Governor's Conference on Managing Drought and Climate Risk

Water Supply and Water Quality

By Mark T. Pifher

Director, Aurora Water

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Topic Outline

- Operative CWA Provisions
- Climate change/drought implications
- Specific water quality impacts
- Water supply trends and water quality
- Prairie Waters Project (an option)

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I. CWA Provisions of Note

A. Section 301 (Effluent Limitations)

B. Section 303 (Water Quality Standards)

C. Section 304 (Information and Guidelines)

D. Section 401 (Project Certifications)

E. Section 402 (NPDES Permits)

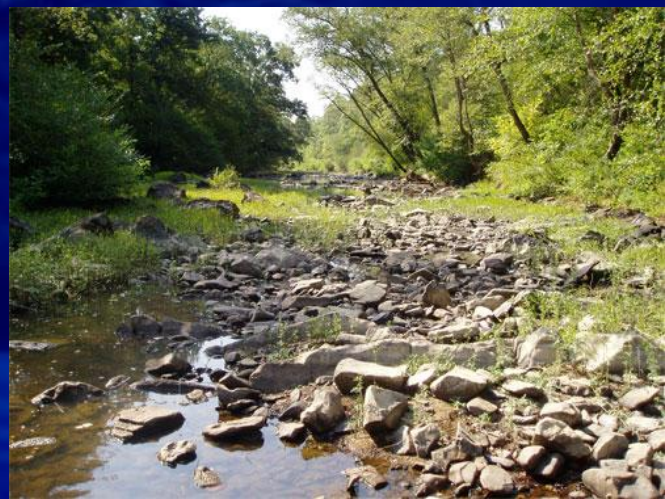
F. Section 404 (Dredge and Fill Permits)

II. Water Quality Standards

A. Temperature Criteria
   1. Daily and weekly maximum temperatures.
   2. Thermal shock.
   3. Spawning criteria.
   4. Reservoir releases.

B. Antidegradation Reviews
   1. Defining “better than necessary water quality”.
   2. Outstanding water designations.

C. Nutrient Criteria
   1. Reservoir operations.
   2. Use impairments.



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II. Water Quality Standards (con't)

D. Site Specific Standards
   1. Daily and weekly maximum temperatures.
   2. Ephemeral and effluent dependent waterbodies
      i. WGA initiative.
      ii. Created ecosystems.

E. Biological Criteria

F. Sediment Criteria

G. ("The 3 E's) Emerging/Exotic/Endocrine Disrupters (CWA and SDWA)

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III. TMDL's

A. Use impairment determinations (fishery).

B. Dilution/assimilative capacity calculations.

C. Nonpoint source contributions.

D. Temperature impairments.

E. Interstate TMDL's.

IV. Permit Terms and Conditions

A. Assimilative capacity (RO brines)

B. Low flow calculations

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V. Reuse Regulations

A. Types of uses (industrial, irrigation, domestic)

1. Indirect potable reuse.
2. Direct potable reuse.
3. Level of treatment.

B. Recapture of reusable waters

VI. Section 402 Discharge Permits

A. South Florida Water Management District vs. Miccosukee Tribe.

B. City of New York vs. Trout Unlimited.

C. Water transfer rule.

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VII. Impacts on Water Quality

A. Physical Integrity

- Channel reconfiguration due to changes in flow regimes (damage to riparian areas and sediment transport through flooding)
- Increase in forest fires and accompanying sedimentation and runoff concerns.
- Warmer temperatures and decrease in flows, along with wide channels, result in significant water warming.

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B. Biological Integrity

- Drought related low flows may fall below aquatic life needs (loss of biodiversity)
- Cold and cool water species (salmon and trout) may experience significant reduction in numbers.
- Exacerbation of whirling disease instances.
- Potential loss of riparian zone plant and animal species.

