2012
EPA GUIDELINES FOR WATER REUSE

Region III State/Interstate Water Directors Meeting

EPA
United States
Environmental Protection
Agency

USAID
FROM THE AMERICAN PEOPLE

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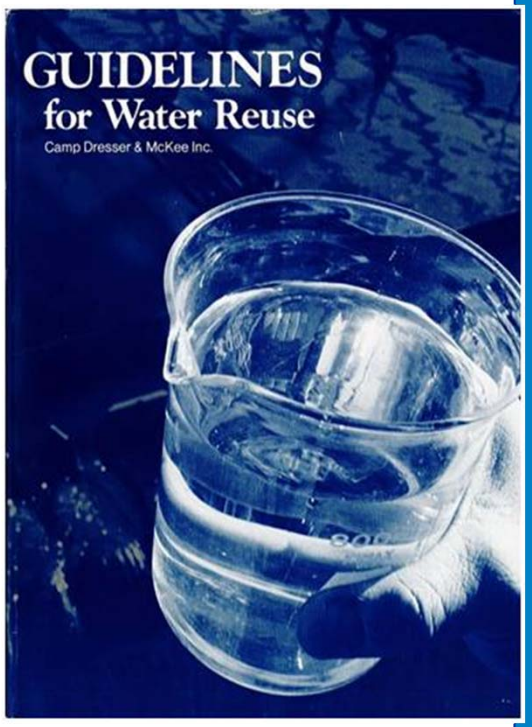
May 2013

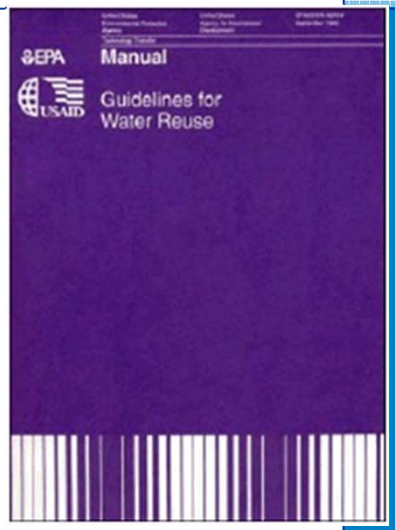
History-EPA Guidelines For Water Reuse

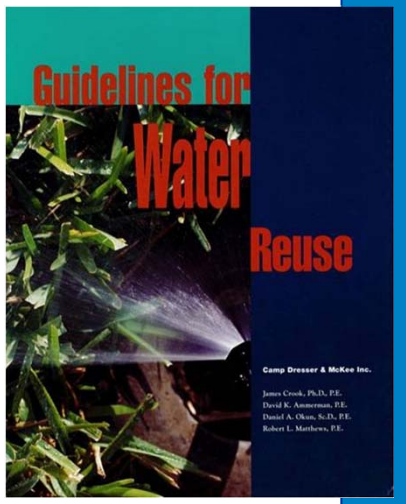
- First Guidelines for Water Reuse- 1980 Research Report by CDM for EPA Office of Research and Development
- Concurrent 1980 EPA Workshop, Protocol Development: Criteria and Standards for Potable Reuse and Feasible Alternatives
- Survey found 540 projects in 24 states



History-EPA Guidelines For Water Reuse

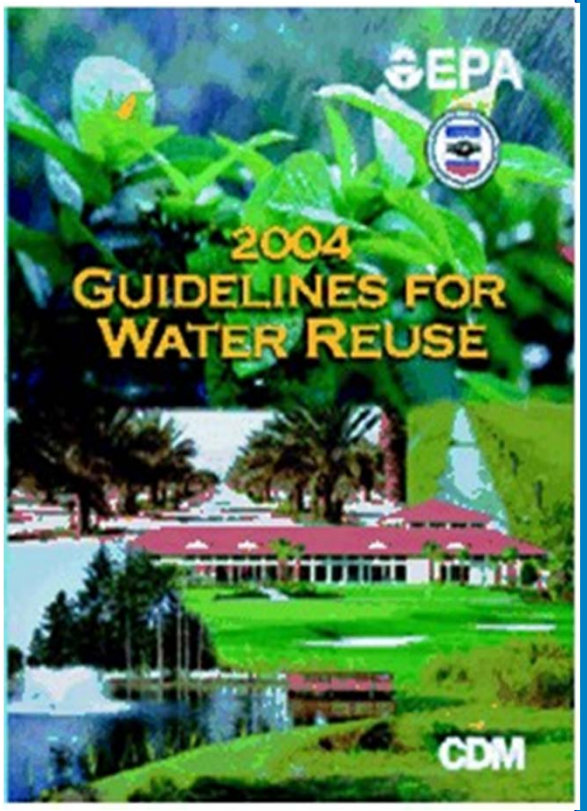
- 1992 Guidelines update-purple manual series, WASH Technical Report No. 81
- Focus – non-potable reuse guidelines for state regulatory and utility use in states where no guidelines exist
- Non controversial non-potable uses for urban, industrial, and agricultural
- Identified special needs for water reuse in other countries
- Survey found 1900 projects in 34 states
- 18 States with regulations, 18 with guidelines





History-EPA Guidelines For Water Reuse

- 2004 Guidelines incorporated:
  - 3 National Academy studies
    - 1998, *Issues in Potable Reuse: The Viability of Augmenting Drinking Water supplies with Reclaimed Water*
    - 1996, *Use of Reclaimed Water and Sludge in Food Crop Irrigation*
    - 1994, *Ground Water Recharge Using Water of Impaired Quality*
  - UV disinfection alternative
  - Emerging contaminants
  - Case studies

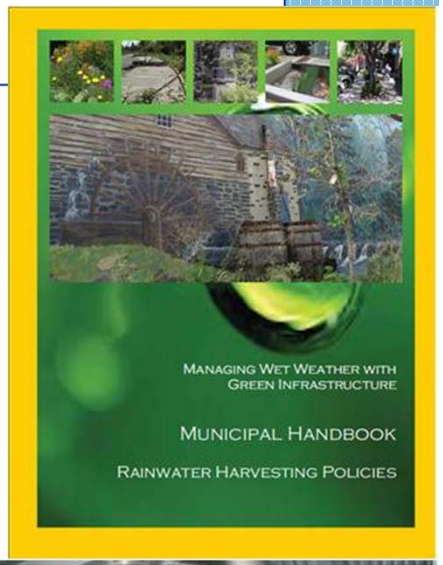


Federal Drivers For 2012 Guidelines Update

- Presidential Executive Order – EO 13514 - increased water and energy efficiency at federal facilities
  - Increase energy efficiency
  - Reduce greenhouse gas emissions
  - Conserve/protect water resources
  - LEED-certified facility criteria a measure of success
- Sponsor interest in updating Guidelines
  - Address new applications and technology
  - Link to updated state regulatory information
- CWA/SDWA linkage to total water management

Desired Expanded Coverage For 2012 Guidelines

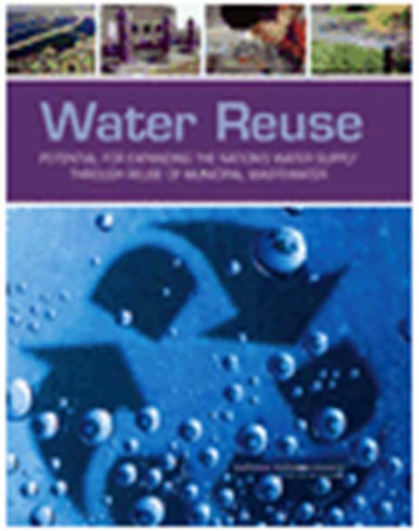
- Onsite/decentralized reuse
- Graywater reuse
- Rainwater and stormwater capture
- Aquifer storage and recovery
- Additional industrial applications
- Public information and choice of words
- Indirect potable reuse/potable reuse



