



Strategic SDWA Compliance Planning for Small Systems

Sponsored by:

U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water
Drinking Water Protection Division
Drinking Water Utilities Team
Washington, DC

In cooperation with:

Association of State Drinking Water Administrators
American Consulting Engineers Council
American Water Works Association
National Association of Regulatory Utility Commissioners
U.S. Dept. of Agriculture - RUS
National Association of Water Companies
National Drinking Water Clearinghouse
National Rural Water Association
.. Rural Community Assistance Program

Opening Remarks

1

Workshop Format

- Agenda
- Presentations
 - Internal assessment
 - External assessment
 - Identifying options & determining optimum solutions
- Facilitated Questions and Answers

2

Introductions

- Mr. Peter Shanaghan
- Dr. Ralph Jones
- Mr. Dan Fraser
- Mr. Fred Pontius
- Mr. Ian Kline

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Information Resources

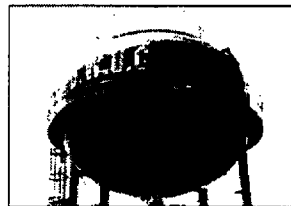
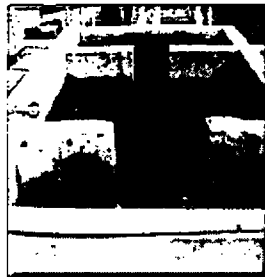
- SDWA Hotline
 - 1-800-426-4791
 - email: hotline-sdwa@epamail.epa.gov
- Web Page
 - <http://www.epa.gov>
 - <http://www.epa.gov/safewater/>
- Documents (e.g.)
 - Strategic SDWA Compliance Planning: A Comprehensive Handbook
 - Guidance and Information Documents

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Water System Strategic Planning in the 21st Century

1

The Planning Imperative: Need to Rehabilitate or Replace Basic Infrastructure



2

1000 Pennsylvania Avenue NW
Washington, DC 20004

Public Water Systems

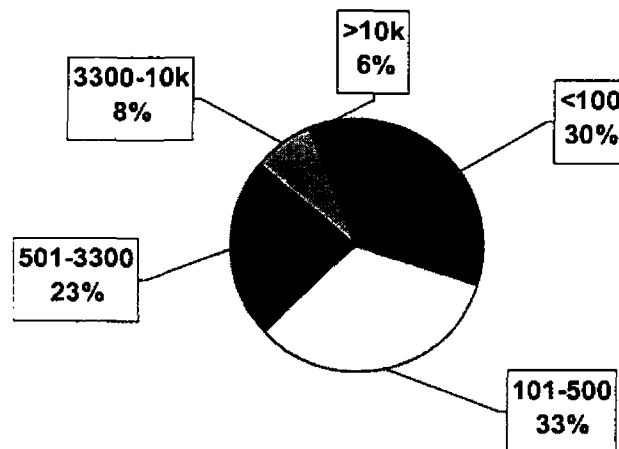
- Public Water Systems (PWSs)
 - Serve:
 - 15 connections or 25 people per day at least 60 days per year
 - There are currently 172,000 PWSs
 - Community Water Systems (CWSs)
 - Non-Community Water Systems
 - Non-Transient, Non-Community Water Systems (NTNCWSs)
 - Transient, Non-Community Water Systems (TNCWSs)
- 85% of US Households Are Served by PWSs

TNCWS
97,000

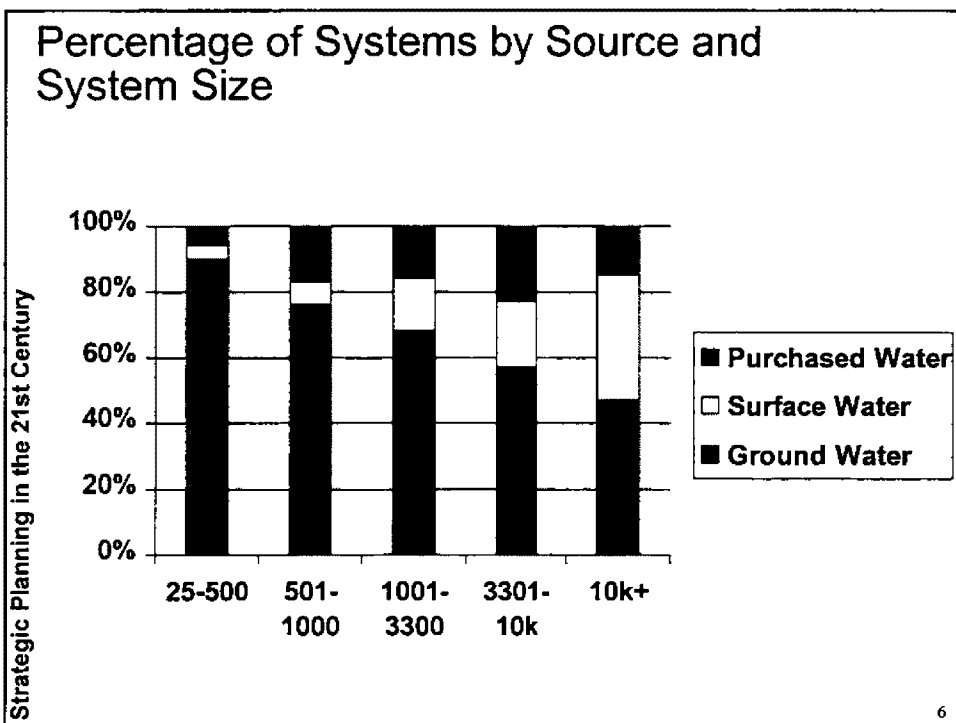
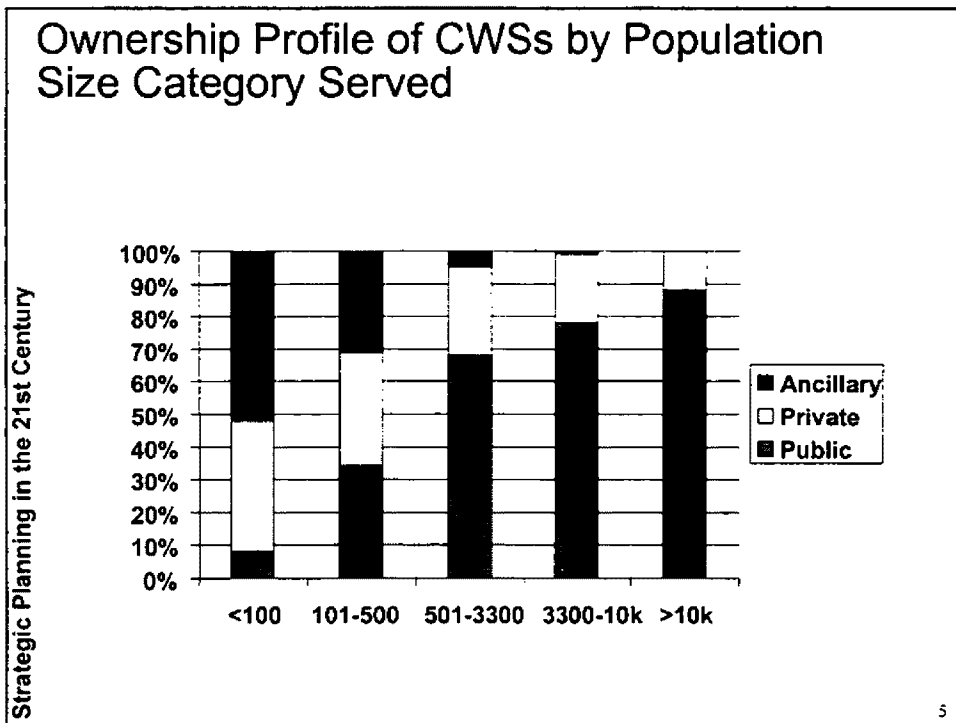


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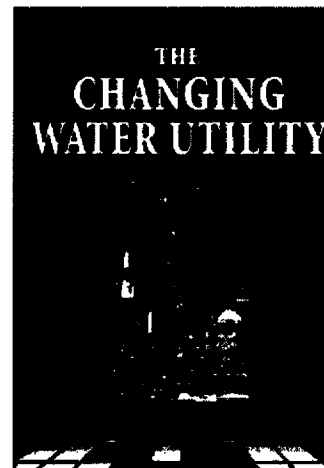
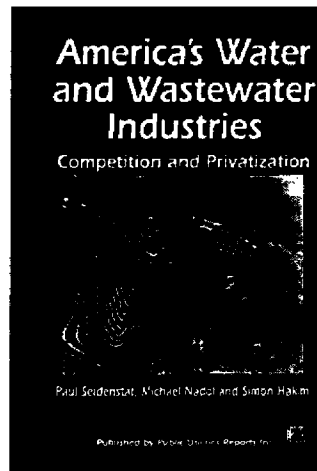
CWSs: Size Distribution by Population Served



4

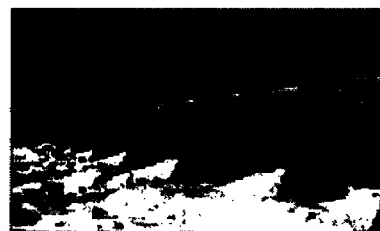


The Planning Imperative: Drinking Water Utilities Are Facing Unprecedented and Increasing Competitive Pressure



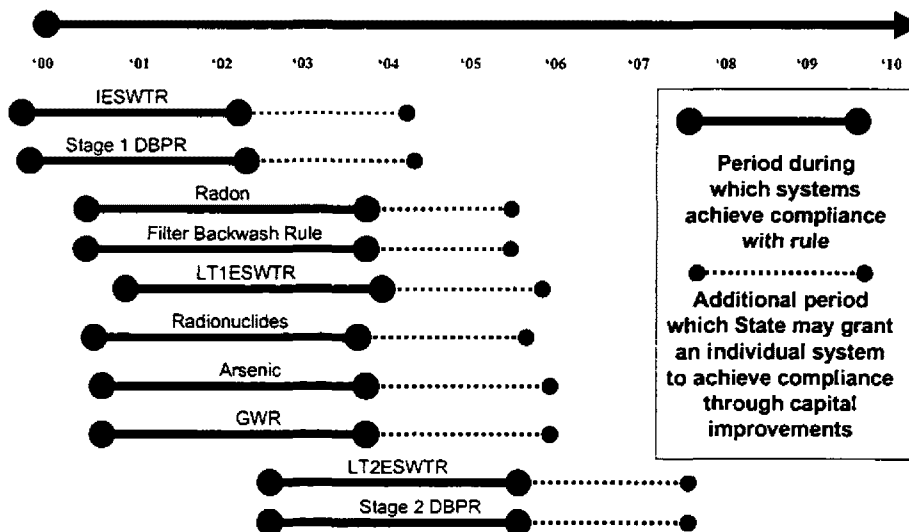
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The Planning Imperative: Emphasis on Source Water Protection & Difficulty in Developing New Supplies



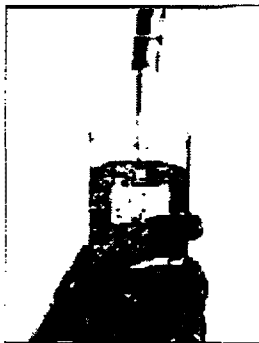
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The Planning Imperative: SDWA Compliance



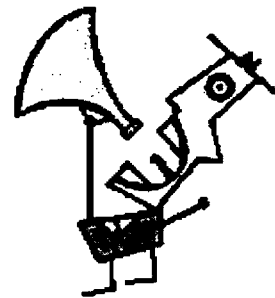
The Planning Imperative: Public Expectations Have Never Been Higher

Strategic Planning in the 21st Century



The Customer Expects

- Regulatory Compliance
- Service at Lowest Reasonable Cost
- Aesthetic Quality



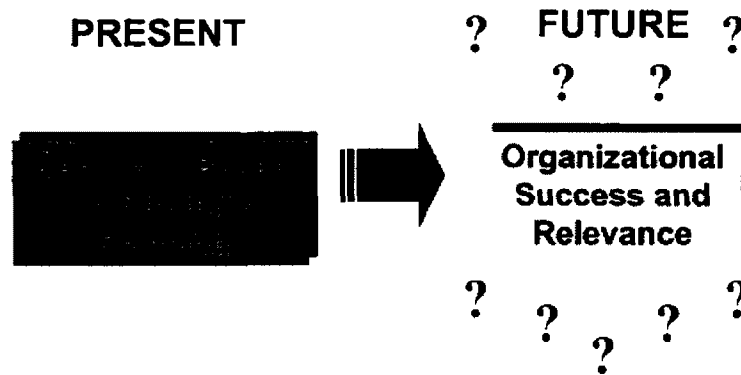
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Strategic Planning is...

- A Disciplined Effort
- To Produce Fundamental Decisions and Actions
- That Shape and Guide
 - What an organization is
 - What it does
 - Why it does it
- With a Focus on the Future.

12

Focus of Strategic Planning



- Preparing today for an uncertain tomorrow
- Futurity of present decisions

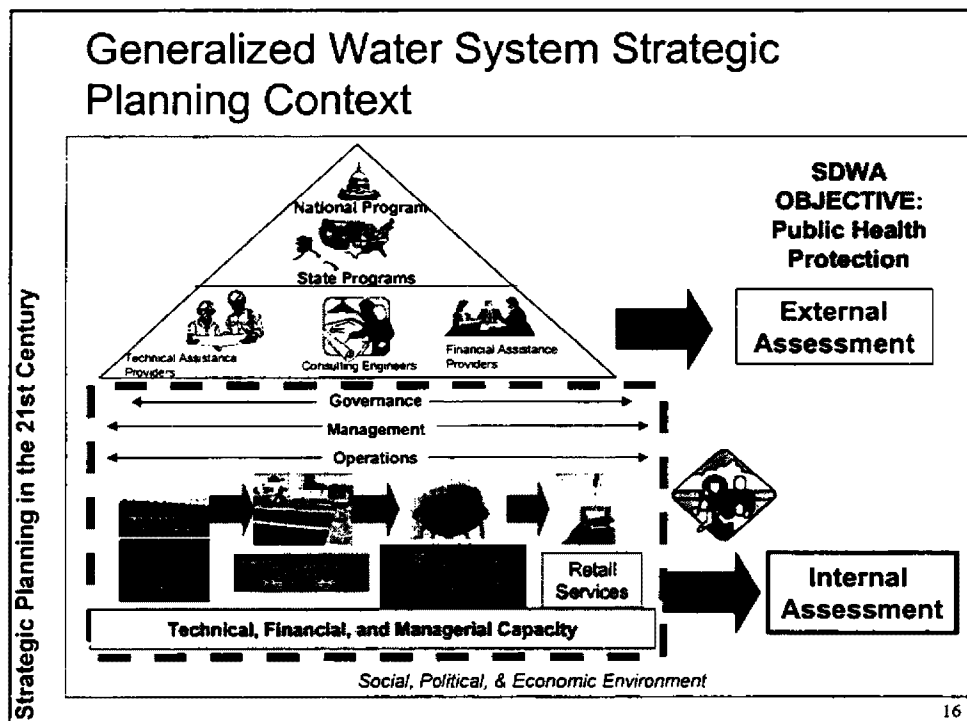
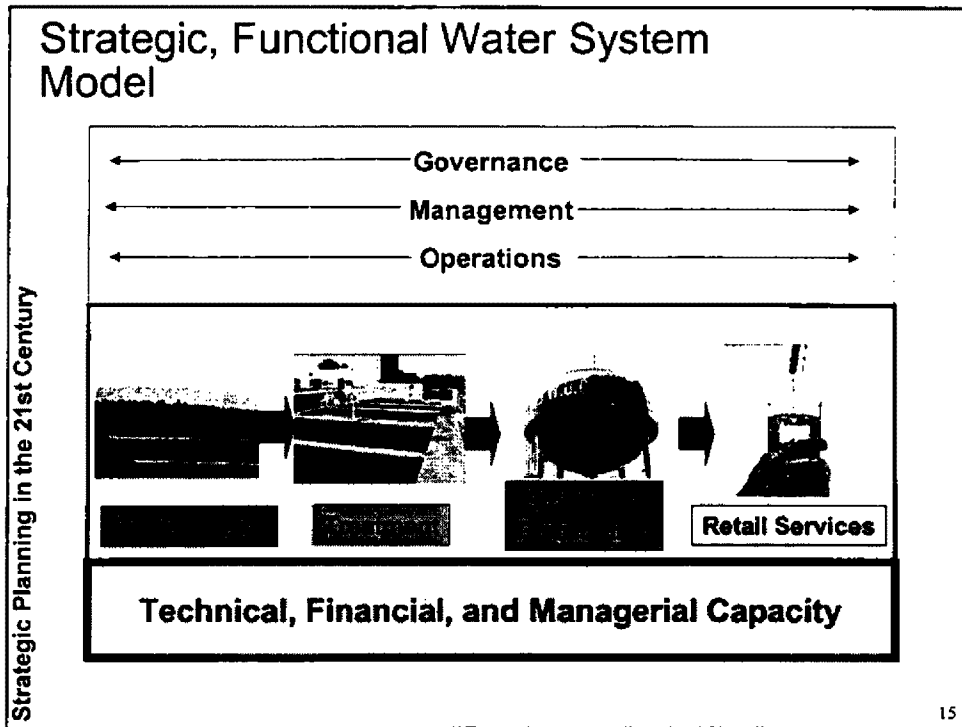
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Simplified 6-Step Framework