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C. Chemical Integrity

- Increase pollutant run off – from more frequent and severe rainfall events.
- Loss of anticipated dilution flows.
- Increase in salinity attributable to additional mineralized groundwater discharge and seepage.
- Increased salinity from agriculture lands run-off.
- Reduced DO levels.

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VIII. Regulatory Implications

A. Compliance with wet weather mandates (CSO's and stormwater BMPs).

B. Impact on permit effluent limitations based on "low flow" averages.

C. Additional 303(d) TMDL listings due to increased pollutant loadings, elevated temperature or loss of flows.

D. Need to expand scope of reuse programs.

E. Additional use of enhanced treatment techniques, such as RO, and brine disposal concerns.

F. Wastewater treatment plant capacity.

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IX. Implications of Climate Change for Urban Water Utilities AMWA, December 2007

A. "Partnering water and wastewater utilities within a region and regulatory agencies constitute important sub-groups of stakeholders with whom it may be necessary to devise entirely new institutional structures and methods of collaborating to meet multiple objectives and constraints on a changing playing field. Such restructuring is consistent with the IRP approach of redefining objectives and constraints to broaden the boundaries that admit a broader range of solutions."

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B. "If programs such as those intended to control sewage overflows and waste load allocations are undermined by changes in hydrology, there may still be room to maneuver within the altered hydrologic system and obtain good outcomes, if regulatory constraints are flexible."

C. "Many water suppliers in over-constrained settings have also turned to energy-intensive membrane treatment processes to enable desalination of saline water sources and reuse of highly treated wastewater effluent. These processes make it possible to overcome a deterioration in the reliability of normal sources of supply by making it possible to meet part of the demand from sources that will be abundant under most climate change scenarios (i.e., yields from water reuse and desal supply options are drought-resistant."

