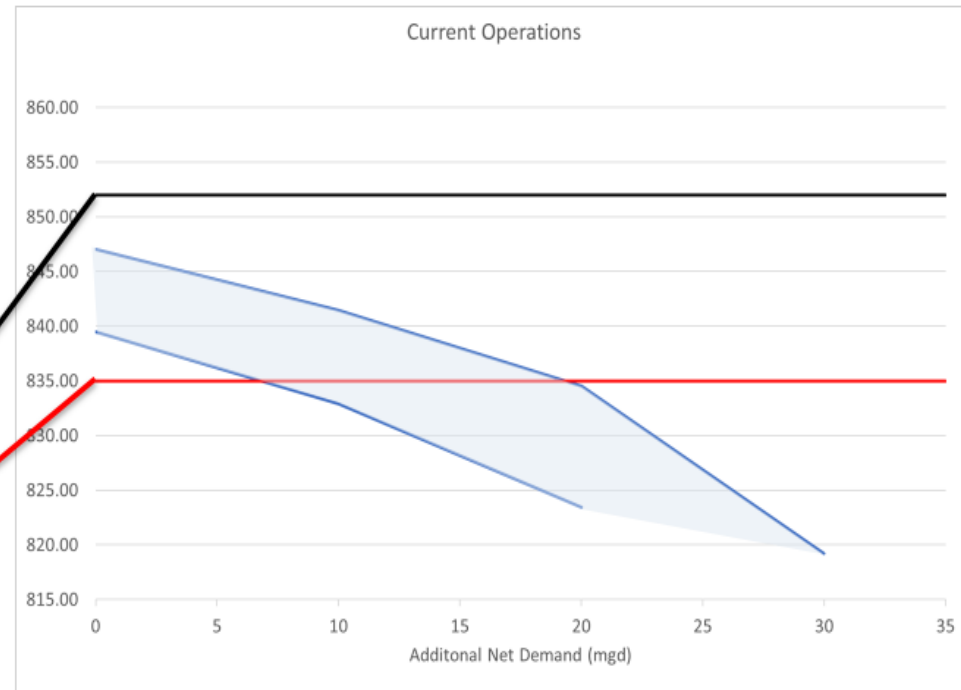
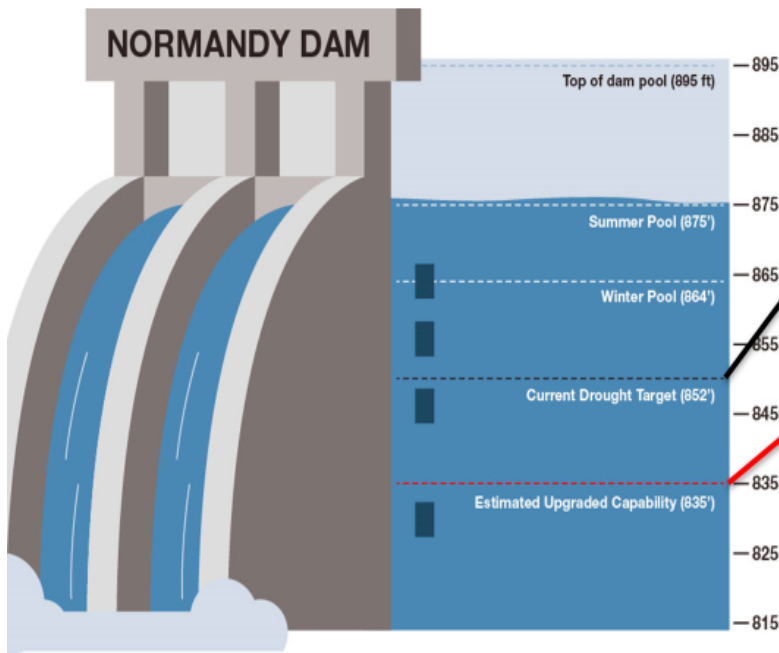
- DRUC concern reduced