Grand Conceptor
American Council of Engineering Companies

Additional Drivers For 2012 Guidelines Update

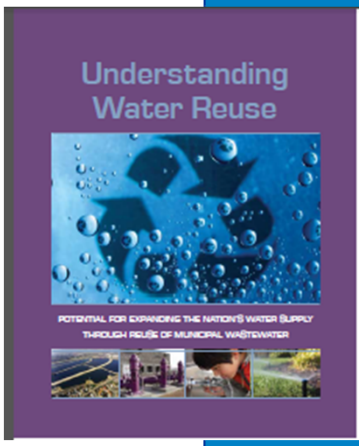
- NAS Report (*2012)Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater*
  - Continuation of previous studies
  - Benefits to nation's expanded water supply
  - Cost compared to other alternatives
  - Human health risk, including indirect potable reuse
  - Future research needs for safe implementation
- Wetland buffers to polish water
- Advanced treatment technologies like OCWD-GWR promote interest in IPR



Follow-on to NAS Reuse Study Report

- WSTB/NRC/NAS Report (2012) *Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater*

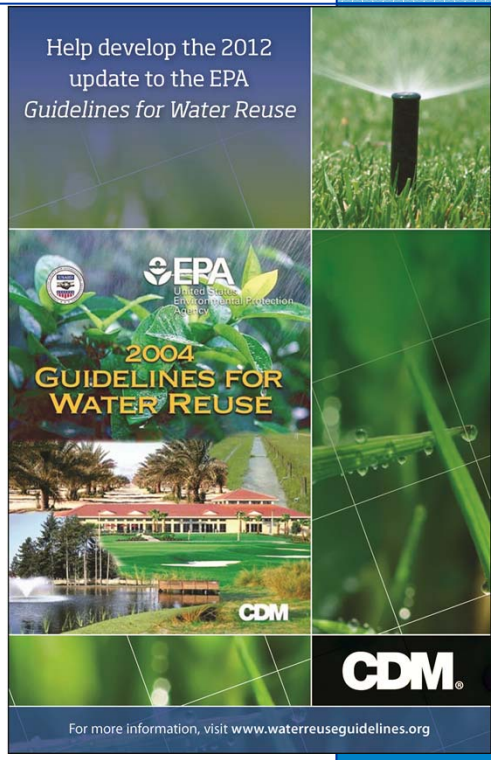
  ("http://dels.nas.edu/Report/Water-Reuse-Potential-xpanding/13303 ")
  - Report in Brief
  - *Understanding Water Reuse* booklet



- Follow-on study …. *On-site Reuse of Graywater and Stormwater: An Assessment of Risks, Costs, and Benefits*

Participation by Diverse Experts

- Discussion for 2012 Guidelines started at 2008 WRA Symposium
- Public workshops to define need and solicit volunteers
- Identify core technical/management team
- Initiate CRADA with EPA
- Confirm Technical Review members
- Confirm Chapter/Section leads
- Identify/request input as text and case study authors



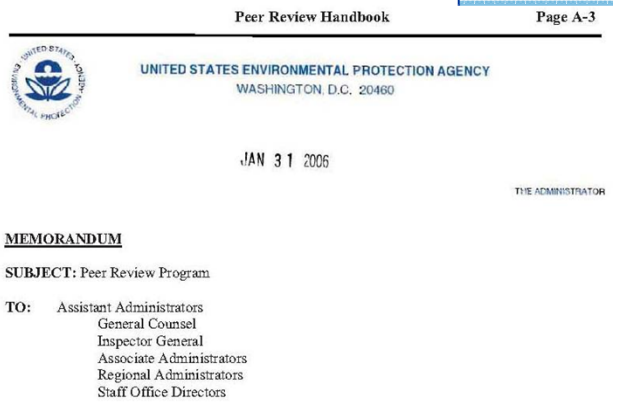
Stakeholder Workshops and Status Reports

- Stakeholder input opportunities
  - WateReuse Symposium, Seattle, WA - 9/2009
  - WEFTEC, Orlando, FL - 10/2009
  - AWWA WQTC, Savannah, GA – 11/2010
- Project Management Team presentations
  - IWA Water Efficiency Conf, Jordan - 3/2011
  - IWA International Water Week, Singapore – 7/2011
  - WateReuse Symposium, Phoenix, AZ - 9/2011
  - IWA Reuse Conference, Barcelona, Spain – 9/2011
  - WEFTEC, Los Angeles, CA - 10/2011
  - Wastewater Reuse and Recycle, Delhi, India – 4/2012

2012 Contract Format/Sponsor Roles

- Contract –Cooperative Research and Development Agreement (CRADA)
  - CDM-EPA/OWM-EPA/NRMRL + USAID
- Federal Sponsors
  - USEPA
  - USAID
  - USDA/NIFA
    - Focused on water quality for food crop irrigation
- Department of Energy supporting EPA review
- CDC review/comment on human health topics

EPA's Formal Peer Review Committee



Peer Review Handbook Page A-3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 31 2006

THE ADMINISTRATOR

MEMORANDUM

SUBJECT: Peer Review Program

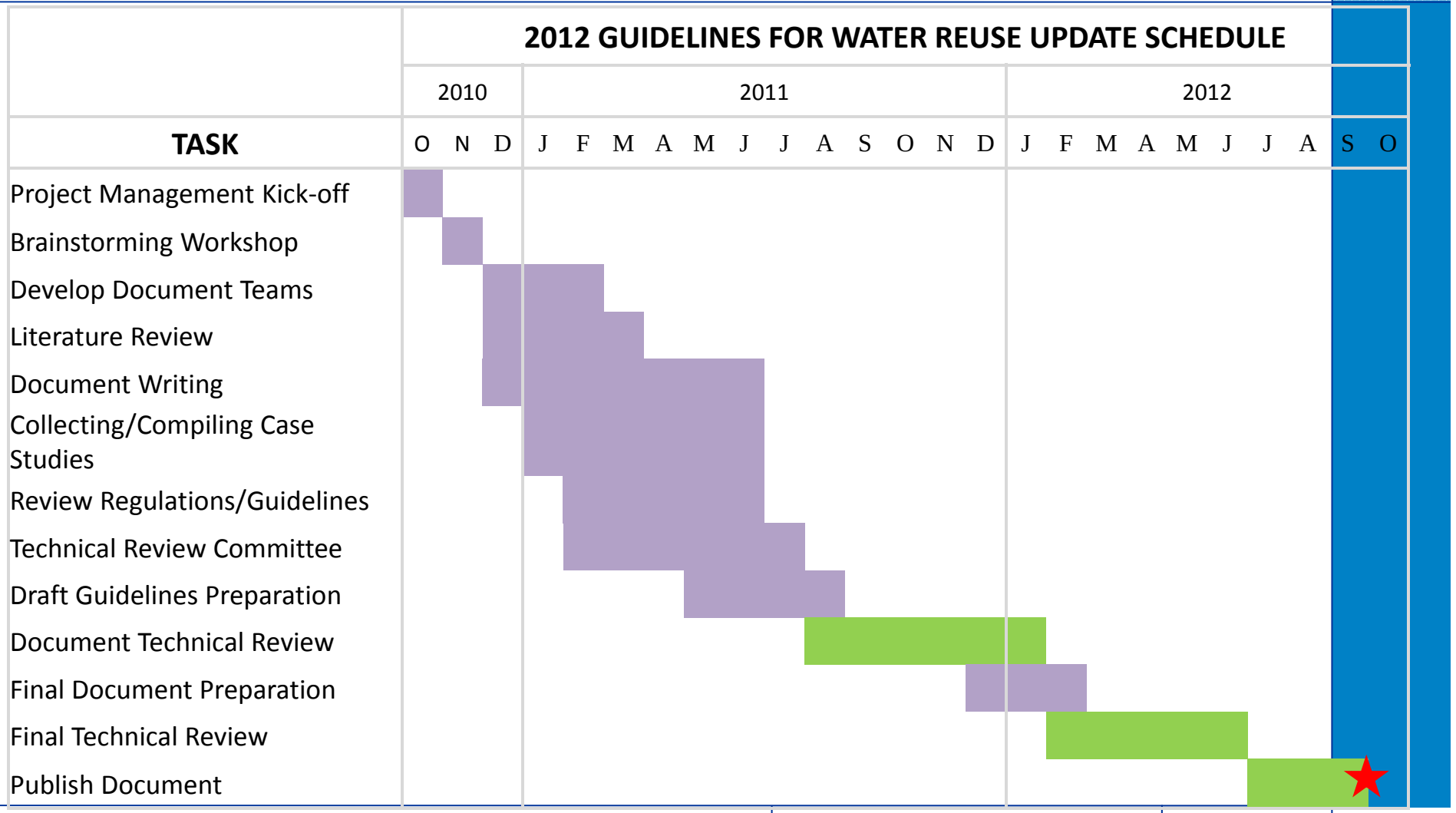
TO: Assistant Administrators
General Counsel
Inspector General
Associate Administrators
Regional Administrators
Staff Office Directors

