

# Water Conservation & Efficiency in EPA Region 4 CWA Section 404 Review of Water Supply Projects

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# CWA Section 404 context

- Projects that involve discharges of dredged or fill material to wetlands or streams need permitting (Corps)
- EPA reviews in accordance with regulations that require:
  - Project scope commensurate w/purpose
  - Avoidance & minimization
  - Alternatives analysis

# Impacts of Impoundments (and Associated Withdrawals)

- In reviewing proposed reservoirs, EPA considers impacts:
  - Direct loss of streams & wetlands
  - Fragmentation of fluvial habitat
  - Blocked migration routes
  - Altered hydrograph (life cycle cues, floodplain access & hydration, energy)
  - Altered temperature & DO regime, degraded water quality
  - Altered sediment transport regime
- Analysis of alternatives seeks to establish LEDPA:  
Least Environmentally Damaging Practicable Alternative
- Determine opportunities to avoid impacts to aquatic resources

# Avoiding Aquatic Resource Impacts

Review of conservation & efficiency can answer key questions about projects with potential aquatic resource impacts:

- Is it really needed?
  - Are projections based on reasonable demand?
  - Can the supply-demand gap be closed completely without new construction or withdrawal? Conservation/Efficiency as “first alternative”
- If needed, are there alternatives w/less aquatic resource impact?
  - Purchase from other system
  - Expansion of existing system
  - Smaller reservoir, perhaps in location w/less adverse impact
- Original WEGs for Section 404 review released in 2010

# Benefits of Finding Supply w/Efficiency

- Responsible management for tax- and rate-payers
- Protection of flowing waters
- Preservation of habitat, migration routes, endemic species
- Protection of water quality
- Maintenance of natural hydrograph (depending upon other influences on system)
- Avoidance or delay of capital investments

# Guidelines: System Accounting

- Recommend auditing using AWWA Free Water Audit Software<sup>©</sup>
  - Five years' worth of data if seeking to develop new supply
- Water balance: Account for all inputs & outputs
  - Apparent losses & real losses
- Metrics:
  - Data Validity Score
  - Non-revenue water

System Input Volume (corrected for known errors)	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (including water exported)	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Customer Metering Inaccuracies	
			Systematic Data Handling Errors	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to point of Customer metering	

From AWWA M36

# Loss Minimization: Leak Management

- Leaks are usually the primary form of real loss
  - Should be proactively managed to economically low level
  - Pressure management often key; also physical condition/stress
- Infrastructure Leakage Index (CARL:UARL) or Op24
  - Expect low ILI
  - Decreasing trend in ILI or Op24
  - DMAs can be helpful in identifying problem areas, recoverable leakage
- Economic Level of Leakage (ELL) analysis
  - Consider cost of providing compensatory mitigation, too
- Informed leakage management program/water loss control plan
  - Four pillars described by AWWA: active leakage control, optimized leak repair activities, pressure management, and system rehabilitation and renewal

# Metering

- Meter all users, including sub-meters for multi-family residential
  - Better understanding of system
  - Revenue recovery
  - Incentivize efficient use
- Bulk metering calibration & replacement program recommended
- Base meaningful portion of bill on volumetric use
  - No flat charges; a meaningful portion of bill must correspond to use
- Source water metering



# Conservation Rate Structure

- Full cost pricing
  - Rates should reflect full long-range (forward-looking) costs
  - Reflect value and scarcity of the resource
  - Encourage & reward conservation and efficient use
- Rate planning, revenue stability planning
  - Base / volumetric charges reflective of fixed costs, demand patterns, etc.
  - Inclining block rates likely best to incentivize efficient use, reflect costs of providing next volume of water
- Utility bill should convey information about customer's water use:
  - Related use level to rate structure
  - Customer's historical use information
  - Comparison to average/conserving use levels

# End User Profile & Practices

- Water use profile: Customer classes (population/accounts)& demand (volume)
  - SFR, multi-family, ICI
  - Variability with time (recommend monthly at least) by customer class
- Residential indoor demand gpcd
- End user characteristics, e.g.:
  - Residential plumbing age/retrofits
  - Programs related to outdoor use
- Assessment of water savings potential
  - Based on BMPs tied to savings opportunities identified

# Water Conservation & Efficiency Plan

- Written plan for optimizing system performance
  - Living document that evolves with system
- Definitive & measurable goals
- Recognize effects of measures already implemented
- Forecast effects of planned measures

# Implementation/Expected Uses

- CWA Section 404 review for water supply projects
  - Reservoirs
  - Infrastructure construction
- Section 404 pre-application & application phases, NEPA scoping & review

# Thank you

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