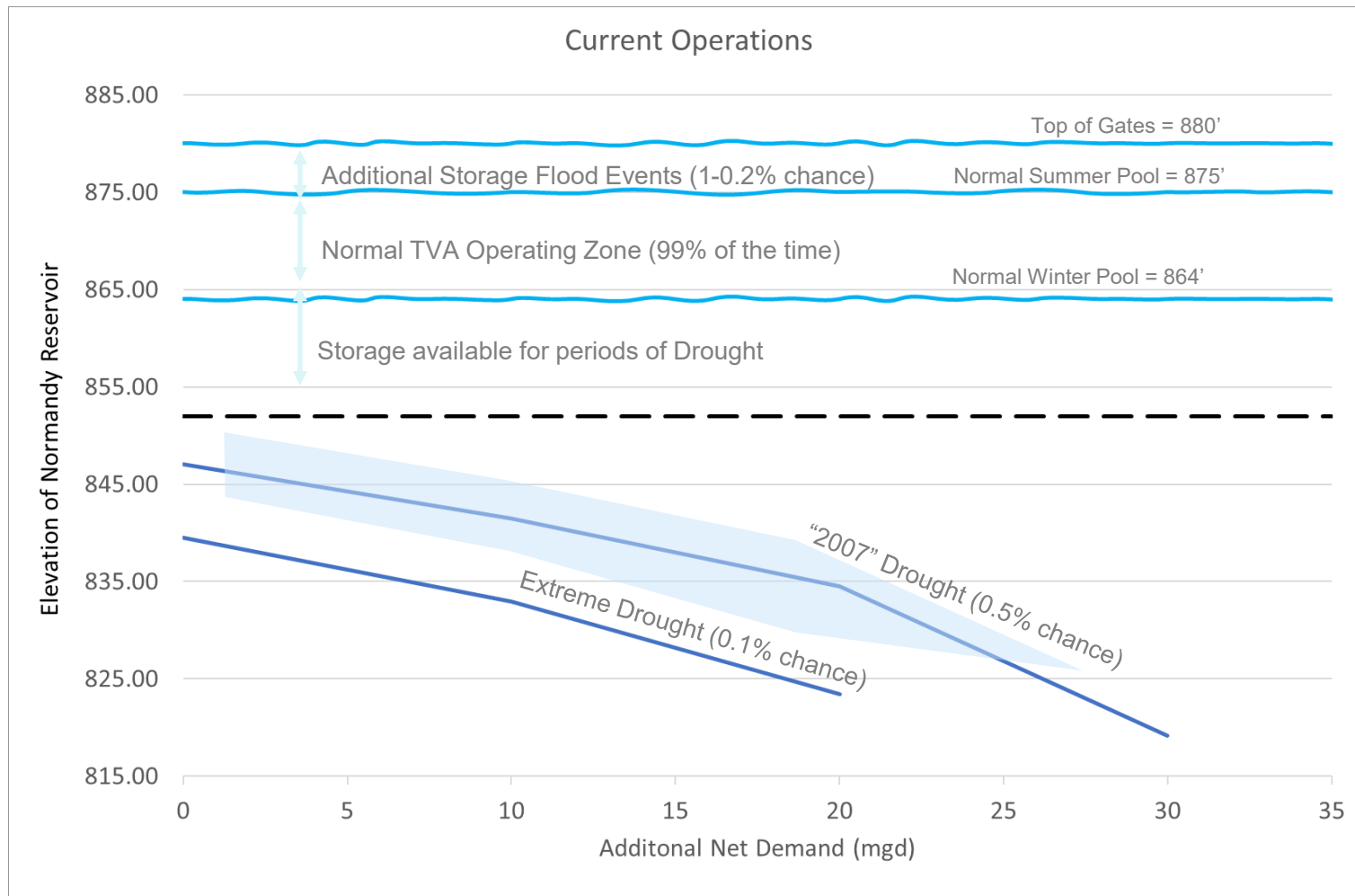
TVA Water Supply Availability Analysis

2023 TVA Presentation

Current Operations



Results with Current Demands





Drought Mitigation Action

- Higher Pump Head Capacity
 - Higher head due to low water level
- Coagulation and Settling Improvements
 - Poor water quality at low water levels
- Granular Carbon Contactor Upgrade
 - Taste and odor issues
 - Toxic algal blooms
 - PFAS concentration
- Refurbish Old Floc and Settling Basins
 - Performance improvements needed