- EPA (2)
- USDA/NIFA (1)
- WateReuse Foundation (1)
- Consultant (1)
- States, Academics & Water Utilities
  - Southwest Florida Water Management District
  - Washington Department of Health
  - Virginia Department of Environmental Quality
  - University of Nebraska
  - Michigan State University
  - Trinity River Authority
  - West Basin Utility District

Volunteer Selection/Confirmation

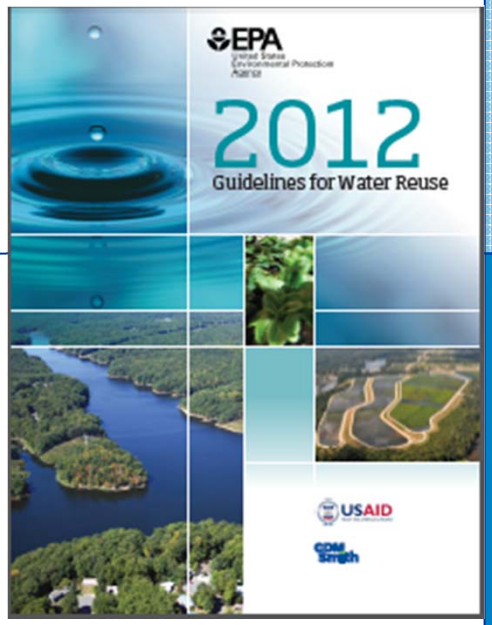
- Participant identification/selection
  - Volunteers at Stakeholder workshops
  - Identification from presentations/reputation
- Calls and e-mails to confirm availability
- Chapter/Section editors and reviewers selected
- Authors selected and identified to editors
- Case study contributions selected same manner
- Confirmations received, section text scheduled
- Continuous communication with volunteers

Development Schedule



Development of the 2012 Guidelines Document

Volunteer Effort - Results



- 330 volunteer contributors
- Over 100 new Case Studies
  - 67 new U.S. Case Studies
  - 41 new International Case Studies
- Update data/links to 44 state regulations/guidelines plus CNMI – big thanks to Shanin Speas-Frost w/FDEP
- New treatment technology chapter
- Addresses IPR and DPR regulation development
- Regional considerations and variations
- Expanded description of uses for reclaimed water

2012 Guideline Chapters (1-3)

- 1 Introduction (8pp)
  - Overview/executive summary
  - Basis for updated document and new terminology
- 2 Planning and Management Considerations (42pp)
  - Planning and management considerations
  - Institutional considerations and system operations
- 3 Types of Reuse Applications (35pp)
  - New recreational, energy and environmental uses
  - Industrial use for cooling towers, process water, and food and beverage industry

Augmentation of Ground and Surface Waters

- Discussion of soil aquifer treatment (SAT)
- ASR for reclaimed water
- Surface water augmentation
- Wetlands polishing

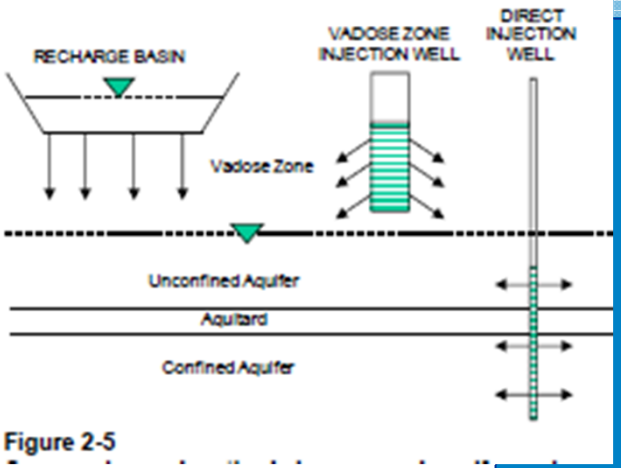
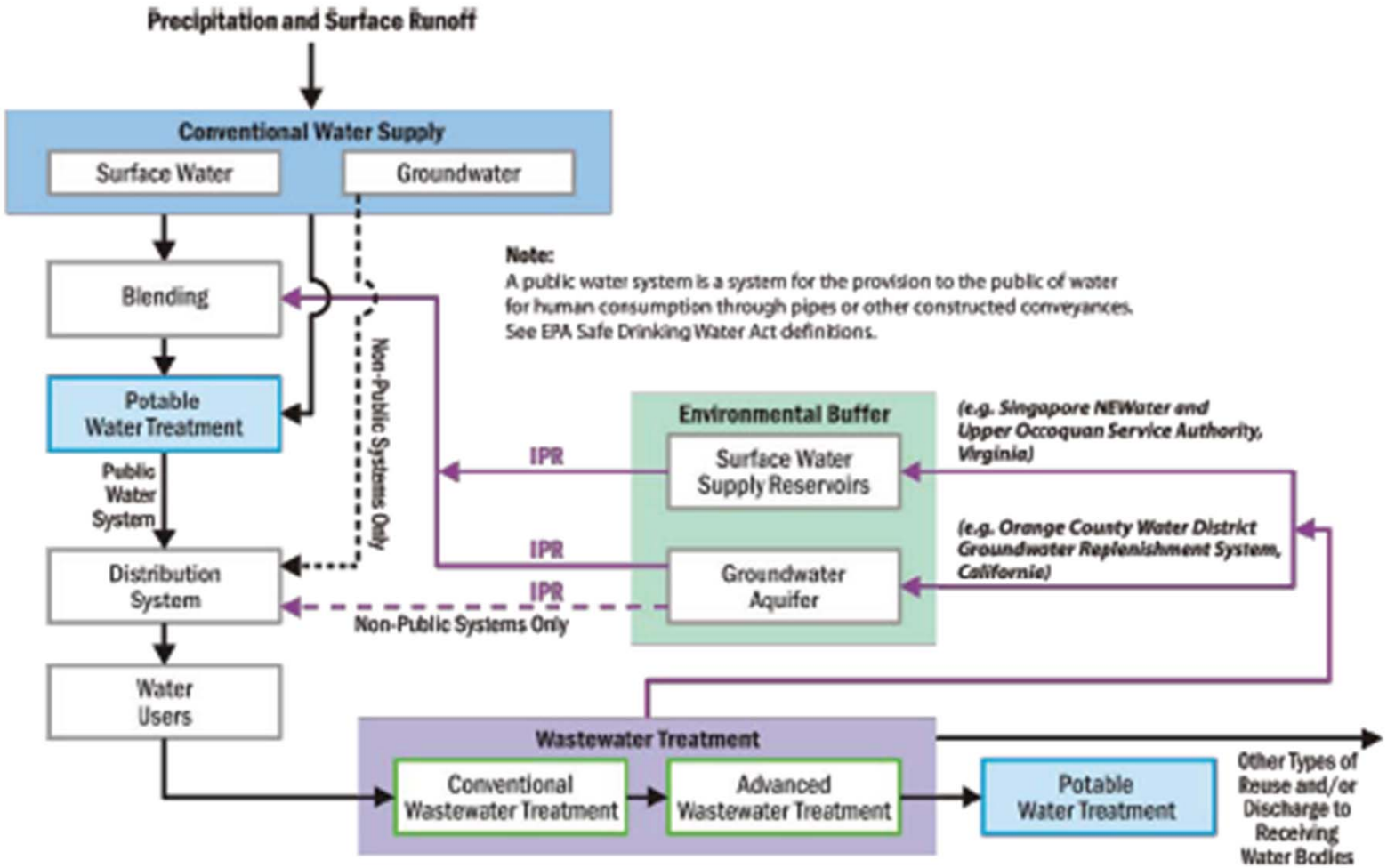