- **Assess** system needs, external pressures, and internal capacity
- **Define** the "Service Horizon"
- **Identify** strategic options
- **Analyze** options and select the optimum
- **Implement** strategic plan
- **Evaluate** and revise strategic plan

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Internal Assessment

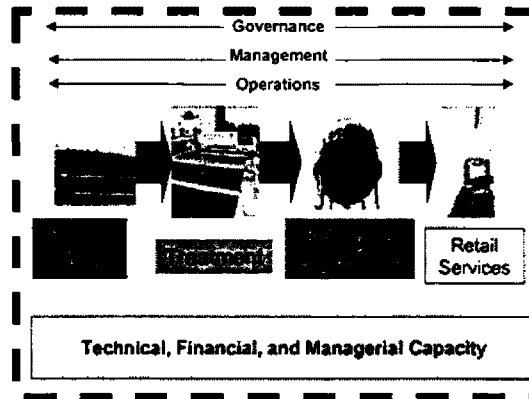
- Identify Strengths and Weaknesses

- Functional Areas

- Source Water
- Treatment
- Storage & Distribution
- Retail Delivery

- System "Capacity"

- Technical
- Financial
- Managerial



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External Assessment

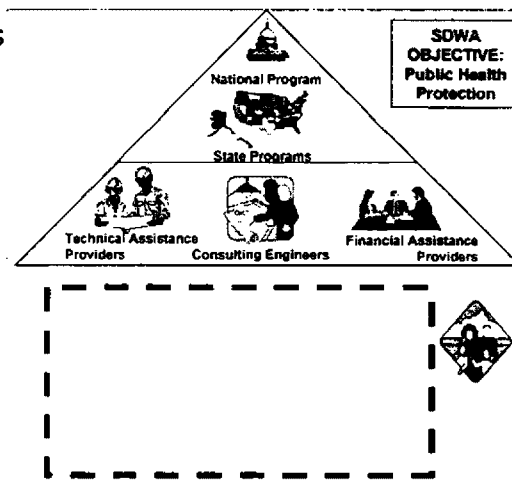
- Identify Challenges and Opportunities

- Challenges

- Regulations
- Competition
- Source quality & availability

- Opportunities

- Partnerships
- Source protection
- Resources
- Public awareness



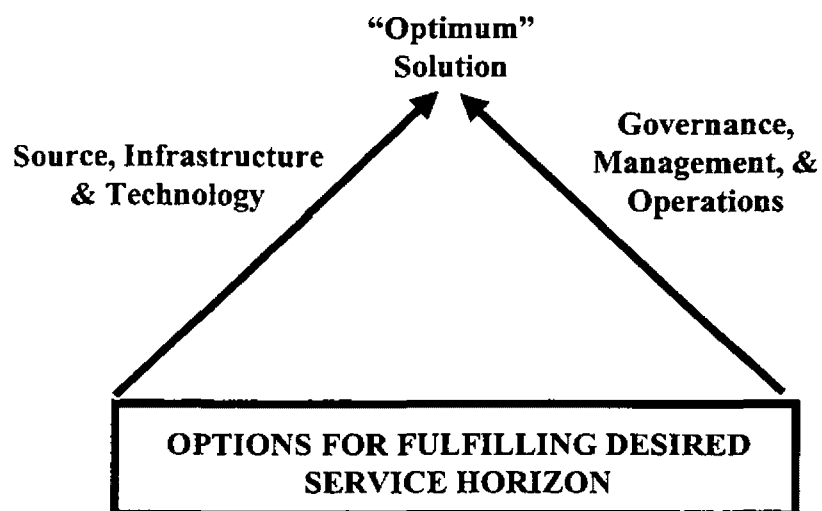
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A Utility's Service Horizon

Role	Source Water	Treatment	Storage & Distribution	Retail Services
Governance				
Management				
Operations				

19

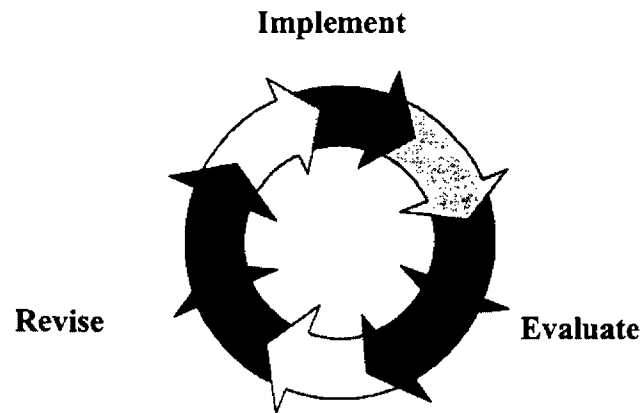
Identify & Analyze Options



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Implement & Evaluate

Strategic Management



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Summary

- Planning Imperatives
- Consumer Expectations
- What is the Focus of Strategic Planning?
- Strategic Planning Framework
 - Assess internal and external capacity
 - Define the “service horizon”
 - Implement the strategic plan

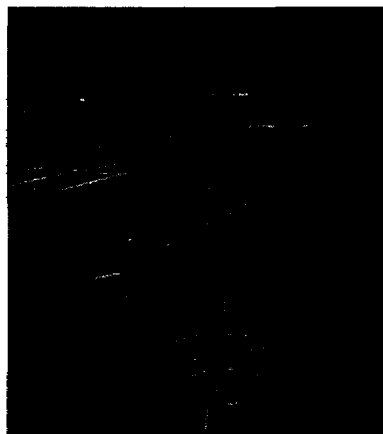
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Assessing Existing Infrastructure

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Assessment of Key Components

- Source
- Intake or Well
 - Raw water pumping
- Transmission
- Treatment
- Distribution
- Storage
- Pumping Facilities



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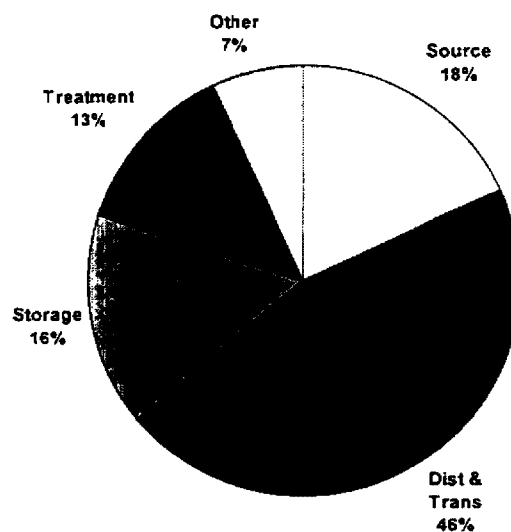
Essential to Assess Total Needs

- Not All Needs Are Obvious
- An Assessment Must Be Made
 - Source
 - Transmission
 - Treatment
 - Distribution
 - Storage
 - Pumping

3

EPA's Drinking Water Needs Survey

1995 Projects



4

Assessing Source of Supply



- Quantity
 - Current and projected use
 - Source capacity
- Quality
 - Current quality
 - Trends
 - Source water protection

5

Ground Water Sources



- Well Construction
- Capacities
 - Wells
 - Pumps
- Sanitary Condition
 - Surface completion
 - Grouting
 - Sanitary seal
- Source Water Protection

6

Surface Water Sources

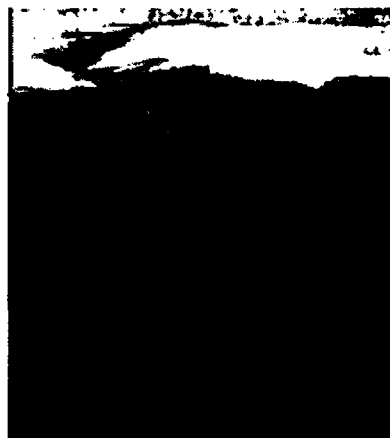
- Source Water Protection
- Intake
 - Condition
 - Problems
- Turbidity



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Assessing Transmission

- Size
- Materials
- Capacity
- Condition
- Air/Vacuum Relief
- Peak Daily Flows
- Redundancy



8

Assessing Existing Treatment

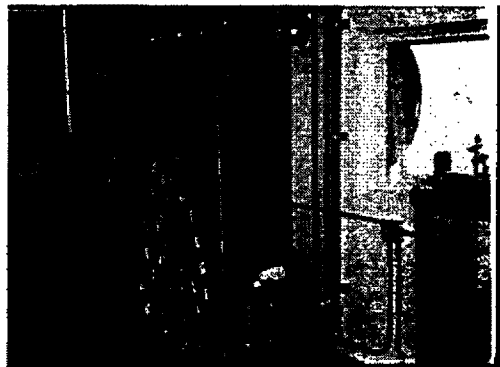
- Objectives
- Design
- Performance
- Age and Condition
- Residuals



9

Existing Treatment Objectives

- Primary Standards
- Secondary Standards



10

Existing Treatment Design

- Design Conditions
 - Hydraulic loading
 - Solids loading
 - Chemical feed
 - Peak daily flow
 - Residuals handling
- Future Demands on System



11

Existing Treatment Performance

- Finished Water Quality
 - Average
 - Excursions
- Process Control
- Performance Limiting Factors
- Cost and Efficiency
- SCADA



12

Age and Condition of Treatment

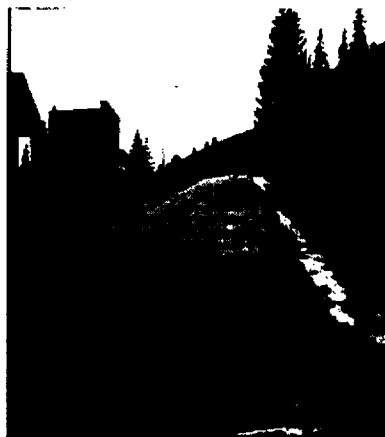
- Structural Components
- Process Equipment
- Electrical Systems
- Control Systems
- Safety
- Redundancy



13

Assessing the Distribution System

- Age
- Materials
- Installation
- Repair History
- Water Use Records
- Valves
- Hydrants



14

Assessing the Distribution System (cont.)

- Main Break and Leak Patterns
- Corrosion History
- Environmental Stresses
- Peak Hourly Flow
- Looping



Internal System Assessment

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Maintenance Alternatives

- Main Break Repair or Replacement
- Cleaning and Lining
- Leak Detection and Repair

Internal System Assessment

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Assessing Storage

- Condition
- Storage Capacity
- CT Provided
- Sanitary Condition
 - Vents
 - Hatches
 - Level measuring devices
 - Overflows



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Storage Capacity

- Operational Storage
 - Peak demands vs. supply capacity
- Fire Storage
 - ISO
 - Fire marshal
- Emergency Storage
 - Power outages
 - Natural disasters
 - Pump or supply failures



18

Storage Capacity (Hydropneumatic)

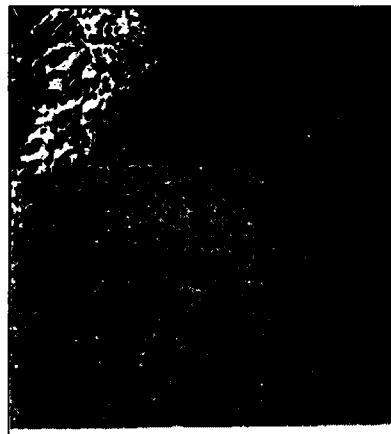
- Frequency of Pump Cycling
- Auxiliary Power
- Pumping Rate vs. Treatment Capacity



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Storage Sanitary Condition

- Vents
- Hatches
- Level Measuring Devices
- Overflows
- Elevation (Pressure)



20

Pumping Stations

- Age
- Condition
- Design Standards
 - Redundancy
 - Auxiliary power
 - Pressure
 - Peak hourly flow
 - Confined spaces



21

Assessing Retail Services

- Meters
- Meter Reading Equipment
- Billing and Revenue Collection
- Hardware and Software

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The Cost of Inadequate Planning

- Financial Hardship
- Poor or Variable Water Quality
- Regulatory Violations
- Periodic or Chronic Water Shortages
- Loss of Revenue Due to Inaccurate Meters or Leaks