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X. Water Supply Trends

A. Agricultural to urban transfers (more lower quality water and advanced treatment).

B. Increase in reuse (similar impacts + decrease in instream flows) and emerging contaminants.

C. Potential increase in infrastructure construction (accompanying environmental impacts).

Aurora's Prairie Waters Project

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a drought response

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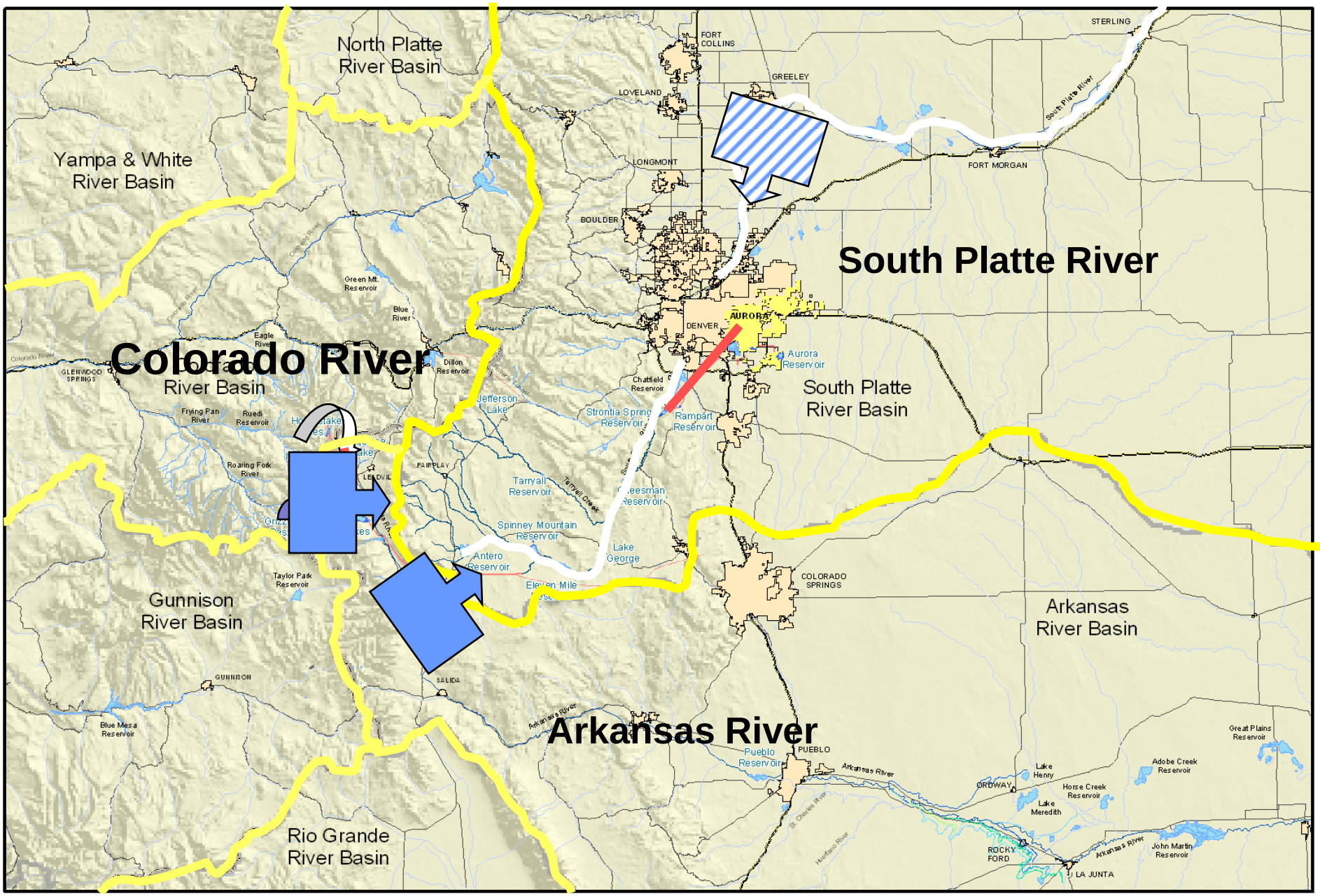
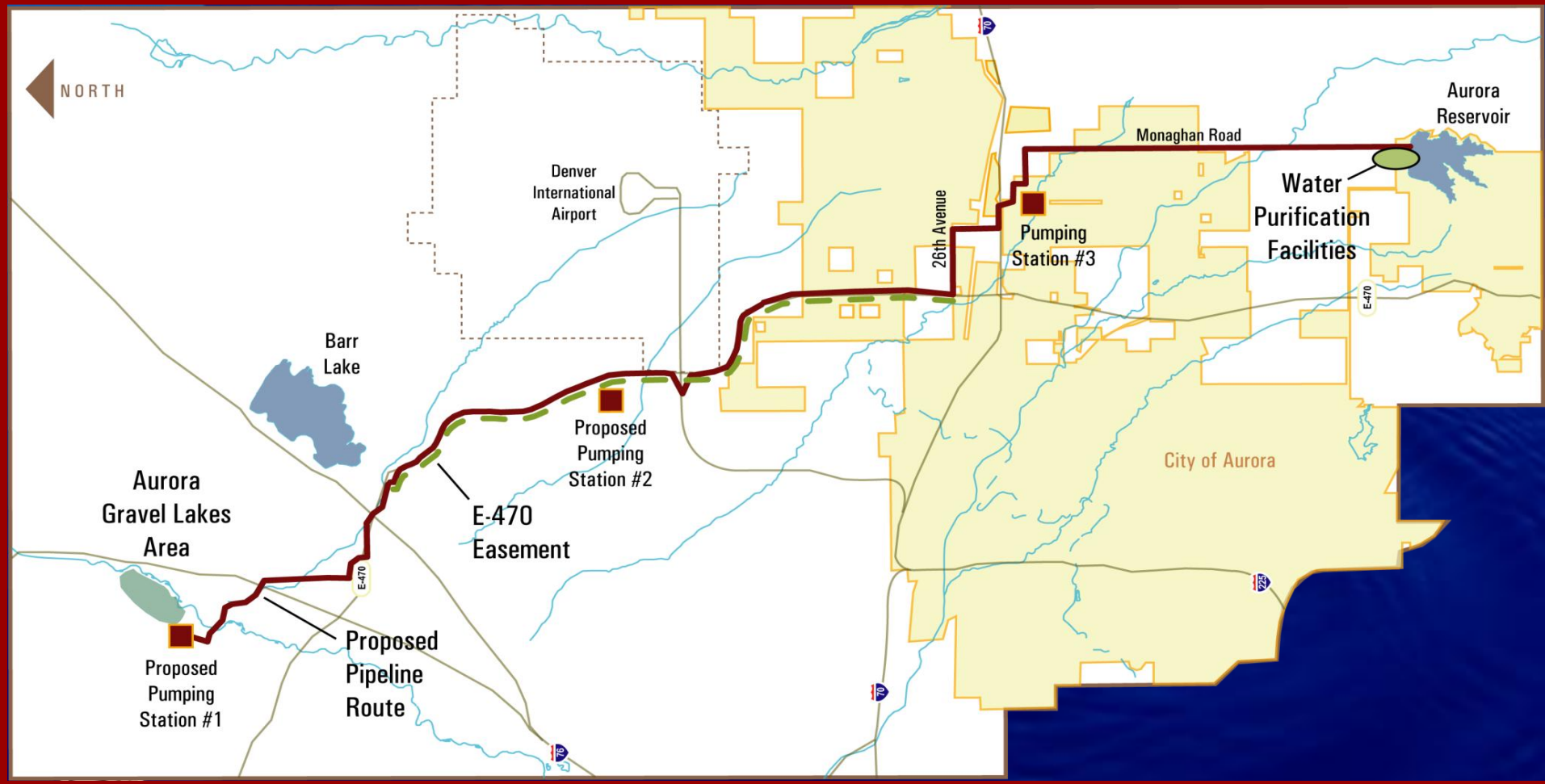
City of Aurora