Figure 2-5

Planned IPR Scenarios – Figure 3.7



2012 Guideline Chapters (4-6)

- 4 State Regulatory Programs for Water Reuse (37pp)
  - Current status of regulations in 44 states + CNMI
  - Treatment and water quality monitoring criteria
- 5 Regional Variations in Water Reuse (51pp)
  - Uses of water in the U.S. by region
  - Drivers and regulatory differences
- 6 Treatment Technologies for Protecting Public and Environmental Health (48pp)
  - Role of technology in public health protection
  - Contaminant removal-engineered and natural systems

Table 4-3 Water reuse categories and number of states with rules, regulations or guidelines addressing these reuse categories [1]

Category of reuse		Description	Number of States or Territories with Rules, Regulations, or Guidelines Addressing Reuse Category
Urban Reuse	Unrestricted	The use of reclaimed water for nonpotable applications in municipal settings where public access is not restricted	32
	Restricted	The use of reclaimed water for nonpotable applications in municipal settings where public access is controlled or restricted by physical or institutional barriers, such as fencing, advisory signage, or temporal access restriction	40
Agricultural Reuse	Food Crops	The use of reclaimed water to irrigate food crops that are intended for human consumption	27
	Processed Food Crops and Non-food Crops	The use of reclaimed water to irrigate crops that are either processed before human consumption or not consumed by humans	43
Impoundments	Unrestricted	The use of reclaimed water in an impoundment in which no limitations are imposed on body-contact water recreation activities (some states categorize snowmaking in this category)	13
	Restricted	The use of reclaimed water in an impoundment where body contact is restricted (some states include fishing and boating in this category)	17
Environmental Reuse		The use of reclaimed water to create, enhance, sustain, or augment water bodies, including wetlands, aquatic habitats, or stream flow	17
Industrial Reuse		The use of reclaimed water in industrial applications and facilities, power production, and extraction of fossil fuels	31
Groundwater Recharge – Nonpotable Reuse		The use of reclaimed water to recharge aquifers that are not used as a potablewater source	16
Potable Reuse	Indirect Potable Reuse (IPR)	Augmentation of a drinking water source (surface or groundwater) with reclaimed water followed by an environmental buffer that precedes normal drinking water treatment	9
	Direct Potable Reuse (DPR)	The introduction of reclaimed water (with or without retention in an engineered storage buffer) directly into a water treatment plant, either collocated or remote from the advanced wastewater treatment system	0

[1] Individual state reuse programs often incorporate different terminology so the reader should exercise caution in comparing the categories in these tables directly to state regulatory definitions

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]
Urban Reuse				
Unrestricted The use of reclaimed water in nonpotable applications in municipal settings where public access is not restricted.	▪ Secondary[4] ▪ Filtration[5] ▪ Disinfection[6]	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD [7] ▪ ≤ 2 NTU [8] ▪ No detectable fecal coliform /100 ml [9,10] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD - weekly ▪ Turbidity - continuous ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 50 ft (15 m) to potable water supply wells; increased to 100 ft (30 m) when located in porous media [16]
Restricted The use of reclaimed water in nonpotable applications in municipal settings where public access is controlled or restricted by physical or institutional barriers, such as fencing, advisory signage, or temporal access restriction	▪ Secondary [4] ▪ Disinfection [6] ▪	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform /100 ml [9, 13, 14] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD – weekly ▪ TSS – daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 300 ft (90 m) to potable water supply wells ▪ 100 ft (30 m) to areas accessible to the public (if spray irrigation)
Agricultural Reuse				
Food Crops [15] The use of reclaimed water for surface or spray irrigation of food crops which are intended for human consumption, consumed raw.	▪ Secondary [4] ▪ Filtration [5] ▪ Disinfection [6]	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD [7] ▪ ≤ 2 NTU [8] ▪ No detectable fecal coliform/100 ml [9,10] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD - weekly ▪ Turbidity - continuous ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 50 ft (15 m) to potable water supply wells; increased to 100 ft (30 m) when located in porous media [16]
Processed Food Crops [15] The use of reclaimed water for surface irrigation of food crops which are intended for human consumption, commercially processed. ***Non-Food Crops*** The use of reclaimed water for irrigation of crops which are not consumed by humans, including fodder, fiber, and seed crops, or to irrigate pasture land, commercial nurseries, and sod farms.	▪ Secondary [4] ▪ Disinfection [6]	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coli/100 ml [9,13, 14] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD - weekly ▪ TSS - daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 300 ft (90 m) to potable water supply wells ▪ 100 ft (30 m) to areas accessible to the public (if spray irrigation)