Technical, Managerial, and Financial Capacity

1

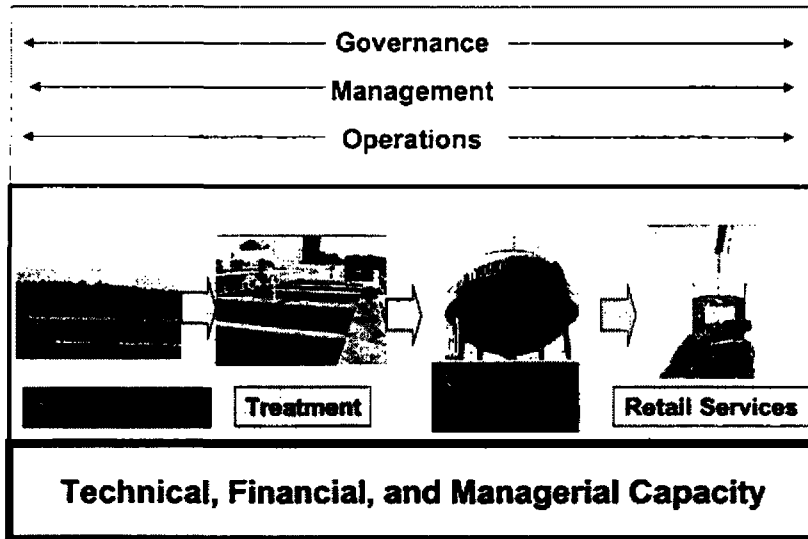
The Three Elements Of Capacity



2

Strategic, Functional Water System Model

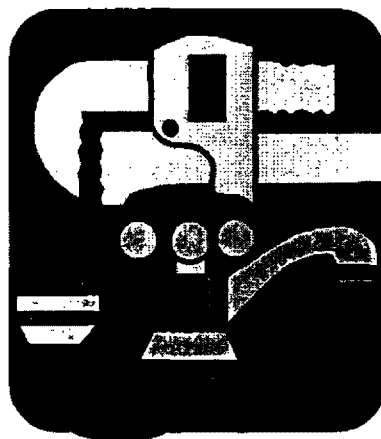
Internal System Assessment



3

Technical Capacity

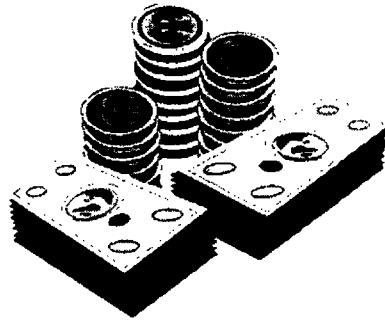
Internal System Assessment



- Source Water
- Infrastructure
- O&M

4

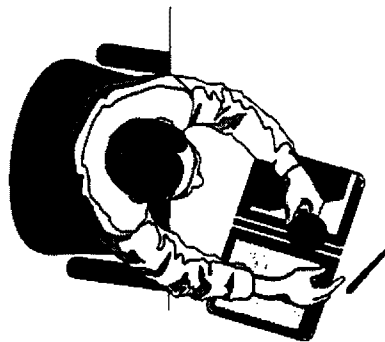
Financial Capacity



- Revenue Sufficiency
- Credit Worthiness
- Fiscal Management

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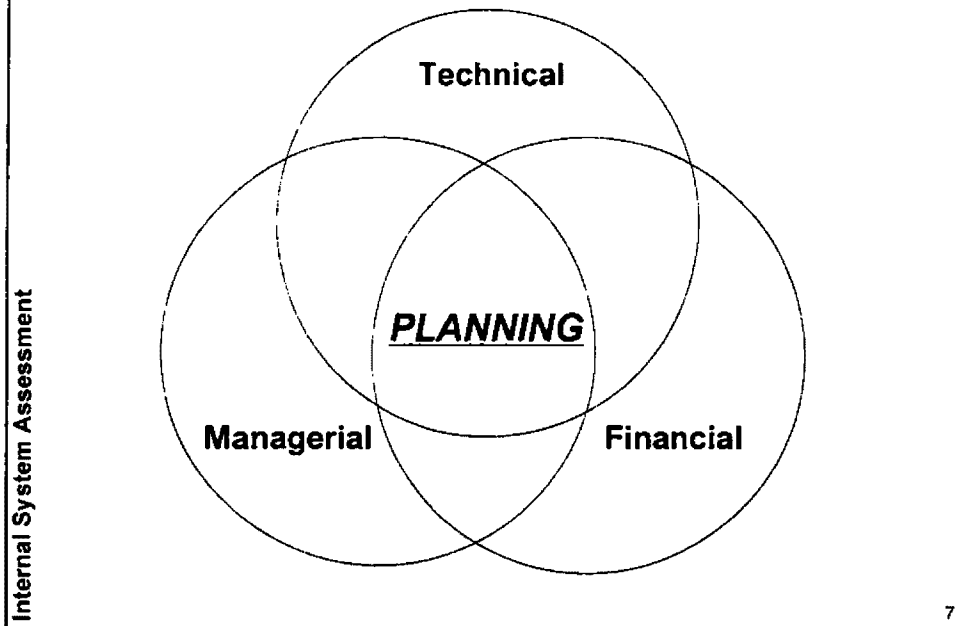
Managerial Capacity



- Ownership Accountability
- Staffing & Organization
- Effective External Linkages

6

Dimensions Of Capacity Are Distinct But Interrelated



Assessment of Internal Capacity

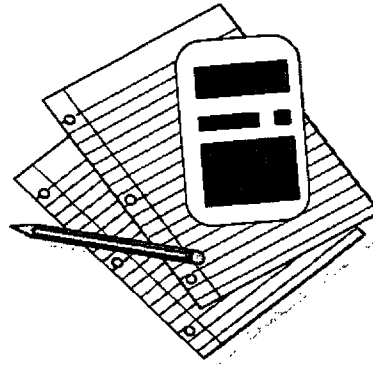
Internal System Assessment

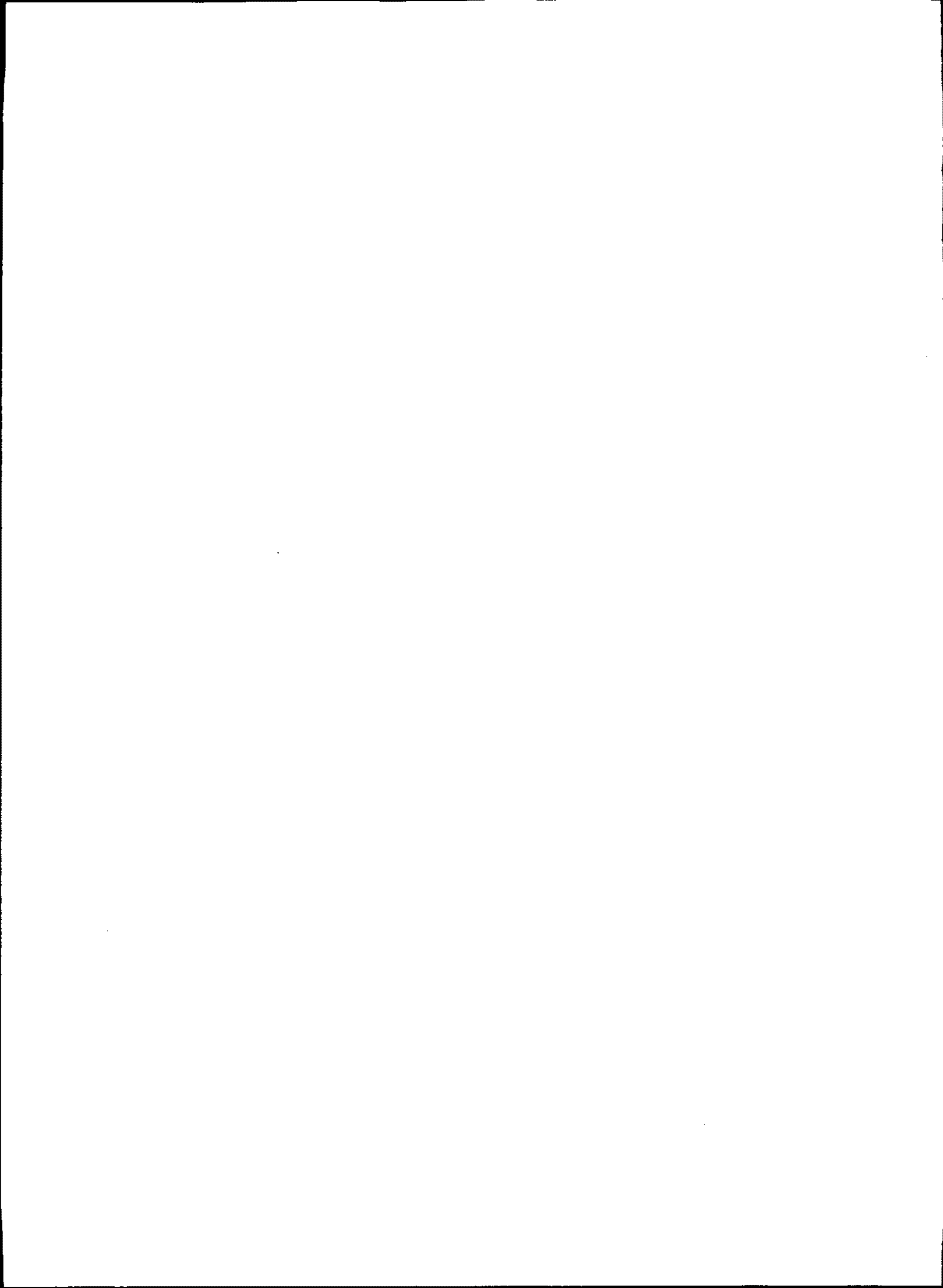
	Elements of Capacity	Strengths	Weaknesses
Technical	Source Water Adequacy		
	Infrastructure Adequacy		
	O & M		
	Ownership Structure & Accountability		
	Staffing and Organization		
Financial	External Linkages		
	Revenue Sufficiency		
	Credit Worthiness		
	Fiscal Management & Controls		

8

Examples Of Capacity Assessment Tools

- NRW Self-Assessments
- State Self-Assessments (e.g., CA, PA, IA)
- The "Dozen Questions" (AWWA)
- Financial Viability Assessments Developed by PUCs
- Sanitary Surveys
- Permit Application Data
- Criteria Used by Lenders





Regulation Overview for Small Systems

An Imposing Mountain

Customer Expectations

FBRR Radon Revisions
Arsenic Stage 2 D/DBP
LT2ESWTR GWR CCR CCL
Stage 1 D/DBP LT1ESWTR
IESWTR Copper Lead UCMR
TCR SWTR VOCs
Phase II Fluoride Phase V
NIPDWRs

1000 Pennsylvania Ave.
Washington, D.C. 20540
202-548-5000

Existing Rules Reduce Risk

Assessing External Challenges

Microbial Risk		Chemical Risk	
SW	GW	SW	GW
[Redacted]	[Redacted]	UCMR	
		CCR; PN	
		Stage 1 DBPR	
		Phase 2/5	
[Redacted]	[Redacted]	LCR	
		VOC	
		Fluoride	
		NPDWRs	

New Rules Address Newly Identified Risks

Assessing External Challenges

Microbial Risk		Chemical Risk	
SW	GW	SW	GW
[Redacted]	[Redacted]	DWCCL	
		NPDWR Revisions	
[Redacted]	[Redacted]	Stage 2 DBP	
		Radionuclides	
		Arsenic	
[Redacted]	[Redacted]	Radon	
		Existing NPDWRs	

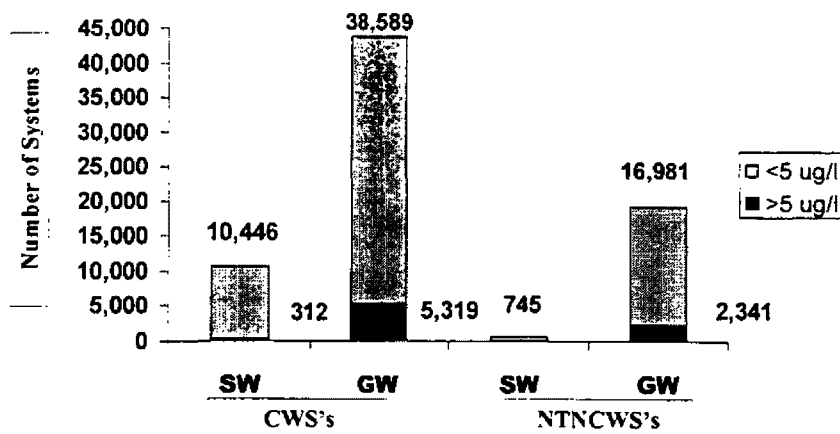
Arsenic

- Proposed June 22, 2000 (Sept. 20)
- Final Rule Due January 2001
- Goal
 - Establish an updated regulation to protect the public from health risks caused by arsenic in drinking water
- Applies to Community Water Systems
 - NTNCWSs to notify customers if MCL exceeded

Arsenic Proposed Requirements

- MCLG = zero
- Feasible Level = 3 ug/L
- Proposed MCL = 5 ug/L
 - Comments requested at 3, 10, and 20 ug/L
 - Proposed MCL was adjusted upward to where the cost is justified by the benefits
- Best Available Technology
- Compliance Monitoring and Reporting

Proposed Arsenic Rule - System Impacts



Radon

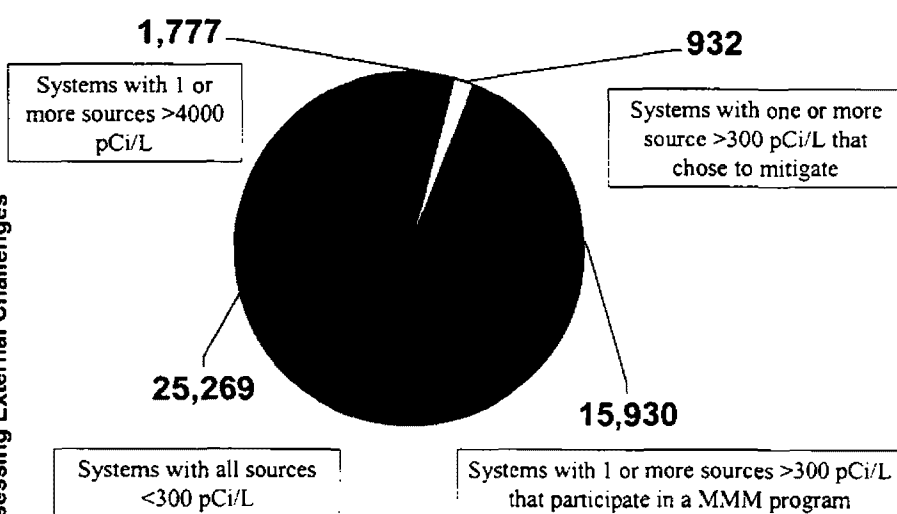
- Proposed November 2, 1999
- Final Rule Expected Fall 2000
- Goal
 - Reduce health risks to exposure to radon in drinking water
- Applies to All Community Water Systems Using Ground Water or Mixed Ground Water and Surface Water

Assessing External Challenges

Radon Proposed Requirements

- MCLG = Zero
- MCL = 300 pCi/l
 - Alternative MCL (AMCL) = 4,000 pCi/l
- MMM Program Assistance Document to Be Provided With Final Rule
- BAT, Compliance Monitoring, Reporting
- Option 1
 - State Develops Multimedia Mitigation (MMM) Program for Indoor Radon (to Achieve ↕ Risk Reduction)
- Option 2
 - No State MMM Program

Proposed Radon Rule - System Impacts



Radionuclides

- Proposed Rule July 1991
- Notice of Data Availability (NODA)
published April 21, 2000
- Goal
 - Protect the public against the harmful effects of radionuclides in drinking water
- Applies to Community Water Systems
 - Options presented for NTNCWSs

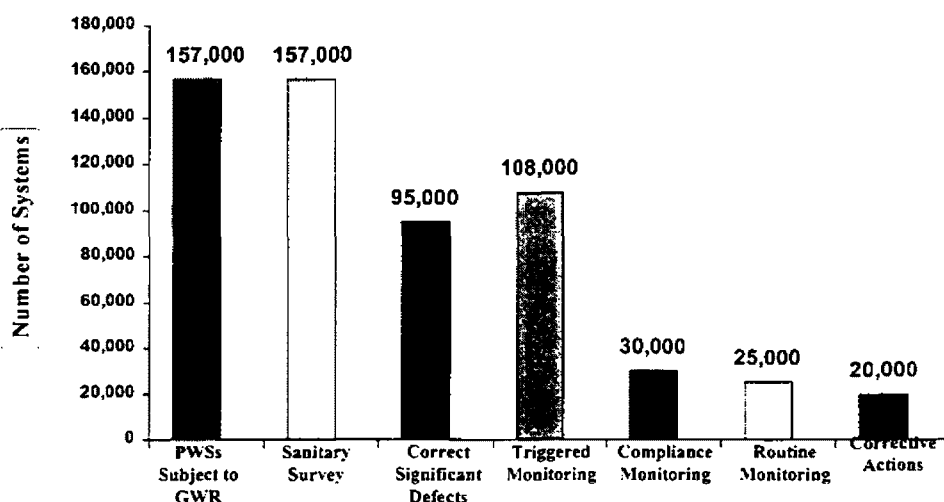
Ground Water Rule (GWR)

- Proposed Rule May 10, 2000 (Aug. 9)
- Final Rule Expected Fall 2000
- Goals
 - Establish a targeted strategy to identify ground water systems susceptible to microbial contamination
 - Establish a protective barrier to prevent microbial illness in ground water systems

GWR Proposed Requirements

- Sanitary Surveys by State to Identify Significant Deficiencies
- Corrective Actions
- Compliance Monitoring for Systems That Disinfect
- For Systems That Do Not Disinfect
 - Hydrogeologic sensitivity assessments
 - Source water monitoring from sensitive aquifers or by systems that have detected fecal indicators in the distribution system