Raw Water Supply



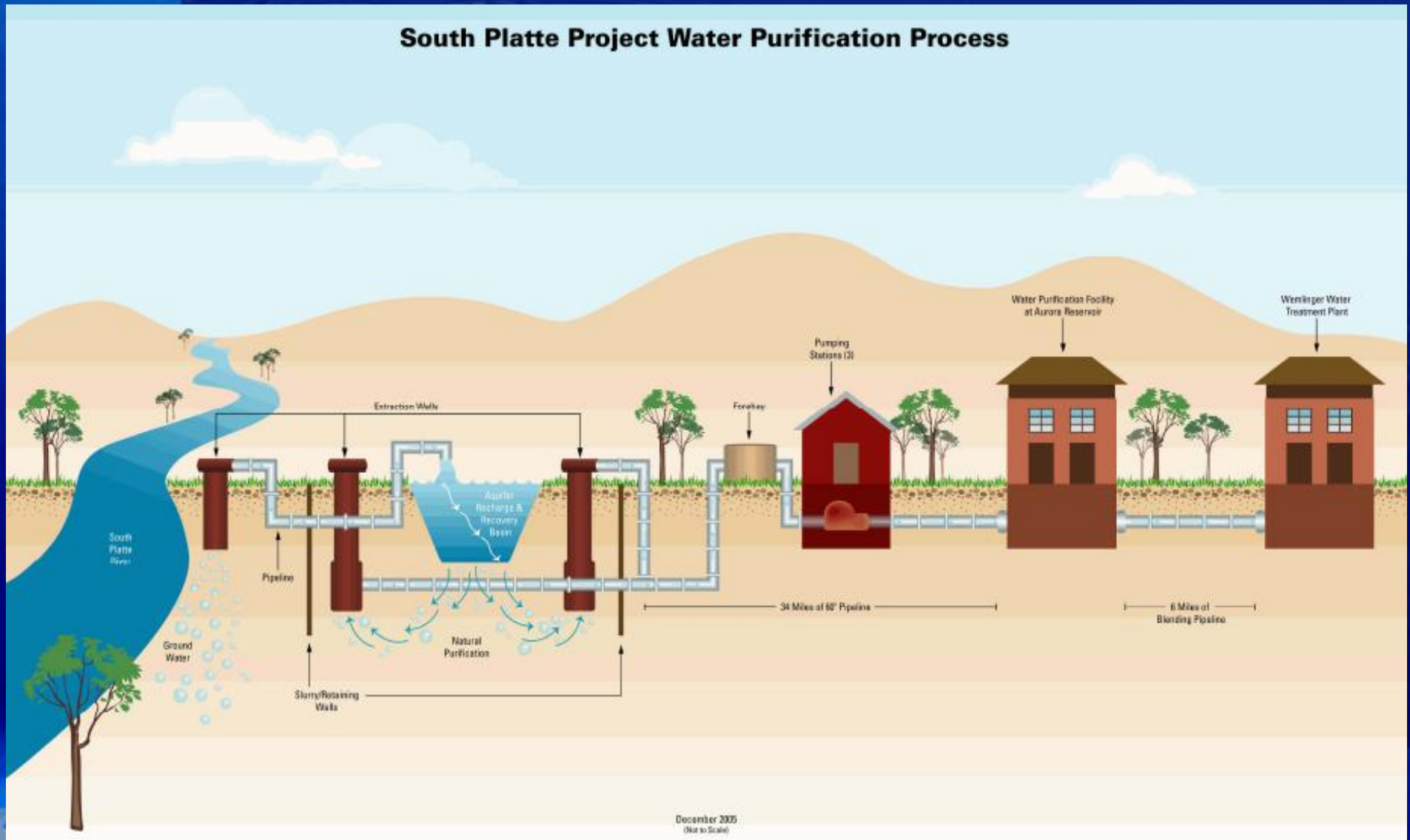
For information purposes only
For further information, contact
Aurora Department of Utilities
phone # 303-739-7378

Aurora's New Water Supply Project



- 34 miles of 60-inch pipeline
- 3 pumping stations
- North Campus (bank filtration and aquifer recharge and recovery)
- 50-mgd water purification facility