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]
Impoundments				
Unrestricted The use of reclaimed water in an impoundment in which no limitations are imposed on body-contact.	▪ Secondary [4] ▪ Filtration [5] ▪ Disinfection [6]	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD [7] ▪ ≤ 2 NTU [8] ▪ No detectable fecal coliform/100 ml [9,10] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD – weekly ▪ Turbidity – continuous ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 500 ft (150 m) to potable water supply wells (min.) if bottom not sealed
Restricted The use of reclaimed water in an impoundment where body-contact is restricted.	▪ Secondary [4] ▪ Disinfection [6]	▪ ≤ 30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml [9,13,14] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ TSS – daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 500 ft (150 m) to potable water supply wells (min.) if bottom not sealed
Environmental Reuse				
Environmental Reuse The use of reclaimed water to create wetlands, enhance natural wetlands, or sustain stream flows.	▪ Variable ▪ Secondary [4] and disinfection [6] (min.)	Variable, but not to exceed: ▪ ≤30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml [9,13,14] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ BOD – weekly ▪ SS – daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	
Industrial Reuse				
Once-through Cooling	▪ Secondary [4]	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml [9,13,14] ▪ 1 mg/l Cl_2 residual (min.) [11]	▪ pH – weekly ▪ BOD – weekly ▪ TSS – weekly ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 300 ft (90 m) to areas accessible to the public
Recirculating Cooling Towers	▪ Secondary [4] ▪ Disinfection [6] (chemical coagulation and filtration [5] may be needed)	Variable, depends on recirculation ratio: ▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [7] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml [9,13,14] ▪ 1 mg/l Cl_2 residual (min.) [11]		▪ 300 ft (90 m) to areas accessible to the public. May be reduced if high level of disinfection is provided.
Other Industrial uses – e.g. boiler feed, equipment washdown, processing, power generation, and in the oil and natural gas production market (including hydraulic fracturing) have requirements that depends on site s				
Groundwater Recharge – Nonpotable Reuse				
The use of reclaimed water to recharge aquifers which are not used as a potable drinking water source.	▪ Site specific and use dependent ▪ Primary (min.) for spreading ▪ Secondary [4] (min.) for injection	▪ Site specific and use dependent	▪ Depends on treatment and use	▪ Site specific

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]
Indirect Potable Reuse				
Groundwater Recharge by Spreading into Potable Aquifers	▪ Secondary [4] ▪ Filtration [5] ▪ Disinfection [6] ▪ Soil aquifer treatment	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml [9, 10] ▪ 1 mg/l Cl_2 residual (min.) [11] ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU [8] ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards after percolation through vadose zone	Includes, but not limited to, the following: ▪ pH – daily ▪ Total coliform – daily ▪ Cl_2 residual – continuous ▪ Drinking water standards – quarterly ▪ Other [17] – depends on constituent ▪ TOC – weekly ▪ Turbidity – continuous ▪ Monitoring is not required for viruses and parasites: their removal rates are prescribed by treatment requirements	▪ Distance to nearest potable water extraction well that provides a minimum of 2 months retention time in the underground.
Groundwater Recharge by Injection into Potable Aquifers	▪ Secondary [4] ▪ Filtration [5] ▪ Disinfection [6] ▪ Advanced wastewater treatment [16]	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml [9, 10] ▪ 1 mg/l Cl_2 residual (min.) [11] ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU [8] ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards	Includes, but not limited to, the following: ▪ pH – daily ▪ Turbidity – continuous ▪ Total coliform – daily ▪ Cl_2 residual – continuous ▪ TOC – weekly ▪ Drinking water standards – quarterly ▪ Other [17] – depends on constituent ▪ Monitoring is not required for viruses and parasites: their removal rates are prescribed by treatment requirements	▪ Distance to nearest potable water extraction well that provides a minimum of 2 months retention time in the underground.
Augmentation of Surface Water Supply Reservoirs	▪ Secondary [4] ▪ Filtration [5] ▪ Disinfection [6] ▪ Advanced wastewater treatment [16]	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml [9, 10] ▪ 1 mg/l Cl_2 residual (min.) [11] ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU [8] ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards		▪ Site specific – based on providing 2 months retention time between introduction of reclaimed water into a raw water supply reservoir and the intake to a potable water treatment plant.

Pacific Northwest: Idaho, Oregon, Washington and Alaska

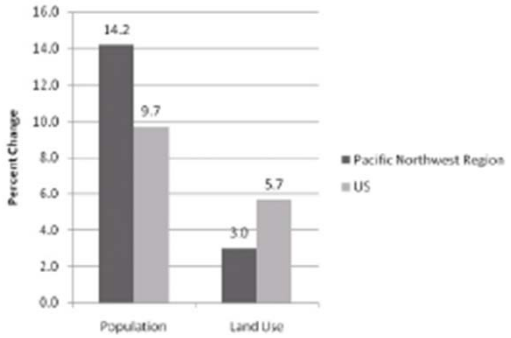


Figure 5-38
Change in population (2000-2010) and developed land (1997-2007) in the Pacific Northwest region, compared to the United States

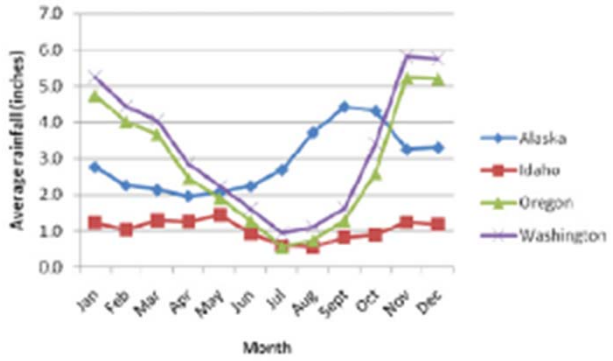


Figure 5-39
Average monthly precipitation in the Pacific Northwest region

5.2.8.3 Water Use by Sector

Figure 5-40 shows freshwater use by sector in the Pacific Northwest.

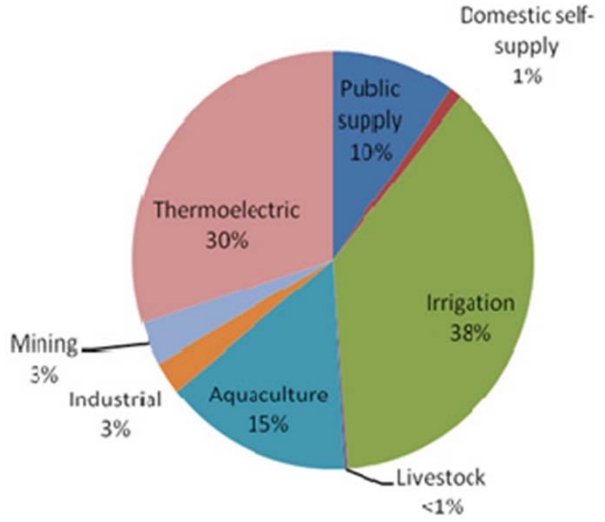


Figure 5-40
Freshwater use by sector for the Pacific Northwest region

Water Use by Sector

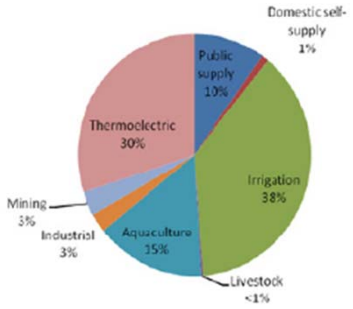


Figure 5-40
Freshwater use by sector for the Pacific Northwest region

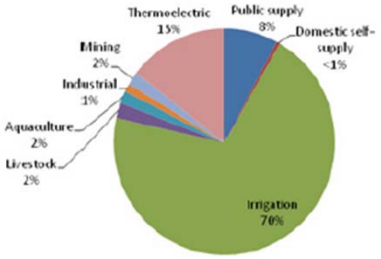


Figure 5-32
Freshwater use by sector for the Mountain and Plains region

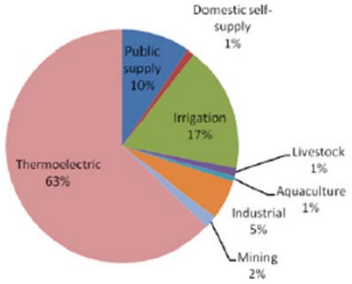


Figure 5-17
Freshwater use by sector for the Midwest and Great Lakes region

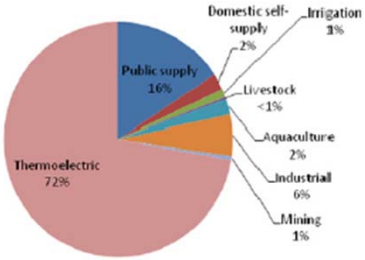


Figure 5-5
Freshwater use by sector for the Northeast region

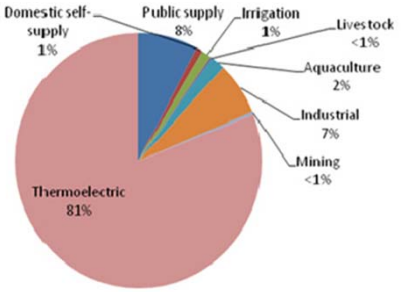


Figure 5-8
Freshwater use by sector for the Mid-Atlantic region

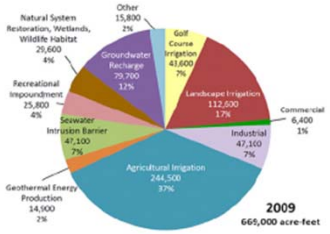


Figure 5-37
Uses of recycled water in Calif. (SWRCB 2011)