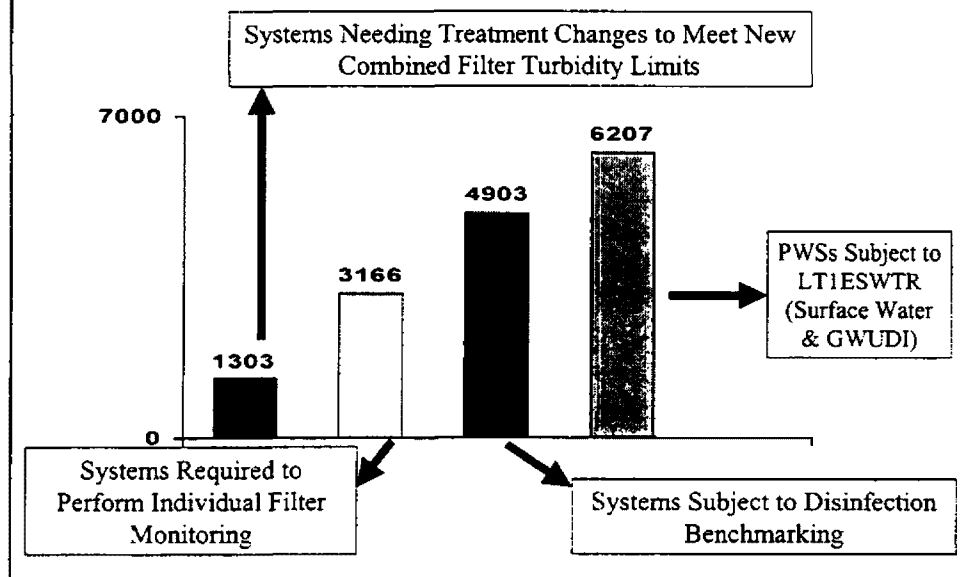
GWR Anticipated Impacts



LT1ESWTR Proposed Requirements

- Applies to Systems < 10,000 Using Surface Water or Ground Water Under Direct Influence (GWUDI)
- Cryptosporidium Removal (99%; 2-log)
- Filter Performance Criteria
- Disinfection Benchmarking
- Source Water Protection to Address Cryptosporidium for Unfiltered Systems
- New Uncovered Reservoirs Prohibited

LT1ESWTR Anticipated Impacts



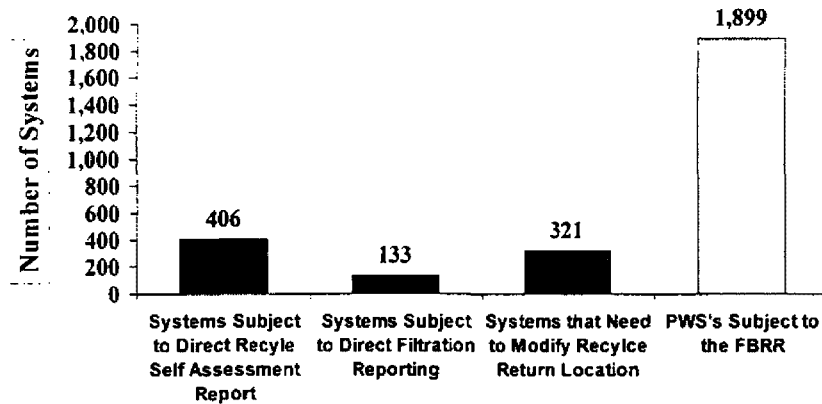
Filter Backwash Recycling Rule (FBRR)

- Incorporated in Proposed LT1ESWTR/FBRR
- Goal
 - Assess and eliminate adverse effects of direct recycling on surface water plants
- Applies to all Surface Water and GWUDI Systems

FBRR Proposed Requirements

- Recycle Prior to the Point of Primary Coagulant Addition (State May Modify)
- Direct Filtration Systems Provide Information to State
- One-month, One-time Recycle Self Assessment for Certain Systems

FBRR Anticipated Requirements



Identify Potential Compliance Actions

RULE	MONITORING	EXISTING TREATMENT PROCESS OPTIMIZATION OR ENHANCEMENT	NEW TREATMENT PROCESS INSTALLATION	MANAGEMENT PRACTICES OPTIMIZATION OR ENHANCEMENT
TCR	X			
SWTR			X	
Phase 1/2/5	X			
Lead & Copper	X		X	
IESWTR	X	X		
LTIESWTR	X	X		
FBRR		X		
LT2ESWTR	X	X	?	
GWR	X			X
Stage 1 DBPR	X	X		
Stage 2 DBPR	X	X	?	
Radon	X			X
Radionuclides	X		?	
Arsenic	X	X	X	
CCR				X
PN				X

Plan Strategically



- Take the Initiative
- Time Is Adequate If You Plan Intelligently
- No Time to Delay Long-term Planning
- It's Only a 'Train Wreck' If You Let It Become One
- It Can Be Done!

The first part of the paper discusses the importance of the study of the history of the English language. It is argued that the study of the history of the English language is not only a matter of academic interest, but also a matter of practical importance. The study of the history of the English language can help us to understand the development of the English language and the influence of other languages on it. It can also help us to understand the social and cultural changes that have shaped the English language over time.

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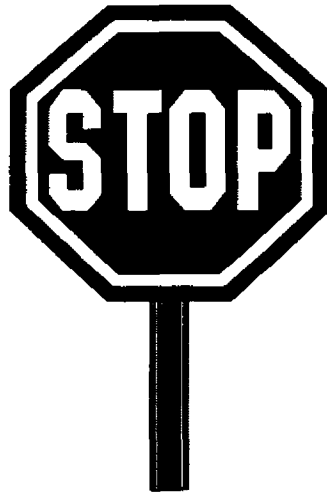
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Small System Treatment Technology Selection

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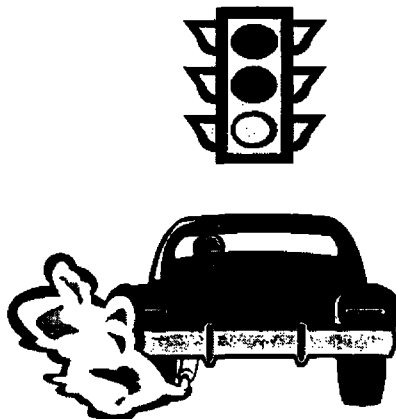


Does the System Really Want to Be in the
Water Treatment Business?

Alternatives to Treatment

- Improve Source Water Protection
- Improve System Operation and Maintenance (O & M)
- Switch to Higher Quality Source
- Purchase Water
- Consolidate

3



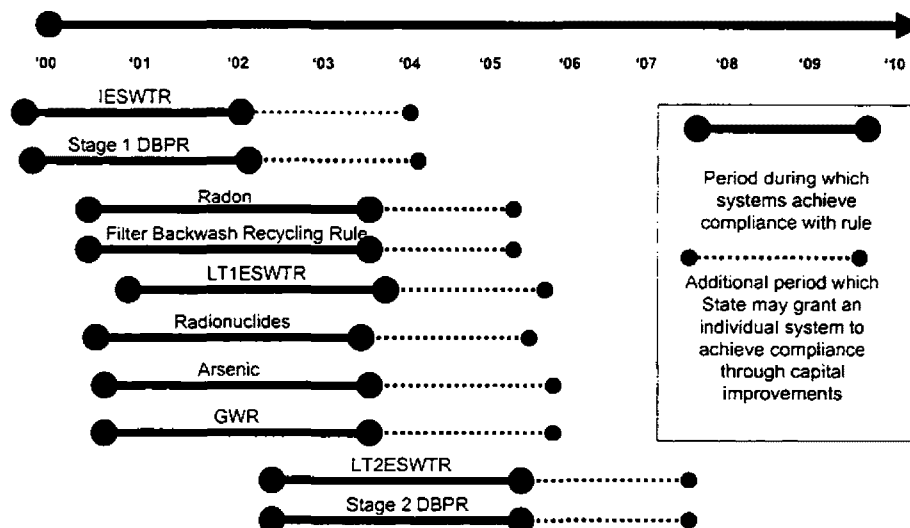
Go Forward with Treatment Selection if
No Practical and Economically Attractive
Alternatives to Treatment of a Current or
New Water Source Exist

Factors Influencing Treatment Selection

- System Characteristics
- Impact of Upcoming Rules
- Characteristics of Proposed Treatment(s)

5

Compliance Timeline



Characteristics of Proposed Treatment(s)

- Ability to Reliably Achieve Compliance
- Costs (Capital, O&M, Waste Disposal)
- Complexity and Flexibility
- Environmental Compatibility

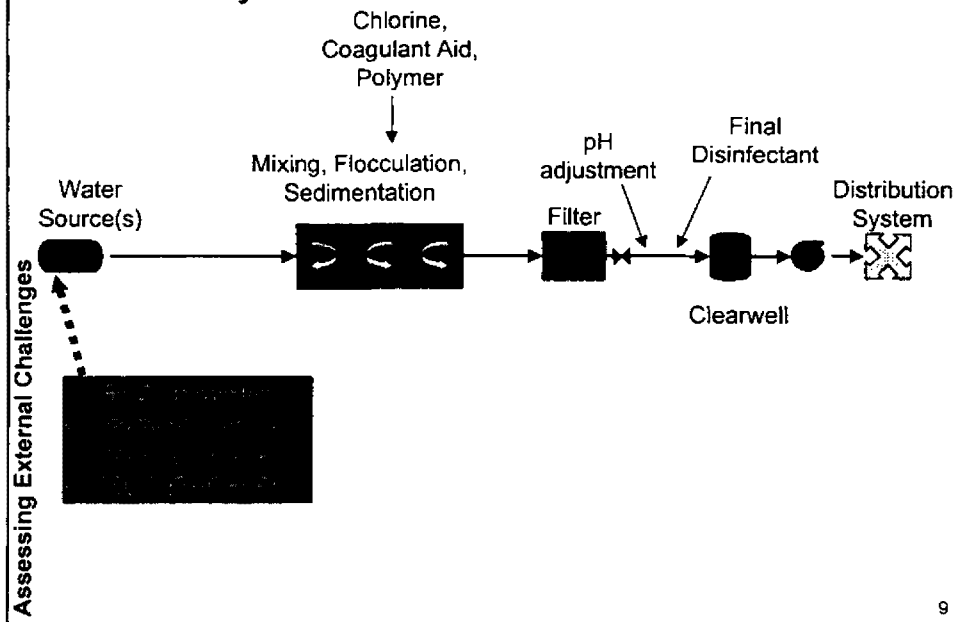
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Treatment Options Analysis- Case Study

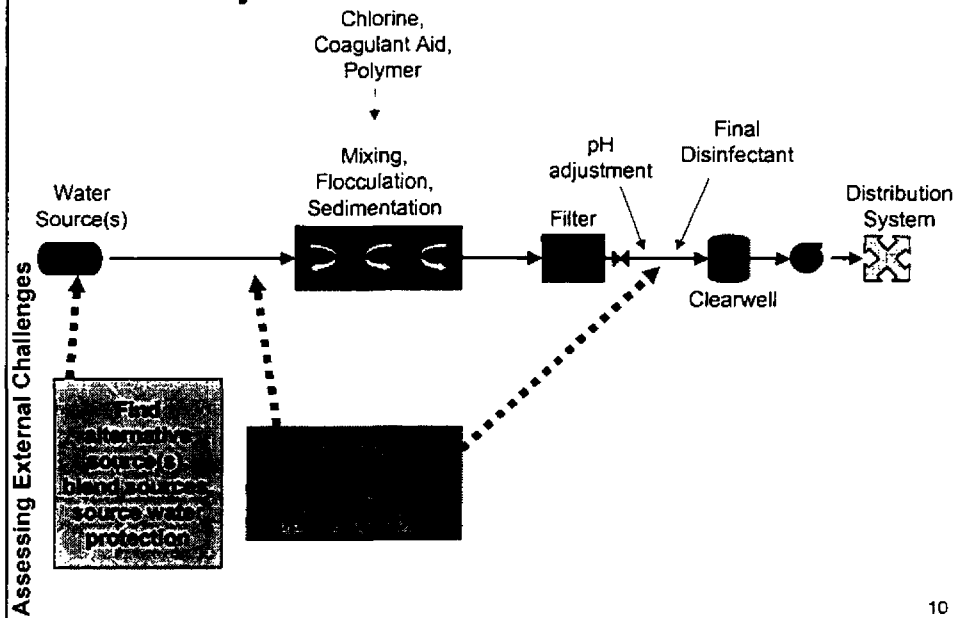
- System Characteristics
 - CWS, surface water, serves 2,500
 - Conventional filtration with chlorine disinfection
 - Raw TOC averages 3.2 mg/l
 - Alkalinity averages 95 mg/l
- Compliance Concerns
 - TTHMS average 0.085 mg/l
 - Treated TOC averages 2.3 mg/l
 - Turbidity is not less than 0.3 NTU 95% of the time
 - Turbidity excursions on individual filters
- Observations
 - Must reduce finished water TOC
 - Address turbidity