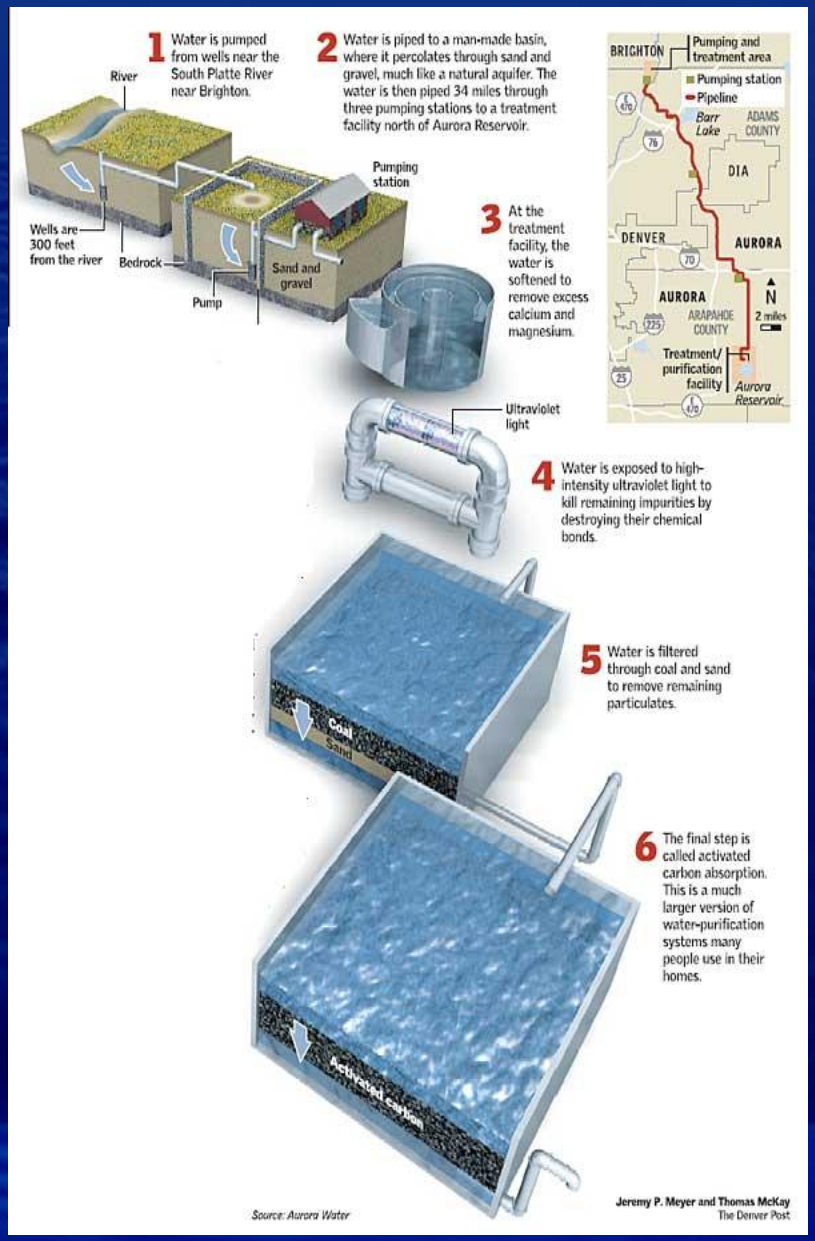
Natural and Physical/Chemical Treatment Processes



Aurora's Water Purification Approach

Denver Post (1/24/2007)

"This is the wave of the future," said Glenn Bodnar, drinking-water specialist for the Colorado Department of Public Health and Environment.



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Governor's Drought Conference: Water Supply and Water Quality
By Mark T. Pifher, Aurora Water

Climate change, with its potential impacts upon the amount and timing of runoff, the form of precipitation, the intensity of storm events, increasing evapotransporation, and both structural and nonstructural activities to be taken by water and wastewater utilities in response thereto may significantly affect water quality in Colorado. Under the Clean Water Act, designated beneficial uses, including aquatic life, recreation, domestic consumption and irrigation are identified by the WQCC, and water quality standards (criteria), both numeric and narrative, are established to protect such uses. These standards, in turn, drive permit effluent limitations, non-point source best management practices (BMPs), stormwater controls and total maximum daily load (TMDL) calculations. Climate change and associated drought episodes can directly impact the level of pollutants in waterbodies upon which compliance is measured, and/or the amount of dilution flows that historically masked such pollutants. Water supply trends, designed to meet increased water demands under new hydrologic conditions, such as agricultural to urban water transfers, can further impact the condition of aquatic resources. Changes in institutional/regulatory approaches to water quality protection and in water supply development techniques may be necessary to accommodate climate change impacts, including those associated with drought conditions.

Mark Pifher is currently the Director of Aurora Water. Immediately prior to joining the City, he served as the Director of the Colorado Water Quality Control Division, where he was responsible for implementing all aspects of the state Clean Water Act and Safe Drinking Water Act programs. Mr. Pifher was in private law practice for twenty three years before entering public service, emphasizing water, environmental and natural resource matters. He has spoken and written extensively on a variety of environmental topics, including biomonitoring, wetlands regulation, water quality versus water quantity, biocriteria and point source permitting.

Mr. Pifher served for five years as the chairman of the Colorado Water Congress state affairs committee, is a past vice-president of the Association of State and Interstate Water Pollution Control Agencies, and has been an active member of the National Water Resources Association, the Western Urban Water Coalition and the Western Coalition of Arid States. He is a 1979 cum laude graduate of the University of Wisconsin Law School.