Project Scope

- Replace Intake Pumps (4)
- Upgrade Intake Electrical Systems
- Add Flocculation Basins (3 stage)
- Add Settling Basins (2)
- Convert Old Filters to GAC (4)
- Refurbish old Flocculators (3)
- Refurbish old Settling Basins (2)
- Replace associated valves and piping



Drought Project Funding

- DRUC prohibited from issuing bonds by State legislation.
- DRUC requests assistance from the DRA
 - \$3 Million contribution
- DRUC requests portion of ARP funds from Manchester, Tullahoma and Coffee County
 - All declined to provide funding
- DRUC applies for two competitive ARP grants
 - Both were unsuccessful
- TDEC responded with State Strategic Regionalization Grant
 - \$8 Million grant
- DRUC proceeds with design and bids project
 - \$10 Million Construction Estimate



Construction Bid Results

- Prospective Contractors Report Issues
- Project Scope Reduced
- Only Three Bids Received
- Low Construction Bid: \$12,375,565.00
- Total Project Cost: \$13,338,065.00
- Prior Membrane Filtration System Project
 - 2001 Contract for upgrade - \$1,238,390.00
- \$2 Million Funding Gap
- Project Critical - DRUC Proceeds



Construction Progress

- Contractor Reports Delivery Delays
- Contractor Adds Personnel
- Grant Scope Reduced to Improve Schedule
- TUA Agrees to Upgrade Electrical Service
- Contractor Optimistic
- DRUC seeking additional funding for remaining scope and deleted items.



Project Scope Change

- Replace Intake Pumps (4) (2)
- Upgrade Intake Electrical Systems
- Add Flocculation Basins (3 stage)
- Add Settling Basins (2)
- ~~Convert Old Filters to GAC (4)~~
- ~~Refurbish old Flocculators (3)~~
- ~~Refurbish old Settling Basins (2)~~
- ~~Replace associated valves and piping~~



Construction Progress

New Pumps and Electrical



Construction Progress



New Pumps and Electrical



Construction Progress



New Pumps and Electrical



Construction Progress



New Flocculator and Settling Basins



Construction Progress



New Flocculator and Settling Basins



Construction Progress



New Flocculator and Settling Basins



Construction Progress



New Flocculator and Settling Basins



Construction Progress



New Flocculator and Settling Basins



Construction Progress



New Flocculator and Settling Basins



Construction Progress



Filter Conversion to GAC



Construction Progress



Filter Conversion to GAC



Construction Progress



Filter Conversion to GAC



Construction Progress



Filter Conversion to GAC



Construction Completion



- Two Pumps Online by August 15th
 - Electrical Upgrades and two pumps complete
- Coagulation and Settling Complete
 - Basins placed in service by September 15th
- Granular Carbon Contactor Upgrades
 - Underway but lack funding
- Refurbish Old Floc and Settling Basins
 - Pending Funding



Regional Benefits

- **Water Supply Reliability**
 - Improved drought resilience
 - Improved facility reliability
- **Water Availability**
 - Increased ability to maintain releases during an extended drought
 - Support economic development
- **Maintain Low Rates**
 - Economy of scale and broad rate base



Lessons Learned

- **Massive ARP Funding Release**
 - Limited contractor availability
 - Limited subcontractor availability
 - Higher construction and material prices
 - Long lead time on material
- **ARP Compressed Timeline**
 - Rushed design and engineering documents
 - Stress on contractors and subcontractors
- **Struggle to Fund Higher Project Costs**
 - 30% over budget even with scope reduction

Questions ?