8

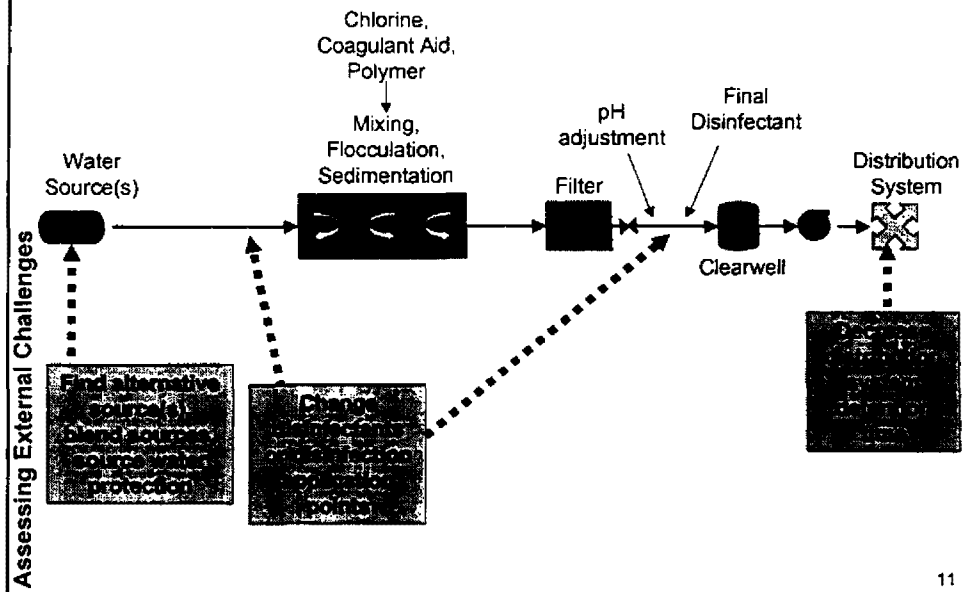
Treatment Options Analysis - Case Study



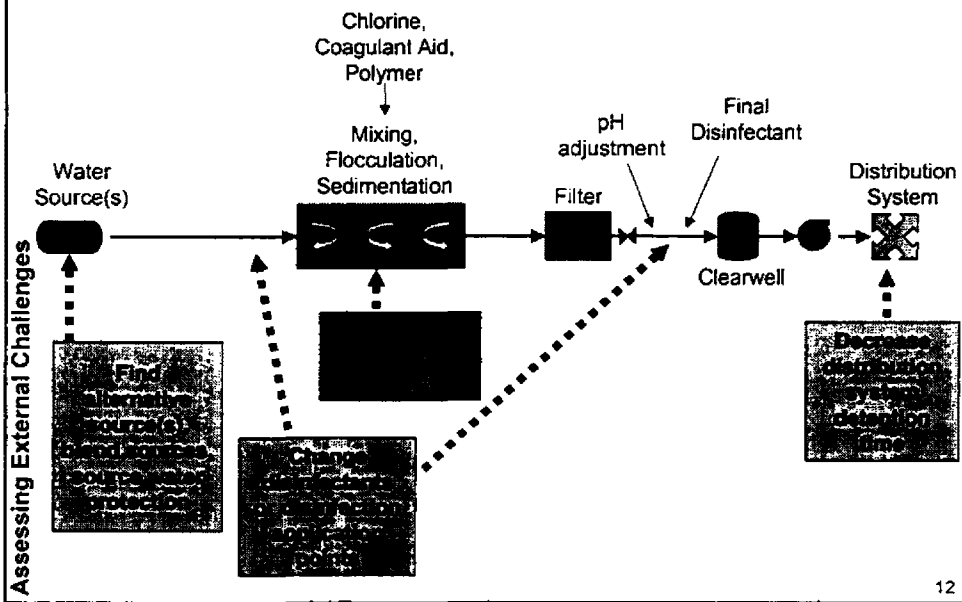
Treatment Options Analysis - Case Study



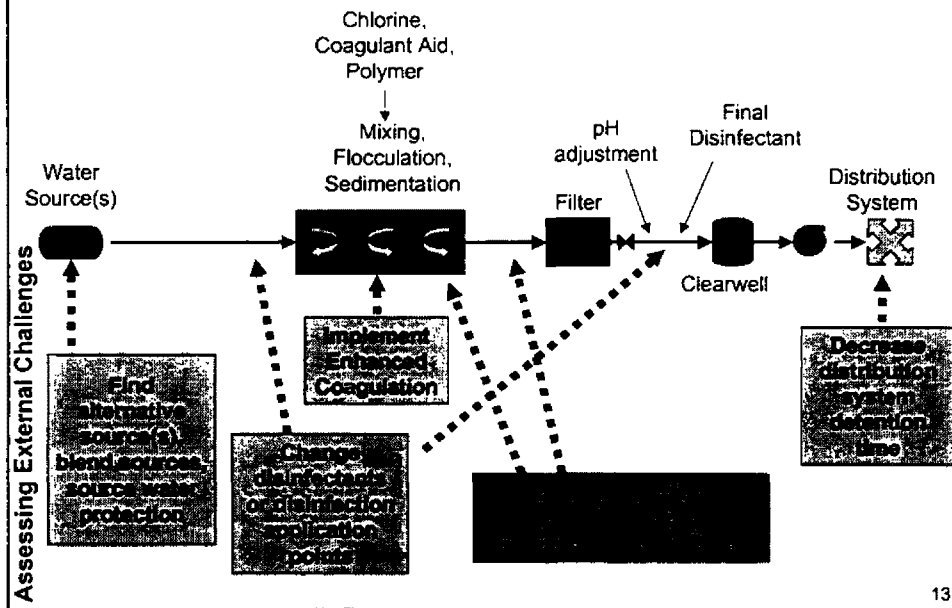
Treatment Options Analysis - Case Study



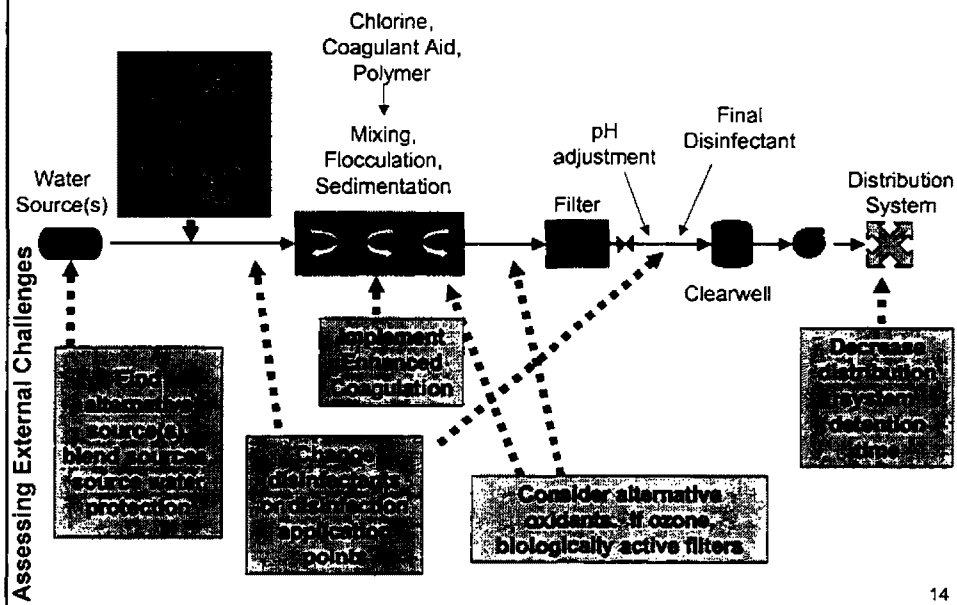
Treatment Options Analysis - Case Study



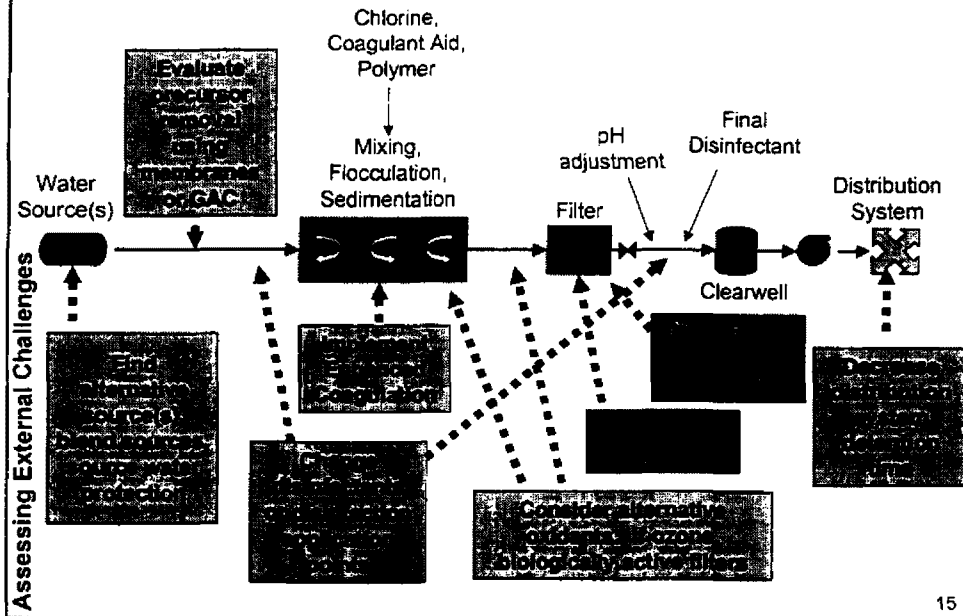
Treatment Options Analysis - Case Study



Treatment Options Analysis - Case Study

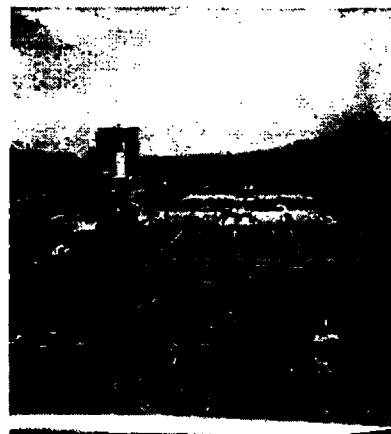


Treatment Options Analysis - Case Study



Conventional Treatment

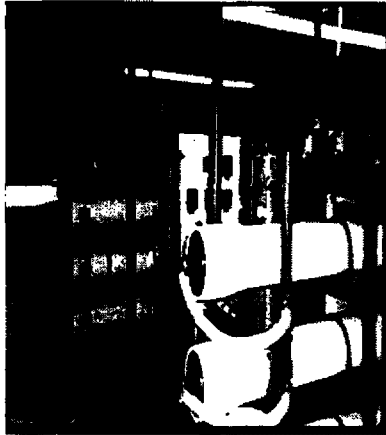
- Assessing External Challenges
- Pros:
 - Removal capabilities
 - Ability to treat source waters of low or inconsistent quality
 - Cons:
 - Advanced operator
 - Adequate land
 - High costs
 - Sludge disposal



16

Membrane Filtration

- RO, NF, UF, MF
- Pros:
 - Removal capabilities
 - Size and flexibility
 - Intermediate operator
- Cons:
 - Water rejection (RO & NF)
 - Pre-treatments
 - Waste disposal (RO & NF)
 - High costs



17

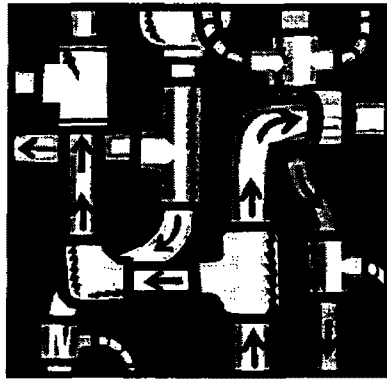
Ion Exchange

- Pros:
 - High removal rates
 - Low cost
 - Intermediate operator
- Cons:
 - Co-contaminants
 - Brine disposal



18

Disinfection

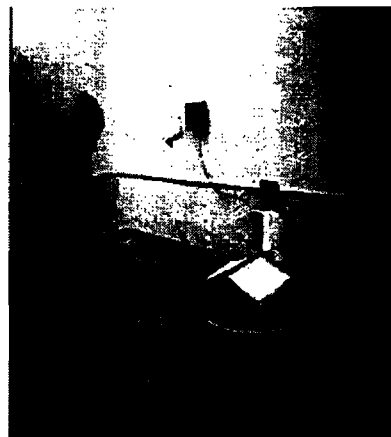


- I. Type
 - Chemical
 - Chlorine
 - Chloramines
 - Chlorine Dioxide
 - Ozone
 - Non-chemical
 - UV
 - Membranes
- II. Purpose
 - Primary
 - Secondary

19

Chemical Disinfection

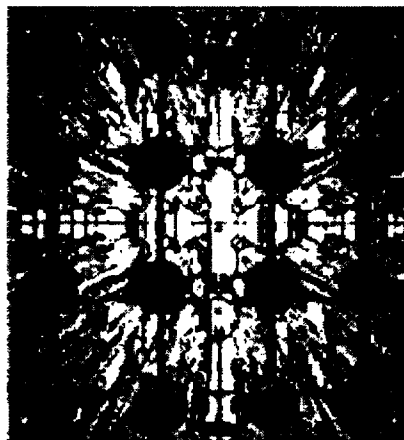
- Pros:
 - Compliance with GW and TC rules
 - Low cost (chlorine, chloramines)
 - Oxidation
- Cons:
 - DBP formation (especially chlorine, chlorine dioxide)
 - Additional disinfectant (ozone, chloramines)
 - Handling dangerous chemicals



20

Ultraviolet Light Disinfection

- Pros:
 - No THM precursors
 - Easy & safe operation
 - Generally low cost
- Cons:
 - No residual disinfectant
 - Not appropriate for waters high in TSS or turbidity
 - High doses required for cyst inactivation will increase costs



21

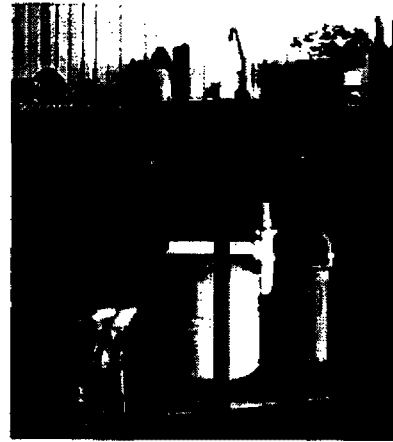
Granular Activated Carbon

- Pros:
 - Effective removal of SOC, VOCs, Radon
 - Improved aesthetic quality
 - Relatively low cost
- Cons:
 - Co-contaminants may interfere with adsorption of selected contaminants
 - GAC must be replaced periodically

22

Centrally Managed POU

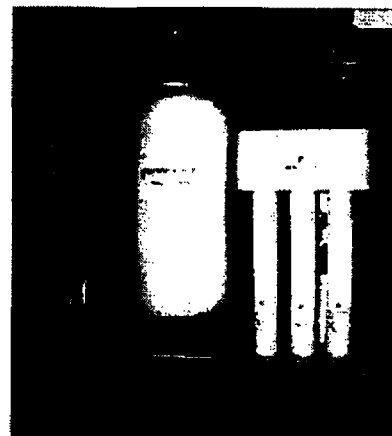
- Pros:
 - Generally more cost effective for very small systems
- Cons:
 - Significant maintenance, oversight, and customer education required
 - Not approved for microbial removal



23

Centrally Managed POE

- Pros:
 - Generally more cost effective for very small systems
- Cons:
 - Significant maintenance, oversight, and customer education required
 - Some states may restrict disposal options for certain devices



24

External Challenges: Other Issues

Source Water Supply
Achieving Competitive Efficiency

1

New Source Development

- Surface Sources
 - Many environmental, regulatory, and social barriers
- Groundwater Sources
 - Aquifers are limited and may be overdrawn

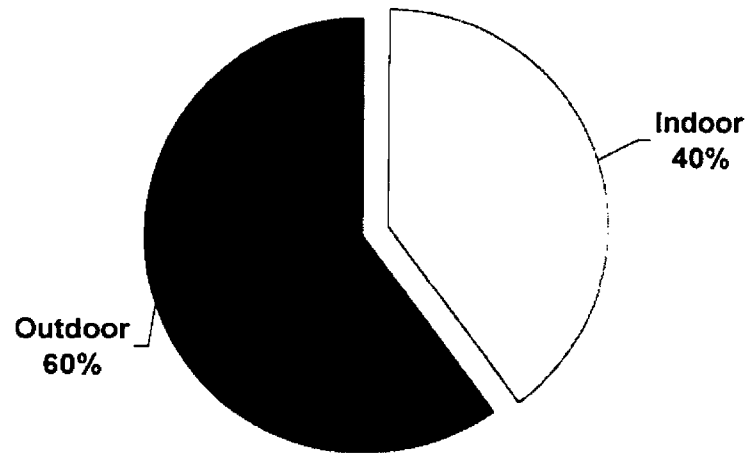
Source Conservation Is a Better Option!

2

U.S. Environmental Protection Agency
1000 Pennsylvania Avenue, NW
Washington, DC 20460

Where Do Residential Customers Use Water?

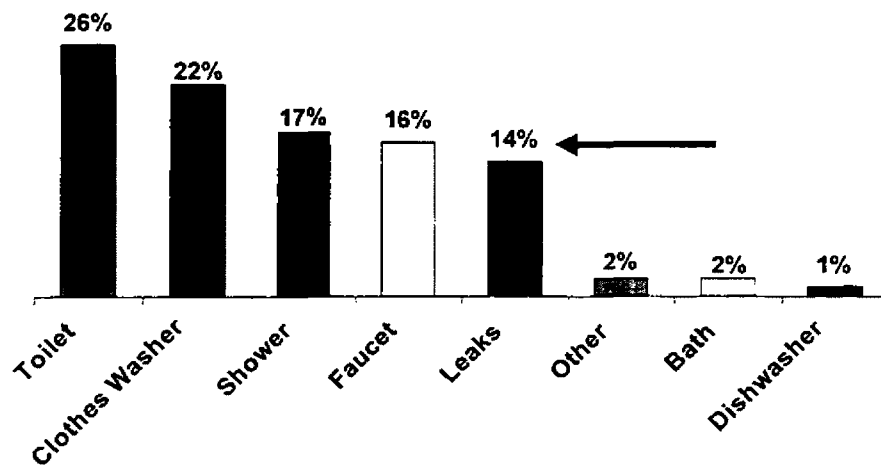
Assessing External Challenges



3

Where Do Residential Customers Use Water Indoors?

Assessing External Challenges



Source: Residential End Uses of Water, AWWARF (1999) 4

Indoor Leaks

- Conservation Potential
 - 10% of homes responsible for 58% of leaks
 - AWWA estimates households can reduce daily per capita water use by about 30% by installing more efficient water fixtures and regularly checking for leaks.