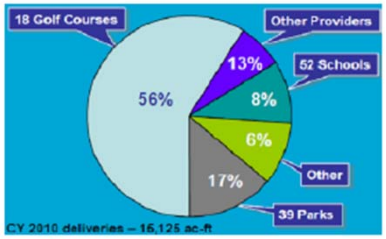


Figure 5-36
2010 Reclaimed water use in Tucson, Ariz.

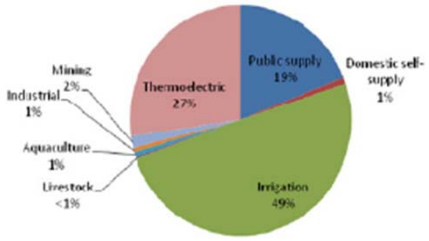


Figure 5-35
Freshwater use by sector for the Pacific Southwest region

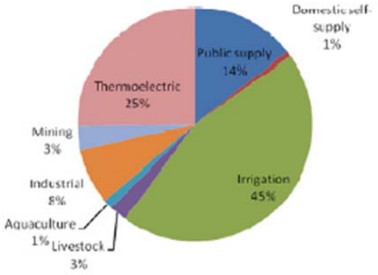


Figure 5-24
Freshwater use by sector for the South Central region

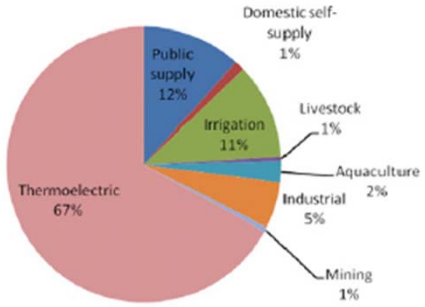


Figure 5-11
Freshwater use by sector for the Southeast region

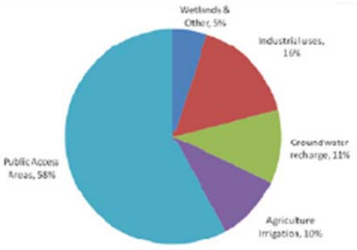


Figure 5-12
Water reuse in Florida by type (FDEP, 2012)

Change in Population by Sector

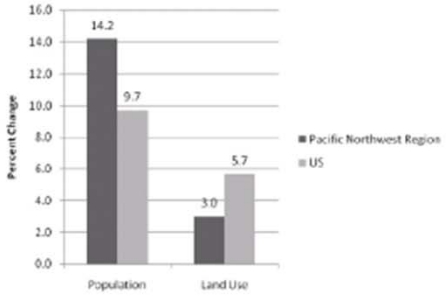


Figure 5-38
Change in population (2000-2010) and developed land (1997-2007) in the Pacific Northwest region, compared to the United States

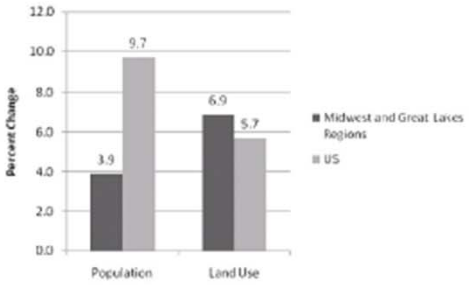


Figure 5-15
Change in population (2000-2010) and developed land (1997-2007) in the Midwest and Great Lakes Region, compared to the United States

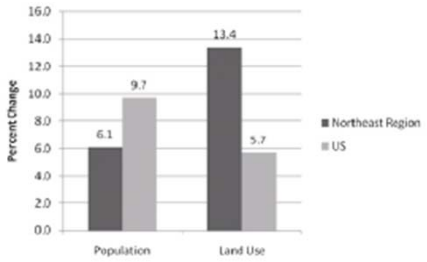


Figure 5-3
Percent change in population (2000-2010) and developed land (1997-2007) in the Northeast Region, compared to the United States

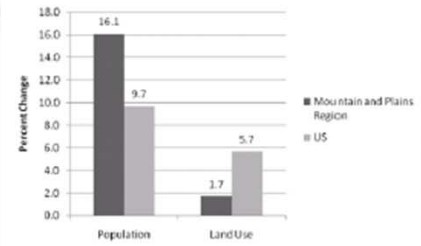


Figure 5-30
Change in population (2000-2010) and developed land (1997-2007) in the Mountain and Plains region, compared to the United States

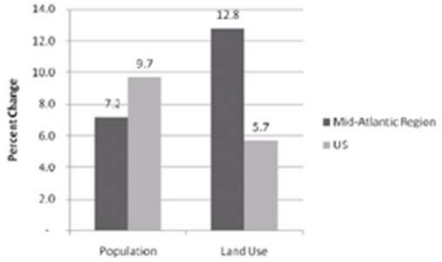


Figure 5-6
Change in population (2000-2010) and developed land (1997-2007) in the Mid-Atlantic region, compared to the United States

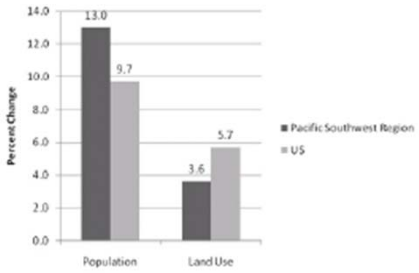


Figure 5-33
Change in population (2000-2010) and developed land (1997-2007) in the Pacific Southwest region, compared to the United States

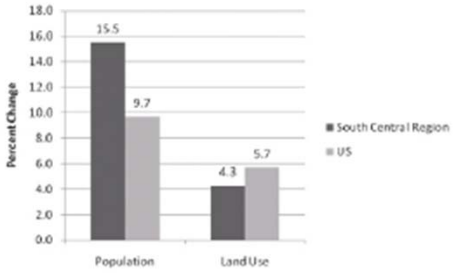


Figure 5-22
Change in population (2000-2010) and developed land (1997-2007) in the South Central region, compared to the United States

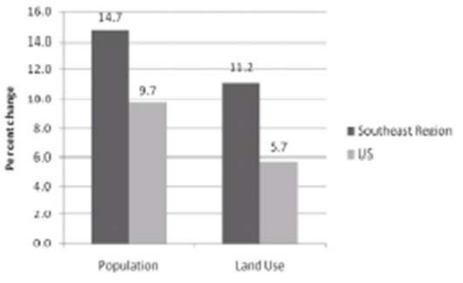


Figure 5-9
Change in population (2000-2010) and developed land (1997-2007) in the Southeast region, compared to the United States