5

Distribution System Leak Detection

- Leak Detection and Repair Saves Water and Expenditures Over the Long Run
- Water Accounting Is the First Step
- If >10% Unaccounted-for Water, Leak Detection Is Recommended
- Investment Pays off Over Time to Repair Leaks



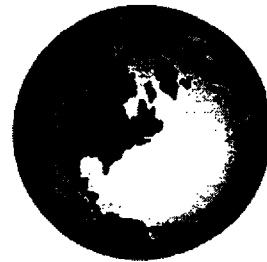
6

Achieving Competitive Efficiency

7

New Players

- Foreign Companies
 - British (Thames)
 - French (Vivendi)
- Energy Companies (subsidiaries)
- Converged Utilities
- Non-utilities -- Vendors



8

The Public Sector Responds

- Re-engineering
- Improved Efficiency
- "Publicization"

9

Implications for Small Systems

- Performance Expectations for Industry as a Whole Will Rise
- Shift in Focus to Water Supply as a Business (Especially Efficiency)
- More Opportunities for Partnerships

10

Partnerships & Water System Organizational Structures

1

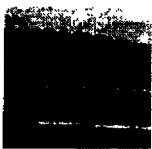



System Partnership Spectrum



2

Assessing System Partnership Potential

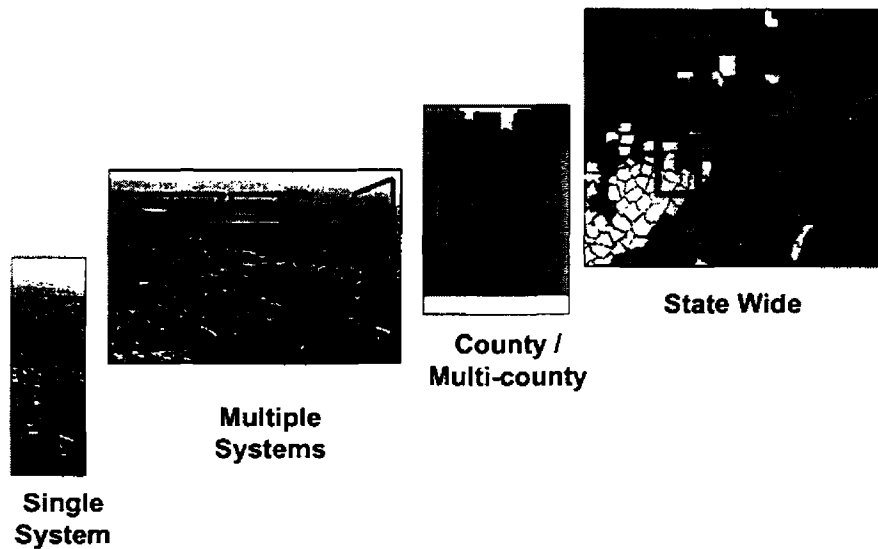
Assessing External Opportunities

		<div> <div>← Governance →</div> <div>← Management →</div> <div>← Operations →</div> </div>			
					
		Source Water	Treatment	Storage & Distribution	Retail Services
Offer					
Acquire					

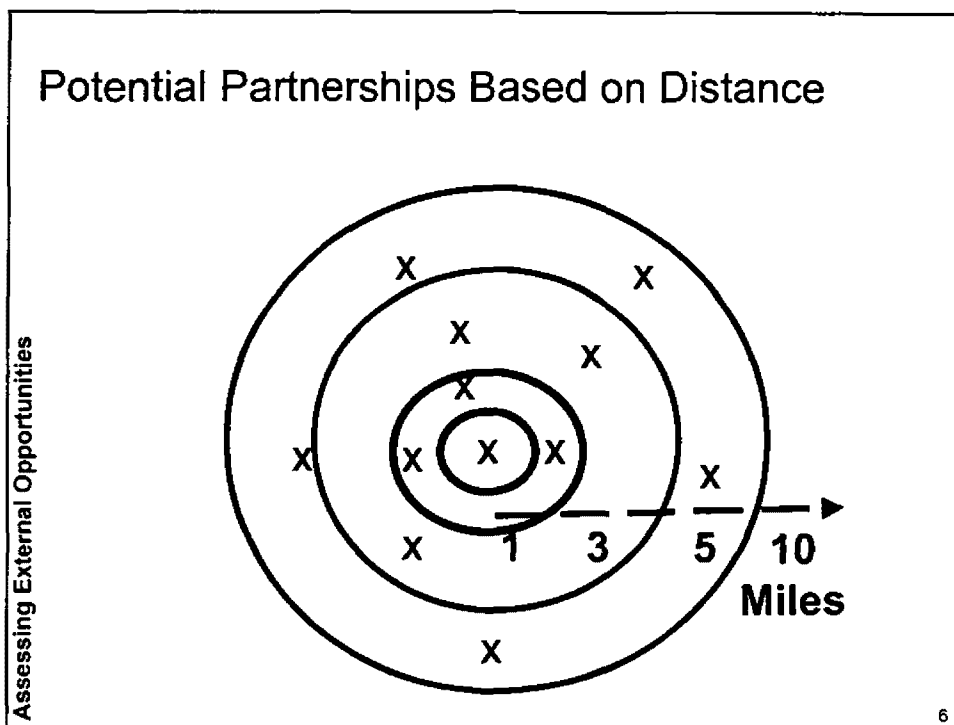
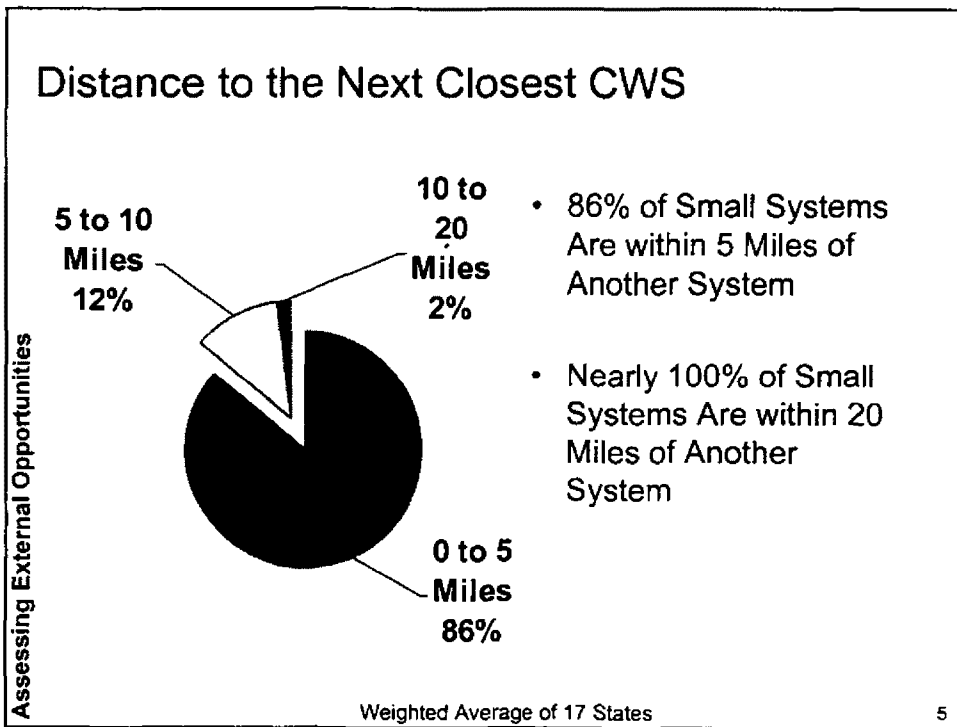
3

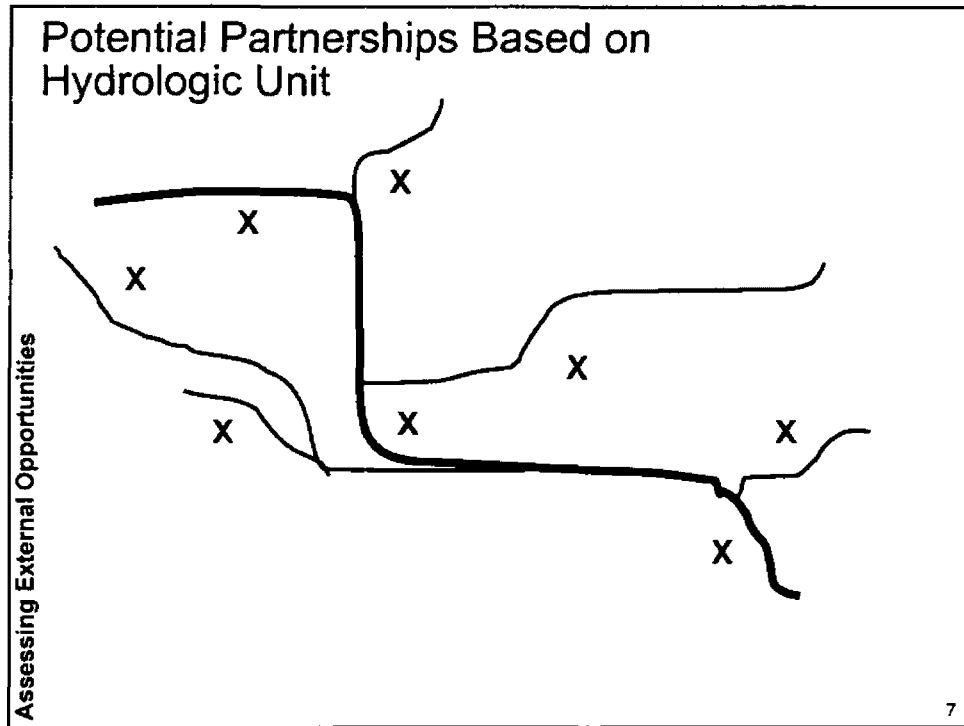
Alternative Spatial Boundaries

Assessing External Opportunities



4





- System Organizational Structures
- Public - Local Government
 - Public - Special Purpose District
 - Private - For Profit
 - Private - Not-for-Profit
- Assessing External Opportunities
- 8

Assessing Organizational Structures

Assessing External Opportunities

	Current Organizational Structure	Strengths	Weaknesses	Interest in Partnering
System 1				
System 2				
System n...				

9

CASE STUDY Kitsap Public Utility District, WA

Assessing External Opportunities



- **KPUD is a municipal corporation**
 - Elected board
 - Incorporated boundaries = county
 - Formed in 1940's
 - Assumed operation of several systems in 1970's
- **Serves:**
 - 55 systems (1/2 are Group B)
 - 30,000 people
 - 8,000 service connections

10

Kitsap Public Utility District, WA Services Offered

Assessing External Opportunities

•UTILITY OPERATIONS

- Satellite management

<u>KPUD</u>	<u>System Owner</u>
Operations	Financing
Preventive Maintenance	Rate Setting
Water Quality Monitoring	Legal Liability
Emergency Response	
Record keeping	

- Direct ownership

- Physical interconnection
- Satellite operation

•CONTRACT & DATA SERVICES

- Wholesale supply
- Planning
- Management & monitoring
- Information services & TA

•SUPPORT ASSISTANCE

- Bulk purchase
- Training
- Source protection & resource studies
- Public education

11

Kitsap Public Utility District, WA RATES

Assessing External Opportunities



•Consolidated (Postage Stamp) rates

- All systems owned by KPUD pay the same rate

•Customer charges

- \$14/month Basic Service Charge (Fixed Costs)
- Increasing block rate (Commodity Charges cover Marginal Costs)
 - \$0.75-\$1.05/100 ft³
- Assessment for newly acquired systems
 - If needed
 - \$2,000-\$5,000 / connection
 - Payable over 20 years

12

CASE STUDY Hansville Water District, WA



- 1,184 connections
- SW & GW
- Issues
 - Quantity
 - SWTR compliance
- Solution
 - Requested consolidation with KPUD

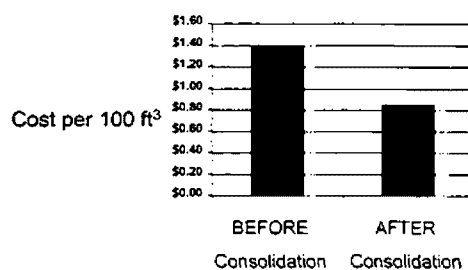
13

Hansville Water District, WA

• KPUD tied Hansville into Kingston Water System

- 41,000 ft of 10" transmission main
- Fire hydrants
- Booster station
- Steel storage tank

• Rates for Hansville customers



NO SPECIAL
ASSESSMENT

14

CASE STUDY Central Iowa Water Association

Assessing External Opportunities



- Serves 8,400 customers; 2.4 MGD
- Water purchased from Newton, Marshalltown, and Pella Water Works
- Provides service to 12 counties
 - Plans to expand to serve 6 more
- Provides direct retail service in 5 incorporated towns & 11 unincorporated communities
- 18 towns purchase bulk water
- 7 towns have emergency connections
- CIWA provides contract operation for 1 town's water and wastewater system

15

CASE STUDY Sully, IA

Assessing External Opportunities

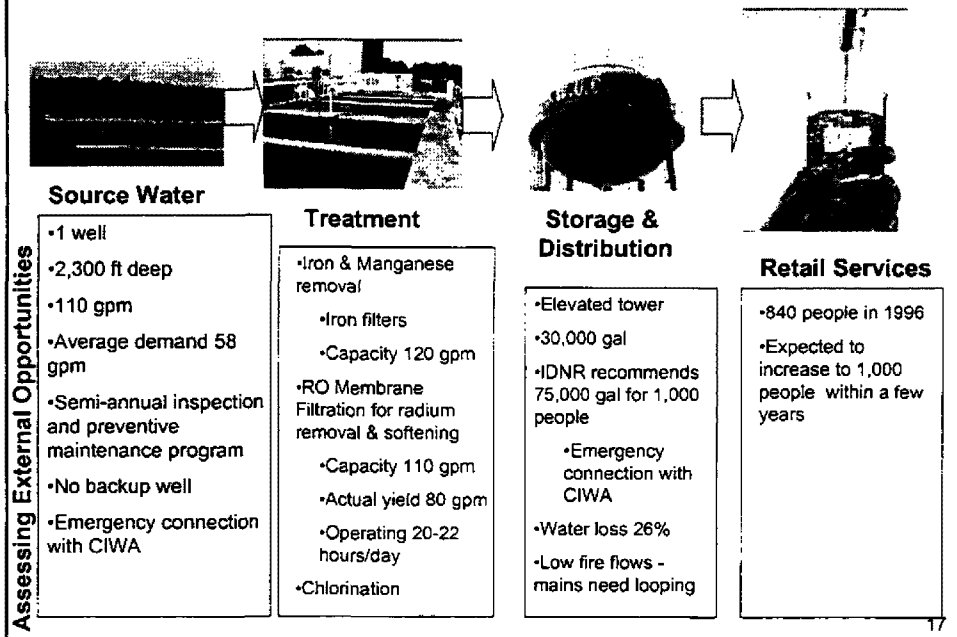


City of Sully

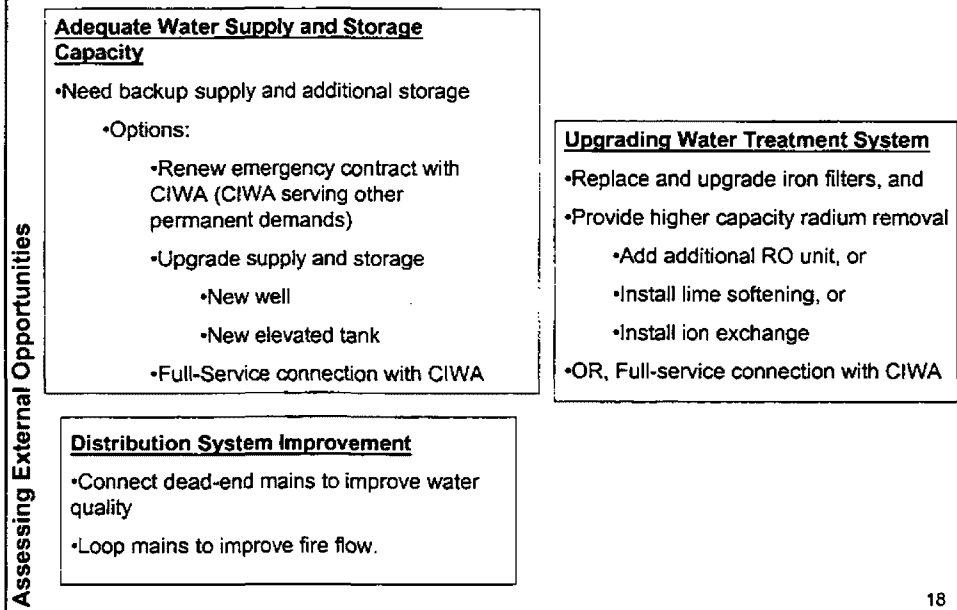
- Provides water to 841 people
- Concerns about condition and adequacy of:
 - Treatment
 - Storage
 - Distribution
- In 1997 city commissioned consulting engineer to prepare study of water system facilities

16

City of Sully, IA -- Facilities Condition

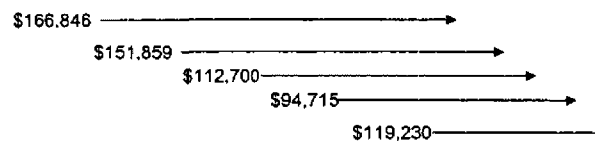


Major Issues and Options for City of Sully, IA



Sully, IA - Scenarios Evaluated

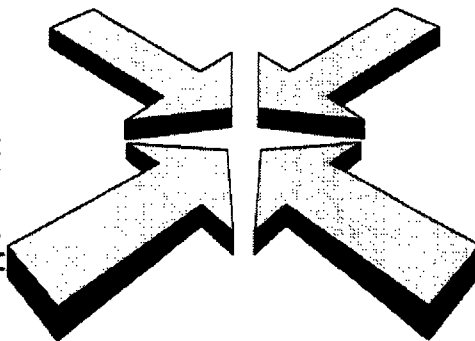
EMERGENCY CONNECTION				X	X	
UPGRADE SUPPLY	X	X				
REPLACE IRON FILTERS	X	X	X	X		
RO						
• Replace	X			X		
• Upgrade	X			X		
UPGRADE STORAGE	X	X				
FULL-SERVICE BULK CONNECTION WITH CIWA						X



19

Sully, IA -- Option Selected

•Full-service bulk connection partnership with CIWA



- Sully focuses on distribution and retail services
- CIWA offers economies of scale
- Sully gets out of treatment business - avoids future costs
- Sully avoids costs associated with further developing its own water supply

20

CASE STUDY Aurora, SD



- Population 600
- System
 - Installed 1972
 - One 150 gpm Well
 - Disinfection & Fluoridation
 - One 50,000 gal elevated tower
 - Flow: Average 100 gpcd; Max 150 gpcd
- Issues
 - Nitrate contamination
 - Hiring Certified Operator
 - 20%-30% Unaccounted for water

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Aurora, SD - Alternatives Considered

New Well Field & Treatment Owned by City

**New Well Field & Treatment Jointly Owned by
City and Big Sioux Rural Water System**

**Interconnect With & Purchase
Water Wholesale From City of
Brookings**

**Interconnect With & Purchase Water
Wholesale From the Brookings-Deuel Rural
Water System**

22

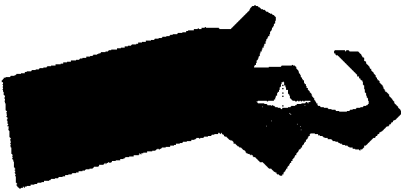
Aurora, SD Capacity Perspective on Alternatives				
	New Well & Treatment – City Owned	New Well & Treatment – Jointly Owned	Interconnect & Wholesale Purchase – Brookings	Interconnect & Wholesale Purchase – Brookings- Deuel
Nitrate Compliance	+	+	+	+
Control of Rates	+	+	-	-
Liability for Future Treatment	-	-	+	+
Certified Operator	-	-	+	+
Access to Technical & Managerial Assistance	-	+	+	+
\$/1000 gal	4.67	3.75	3.21	3.30
+ = Advantage - = Disadvantage				

Assessing External Opportunities

23

CASE STUDY Cohasset, MA

- System serves 7,000 people.
- 3 MGD SW Treatment Plant.
- Board of Water Commissioners
 - Part-time, volunteers
 - Were focused on managing day-to-day system operations
 - Could not find replacement for water system superintendent
 - Wanted to focus energy on planning; not on daily oversight



Assessing External Opportunities

24

Cohasset, MA

- Board decided to contract out system operation.
- First 3-Year contract to a joint venture.
- Second 3-Year contract with American Water Services, Inc.
 - Full-Service management, operation, & maintenance contract.

AWS Responsibilities

Treatment Facilities
 Distribution Facilities
 Cross Connection Program
 Meter Reading
 Meter Repair &
 Replacement
 Customer Services
 Accounting & Reporting
 Personnel Administration

Town Responsibilities

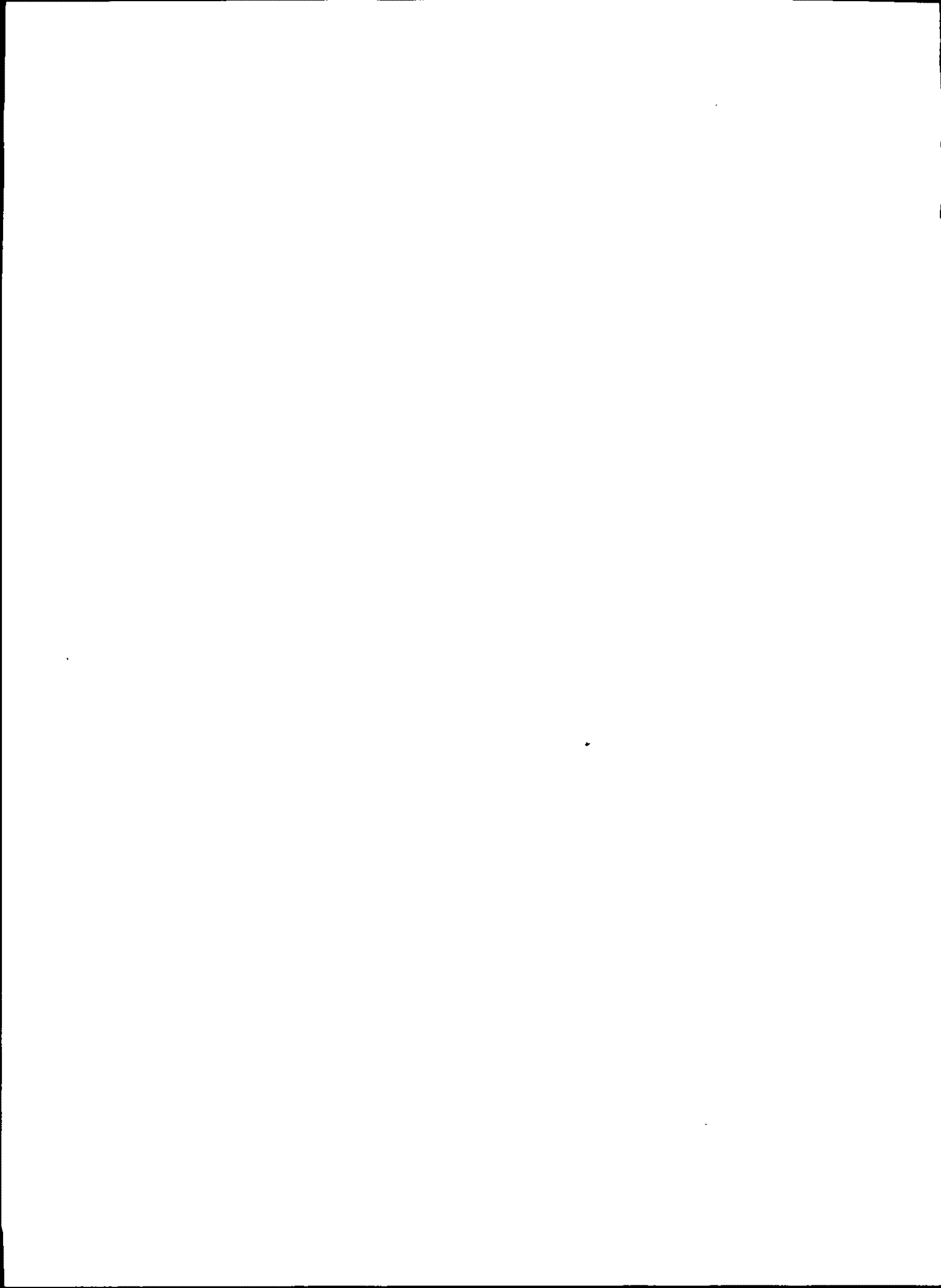
Capital Improvement Decisions
 Funding
 Construction Contracting

25

Benefits of Privatization - Cohasset, MA

- Board Now Focuses On Long-Range Planning.
- Board Developed Comprehensive Capital Improvement Plan.
 - Water Main Improvements
 - Treatment System Upgrades
 - SCADA System Installed
 - New Storage Tank Constructed
- Rates Have Not Increased.

26



External Opportunities: Other Issues

Protecting Source Water
Financial Resources
Public Awareness

Source Water Protection

- Prevent Future Contamination
- Reduce Current Contamination

Elements of a Local Source Water Protection Program

- 1) Assess Source
- 2) Assemble Project Team
- 3) Choose Management Tools

1) Assess Source Water

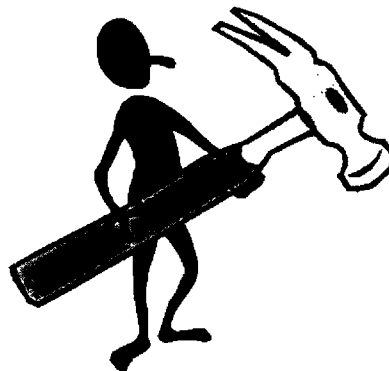
- System/Third-party Activities Can Build on the State Source Water Assessment
 - SWAP will delineate source water protection areas, identify sources of contamination, and analyze susceptibility
 - Gather additional information where necessary
 - Create map for use in management decisions (GIS)
 - Prioritize contamination threats
 - Update assessment (if not updated by state)

2) Assemble Local Project Team

- Assemble Committed Team to Guide Process
- Bring Together Appropriate Stakeholders
- Recruit Volunteers
- Establish Partnerships
 - Local authorities
 - Citizen groups
 - Neighboring communities
 - State regulators
 - Federal land management agencies
 - Businesses

3) Regulatory Management Tools

- Zoning Ordinances (Prohibition of Various Uses, or Permit Conditions)
- Performance Standards
- Health Regulations (Septic Systems, Floor Drains)



3) Non-Regulatory Management Tools

- Public Education
- Citizen Involvement
- Best Management Practices (BMPs)
- Land Acquisition and Protection
- Water Conservation

Financial Resources

Assessment of Financial Options -- Implications

Assessing External Opportunities

Option	Cost	Financing Source	Rates
1			
2			
N			

Water Rates

Assessing External Opportunities

- $\text{Rates} = f(\text{cost}, \text{cost allocation}, \text{rate design} \dots)$
- $\text{Cost} = f(\text{system organization}, \text{roles}, \text{technology} \dots)$
- Choosing Economically Efficient Solutions Will Lead to Lower Rates

Water System Cost Allocation and Rate Design

- Fixed Charge -Capital
- Variable Charge - O&M

Assessing External Opportunities

Sustainable Pricing

**Sustainable
Water Rate
(\$/unit)**

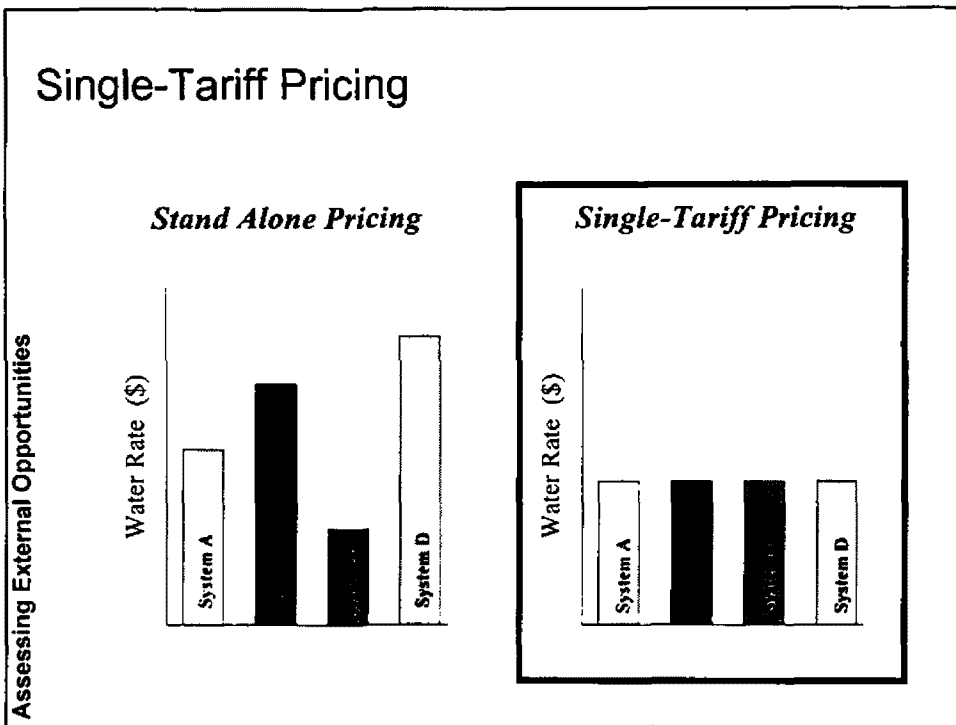
Low enough to be
affordable for customers
so that the system can be
supported over time



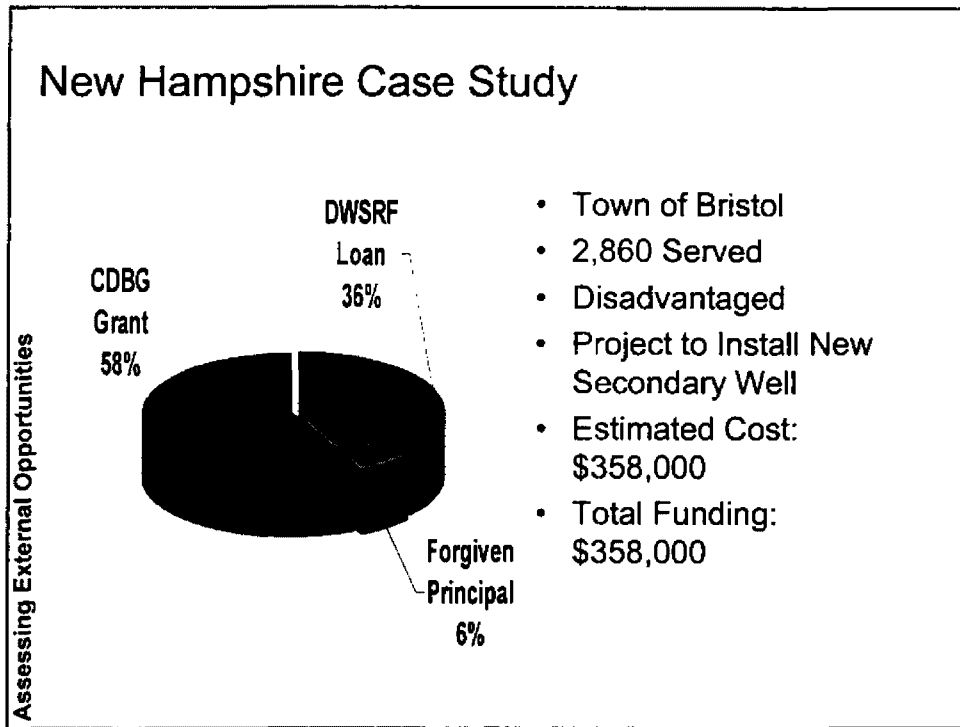
High enough to cover the cost
of service and send efficient
price signals to guide
consumption and product
decisions

Assessing External Opportunities

* Adapted from EPA, Sustainable Pricing: A Long Term Capacity Development Strategy



- Major Funding Sources for Small Systems**
- Assessing External Opportunities
- Grants
 - EPA Drinking Water State Revolving Fund (DWSRF) principal forgiveness
 - HUD Community Development Block Grant (CDBG) Program
 - USDA Rural Utilities Service (RUS) Water and Waste Disposal Program
 - Loans
 - DWSRF
 - CoBank Rural Utility Banking Group
 - State Programs
 - Private Capital Markets
 - USDA Rural Utilities Service (RUS) Water and Waste Disposal Program



Public Awareness

Assessing External Opportunities

Your Customers... Friends or Foes?