Average Monthly Precip by Sector

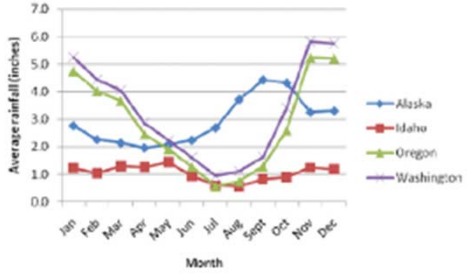


Figure 5-39
Average monthly precipitation in the Pacific Northwest region

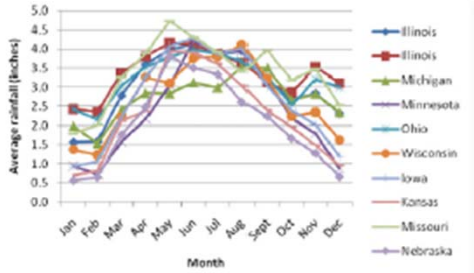


Figure 5-16
Average monthly precipitation in the Midwest

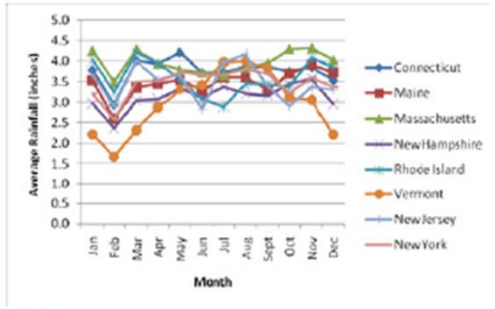


Figure 5-4
Average monthly precipitation (1971-2000) for states in the Northeast region

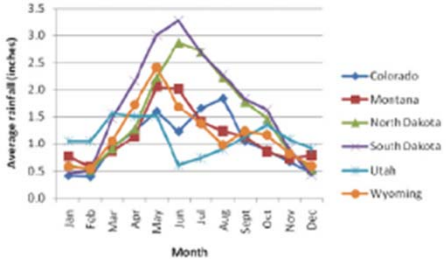


Figure 5-31
Average monthly precipitation in the Mountain and Plains region

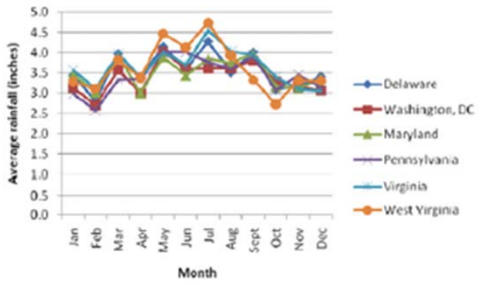


Figure 5-7
Average monthly precipitation in the Mid-Atlantic region

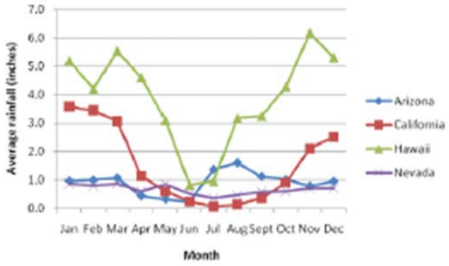


Figure 5-34
Average monthly precipitation in the Pacific Southwest region

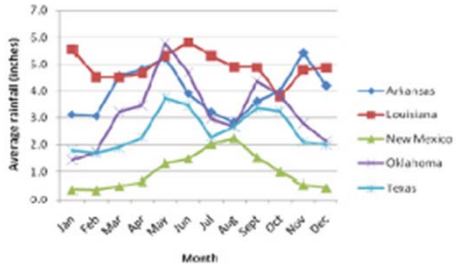


Figure 5-23
Average monthly precipitation in the South Central region

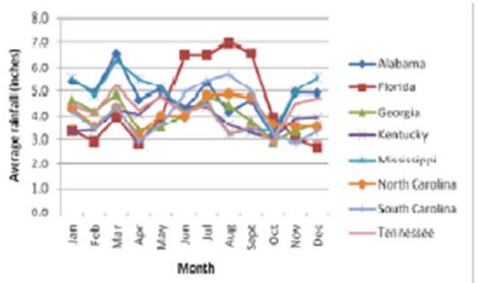


Figure 5-10
Average monthly precipitation in the Southeast region

Idaho

- Idaho has both reuse regulations and guidelines whose scope includes treatment and beneficial reuse of municipal and industrial wastewater. Water reuse by different types of land application facilities is allowed by state regulations. In 1988, Idaho's Wastewater Land Application permitting rules were promulgated and guidance was developed. Idaho has a public advisory working group that meets periodically to advise guidance development and review existing and future reuse guidance. In 2011 reuse regulations were updated, and the name of the rules changed to Recycled Water Rules (IDAPA 58.01.17). Idaho DEQ is the state agency tasked with issuing both industrial and municipal reuse permits. In Idaho, the NPDES permit program, which includes discharge of reclaimed water to surface waters, is administered by EPA Region 10, which means EPA is responsible for issuing and enforcing all NPDES permits in Idaho.

Idaho has been supporting reuse since 1988, and 2011 Idaho DEQ data indicate that 8.5 billion gallons of wastewater were reused by municipal and industrial sites. The drivers for the use of reclaimed water include more stringent discharge regulations, water supply demands, the need to offset potable water use, and a need to reduce pollutant loads and discharge volumes in receiving waters. There are 136 reuse permits in the state, and the number of permits is expected to grow due to strict TMDL limits for pollutants such as phosphorus. The first municipal land application/reuse permit was issued to the city of Rupert in 1989, and the first industrial reuse permit was issued in 1990 to Lamb Weston, a potato processor.

Although municipal reuse has been permitted for many years, the city of Meridian is the first municipal system in the state with a city-wide Class A permit. Several years ago the city had a desire to explore the use of reclaimed water at the city park, located one and a-half miles north of the WWTP. The city was able to convert a seldom used outfall line to transport reclaimed water from the plant to the park for irrigation. Additionally, this outfall line provided the chlorine contact time required to meet the city's site-specific permit. The elevated chlorine levels at the park and nutrients in the reclaimed water presented challenges with the clarity of the holding pond that the city discharged into prior to irrigation. This and other factors led to the city moving to a pressurized reclaimed water system that is currently going through startup testing. This system, coupled with a citywide reuse permit, will allow the city to use reclaimed water at a new interchange, the city park, the WWTP, and a car wash.

Oregon

- The Oregon Administrative Rules, Chapter 340, Division 55 (OAR 340-055), “Recycled Water Use,” prescribe the requirements for the use of reclaimed water for beneficial purposes while protecting public health and the environment. The Oregon DEQ is responsible for implementing these rules. The department coordinates closely with other state agencies to ensure consistency; in particular, the Oregon Department of Human Services and the Oregon Water Resources Department also play key roles in implementing these rules. Facilities are required to manage and operate reclaimed water projects under a water reuse management plan. These plans are specific to each facility and are considered part of a facility’s NPDES or water pollution control facility (WPCF) water quality permit. Site-specific conditions, such as application rates and setbacks, may be established to ensure the protection of public health and the environment.

Washington

- In 1992 the Washington State Legislature passed the Reclaimed Water Act, Chapter 90.46 RCW. The Reclaimed Water Act and Chapters 90.48 and 90.82 RCW encourage the development and use of reclaimed water, require consideration of reclaimed water in wastewater and water supply planning, and recognize the importance of reclaimed water as a strategy within water resource management statewide. Reclaimed water is recognized as a resource that can be integrated into state, regional, and local strategies to respond to population growth and climate change. The state also recognizes reclaimed water as an important mechanism for reducing discharge of treated wastewater into Puget Sound and other sensitive areas for improving water quality in the Sound.