Interactions with the Public

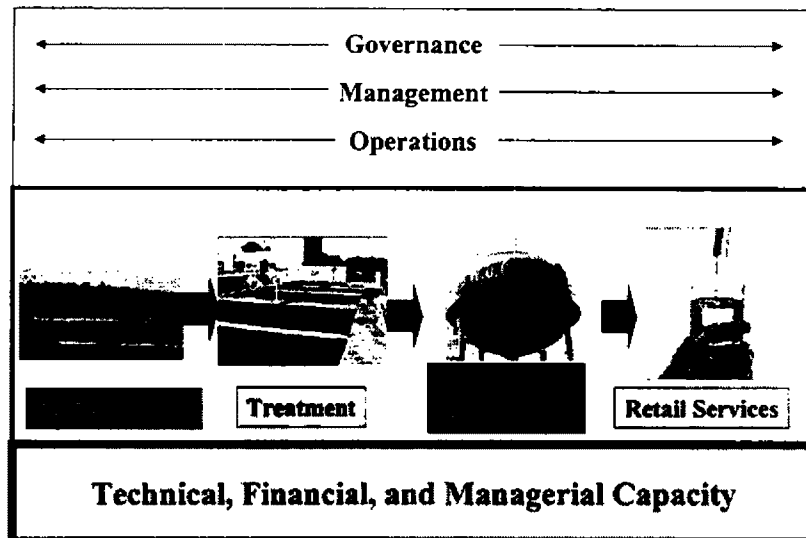
- Public Relations
- Public Education
- Public Involvement

As Part of Your Strategic Plan...

- What Specific Actions Will You Take to Maintain Public Support?

Strategic, Functional Water System Model

Assessing External Opportunities

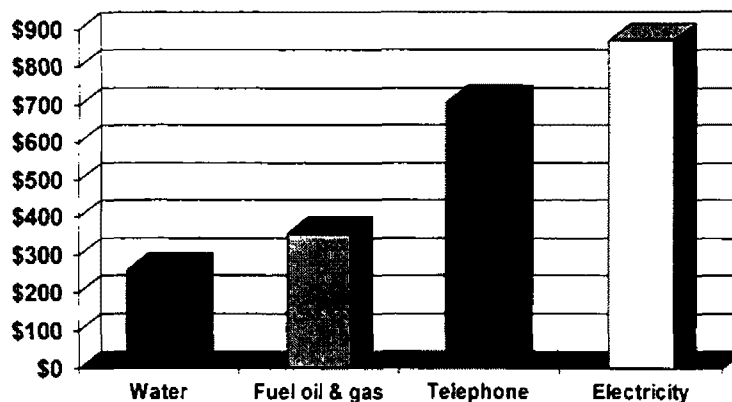


Assessing Interactions with the Public

Assessing External Opportunities

Utility Function	Steps to Build and Maintain Public Support
Source	
Treatment	
Storage & Distribution	
Retail Services	

Annual Household Expenditures for Utilities



Source: U.S. Bureau of Labor Statistics, *Consumer Expenditures in 1995*

Summary

- Getting the Public Involved can:
 - Increase public understanding of true cost and value of water
 - Increase customer willingness to pay and to act
 - Increase public support for changes in infrastructure and administration
 - Enhance water service through public involvement in decision-making, source water protection

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200

Identifying Options & Determining Optimum Solutions

1

Simplified 6-Step Framework



- Assess
- Define
- Identify
- Analyze
- Implement
- Evaluate

2

Simplified 6-Step Framework

- **Assess**

- Internal -- strengths & weaknesses
 - Existing infrastructure
 - Technical, financial, & managerial capacity
- External challenges
 - New regulations
 - Treatment for compliance
 - Source water supply
 - Competition
- External opportunities
 - Partnerships
 - Source water protection
 - Financial resources
 - Public awareness

- Define
- Identify
- Analyze
- Implement
- Evaluate



Options and Solutions

3

Simplified 6-Step Framework

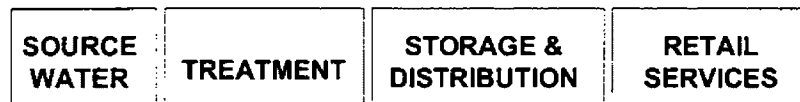
- Assess
- **Define**
 - **Service Horizon**
- Identify
- Analyze
- Implement
- Evaluate



Options and Solutions

4

Define the Service Horizon



Options and Solutions

5

Service Horizon Matrix

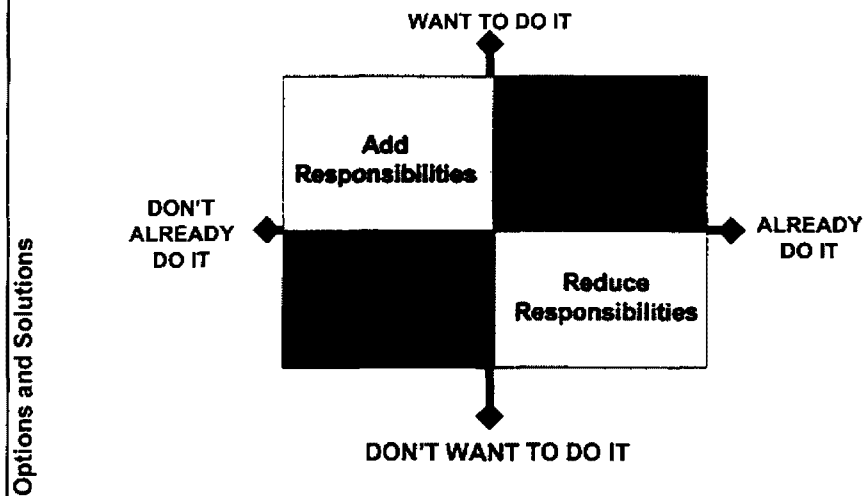
	GOVERNANCE	MANAGEMENT	OPERATIONS
SOURCE			
TREATMENT			
STORAGE & DISTRIBUTION			
RETAIL SERVICES			

Options and Solutions

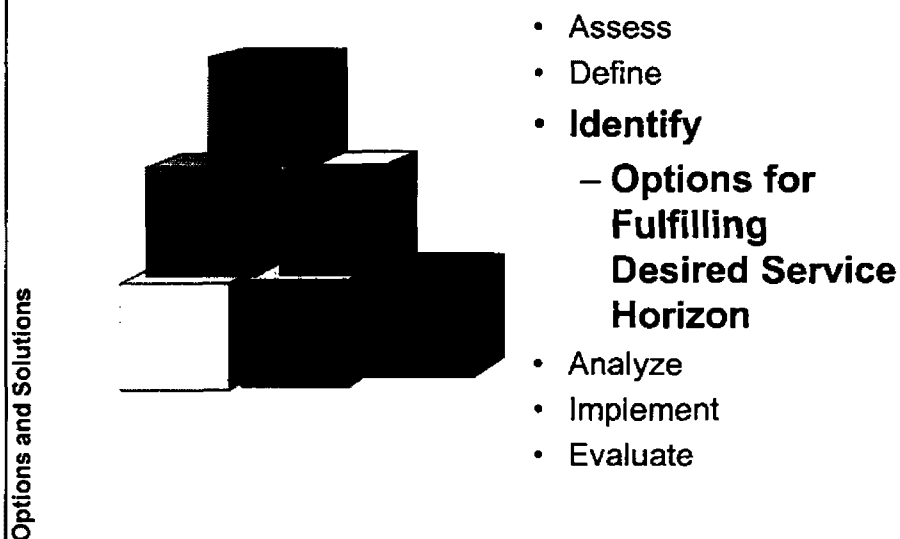
6

Defining the Service Horizon

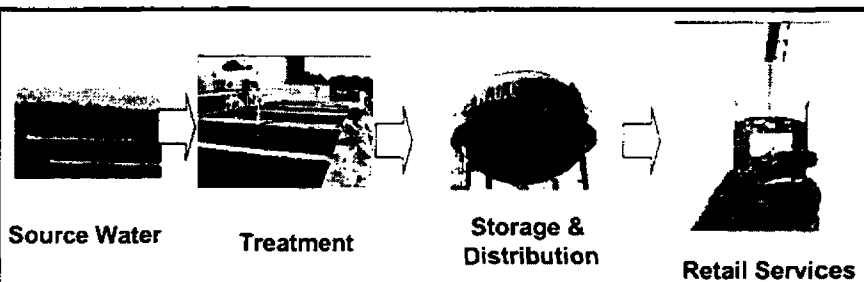
Framework for Filling in the Cells of the Service Horizon Matrix



Simplified 6-Step Framework



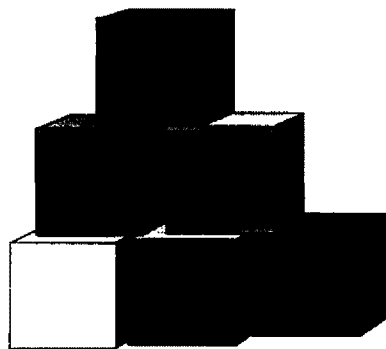
What Will It Take To Fulfill The Desired Service Horizon?



Technical, Financial, and Managerial Capacity

Options and Solutions

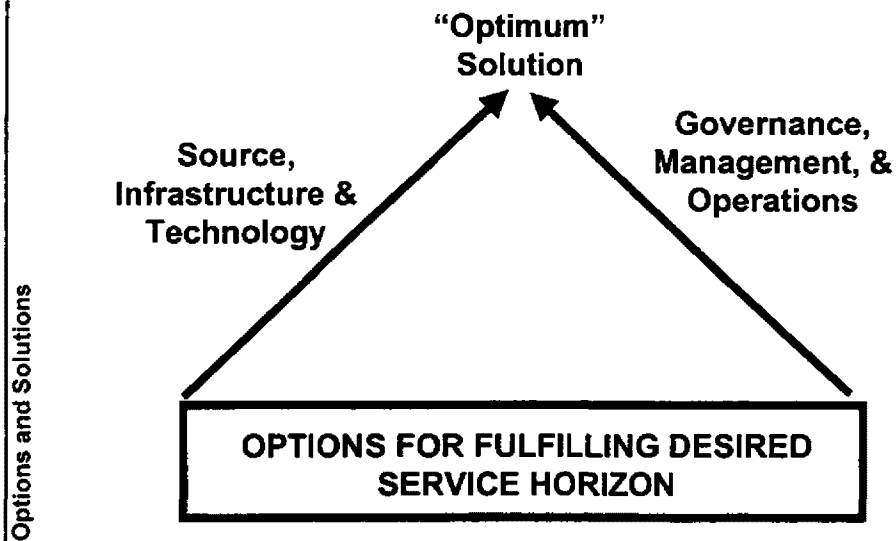
Simplified 6-Step Framework



- Assess
- Define
- Identify
- **Analyze**
 - Identify "Optimum" Solution
- Implement
- Evaluate

Options and Solutions

Identify & Analyze Options



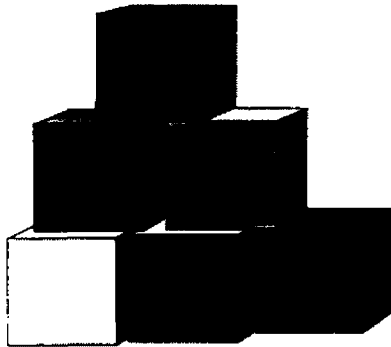
Optimum Relative To What?

- Least Cost
- Political Acceptability
- Best Service
- Water Quality
- Economic Growth

Each System Is Unique -- One Criterion Does Not Fit All -- Key Is To Ensure A Full Understanding Of Tradeoffs & An Informed Decision

Simplified 6-Step Framework

Options and Solutions



- Assess
- Define
- Identify
- Analyze
- **Implement**
- **Evaluate**

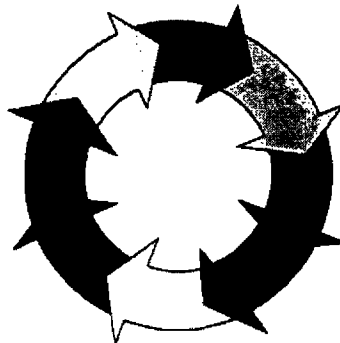
13

Implement & Evaluate

Strategic Management

Implement

Revise



Evaluate

Options and Solutions

14

CASE STUDY: Des Moines Water Works (DMWW)

- Municipal Utility
- Serves 350,000 people
- Provides “contract” services to 20 communities
- Iowa Code § 28E
- 4 Basic levels of service offered
 - Level 1 - Special Projects
 - Level 2 - Wholesale Water
 - Level 3 - Wholesale Water + Billing & Customer Service
 - Level 4 - Total Service Contract



Options and Solutions

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Town of Panora, IA & DMWW (Level 1)



Options and Solutions

- Panora, IA
 - Serves 1,100 people
 - Surface Water
 - Exceeds Nitrate MCL
- Panora contracts with DMWW for:
 - Nitrate Study
 - Employee Classification System
 - Rate Study
- DMWW charges fee based on time and materials

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Xenia, IA Rural Water District & DMWW (Level 2)



Options and Solutions

•Xenia Rural Water District

- Completed in 1983 - served 700
- Today serves 5,000
- Treatment plant at capacity
- Purchasing water is least-cost solution to demand growth

•DMWW

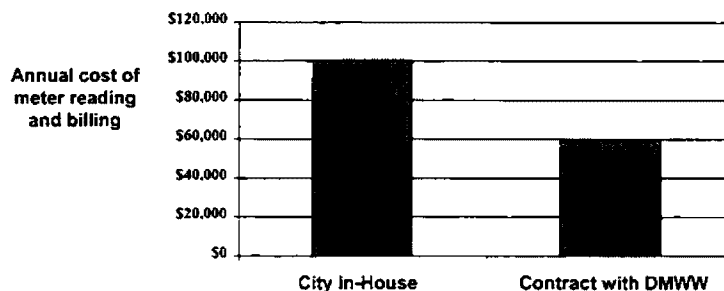
- One of 5 wholesale suppliers to Xenia
- Agreement includes:
 - Initial connection fee based on anticipated demand
 - Metered wholesale supply

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City of Waukeee, IA & DMWW (Level 3)

- City of Waukeee provides water to 3,400 people
- City obtains wholesale treated water from DMWW
- City analyzed its in-house meter reading and billing operation
- City determined that they could contract this function to DMWW and save 40%

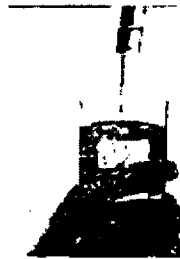
Options and Solutions



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City of Windsor Heights, IA & DMWW (Level 4)

Options and Solutions



- City of Windsor Heights provides water to 5,000 people
- Since 1963 city has purchased entire supply wholesale from DMWW
- In 1989, to streamline its operations, the city contracted with DMWW for "total service":
 - Water supply
 - Meter reading and billing
 - Inspections, preventive maintenance, & repair
 - Annual engineering analysis
 - Automated mapping/facility management data
- City receives significantly better service for the same cost

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Summary

Options and Solutions

- **Assess** system needs, external pressures, and internal capacity
- **Define** the "Service Horizon"
- **Identify** strategic options
- **Analyze** options and select the optimum
- **Implement** strategic plan
- **Evaluate** and revise strategic plan

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