Washington State has a reclaimed water program governed by comprehensive guidelines that define water quality standards and a variety of allowed beneficial uses. This case study describes how the State Departments of Ecology and Health jointly administer the reclaimed water program and the process since 2006 to develop regulations.

Alaska

Water reuse in Alaska is not regularly implemented.

Summary of Pacific Northwest State Regulations

Table 4-5 Summary of State and U.S. Territory water reuse regulations and guidelines*

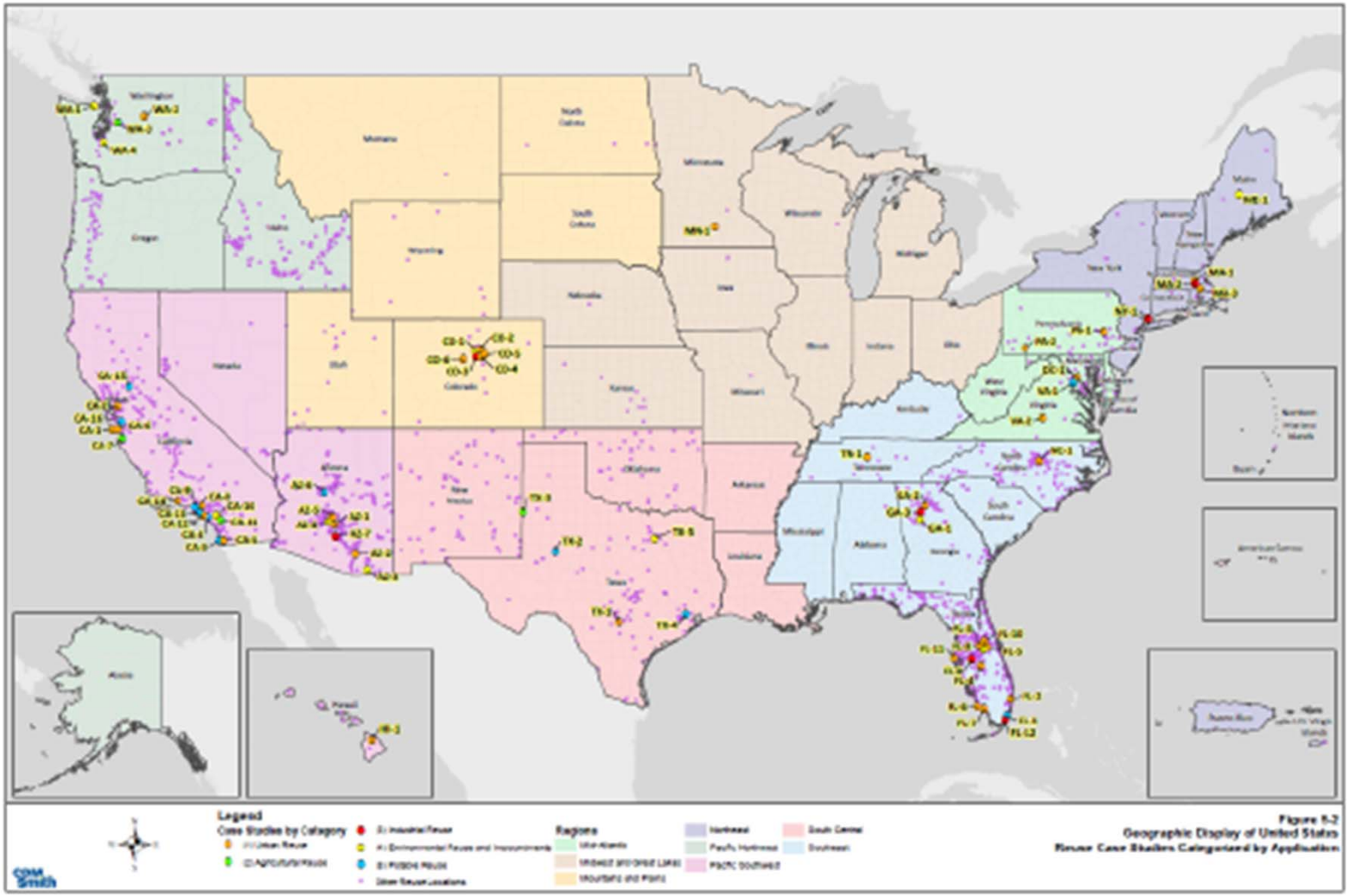
- ● The intent of the state's regulations or guidelines is oversight of water reuse
- □ The intent of the state's regulations or guidelines is oversight of disposal and water reuse is considered incidental
- -- The state does not have water reuse regulations or guidelines but may permit reuse on a case-by-case basis.

State	Regulations	Guidelines	No Regulations or Guidelines (1)	Change from 2004 Edition	Urban Reuse – Unrestricted	Urban Reuse – Restricted	Agricultural Reuse – Food Crops	Agricultural Reuse – Processed Food Crops and Non-Food Crops	Impoundments – Unrestricted	Impoundments – Restricted	Environmental Reuse	Industrial Reuse	Groundwater Recharge – Nonpotable Reuse	Indirect Potable Reuse
Idaho	●			Update	●	●	●	●				●	●	
Oregon	●			Update (10)	●	●	●	●	●	●		●	●	
Washington		●		Update (14)	●	●	●	●	●	●	●	●	●	●
Alaska	□							□						

(10) Groundwater recharge was added to Oregon's reuse regulations in 2008.

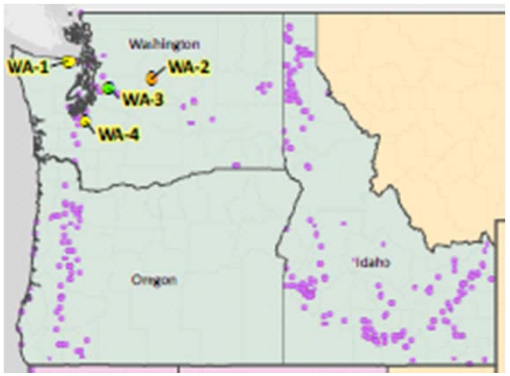
(14) The Washington State currently has no regulations governing the use of reclaimed water. Draft regulations have been developed by the Department of Ecology in coordination with Department of Health and formal rules advisory committee. The draft rules are incomplete. Adoption of the rules has been delayed until after June 30, 2013. The reclaimed water use statute and formal standards guidance and procedures adopted in 1997 remain in effect.

Known Water Reuse Systems in the U.S.



Pacific Northwest Case Studies

Map Code	Text code	Case Study Name	
D-163	US-WA-Sequim	City of Sequim's Expanded Water Reclamation Facility and Upland Reuse System	Chad Newton, P.E. (Gray & Osborne, Inc.)
D-166	US-WA-Regulations	Washington State Regulations	Chad Newton, P.E. (Gray and Osborne, Inc.) and Craig Riley, P.E. (Washington State Department of Health)
D-169	US-WA-King County	Demonstrating the Safety of Reclaimed Water for Garden Vegetables	Sally Brown, PhD (University of Washington)
D-172	US-WA-Yelm	City of Yelm, Washington	Shelly Badger (City of Yelm)



City of Sequim's Expanded Water Reclamation Facility and Upland Reuse System

Chad Newton, Gray & Osborne, Inc.

Sequim Water Reclamation Facility expansion

Introduction of reclaimed water to Bell Creek

Demonstrating the Safety of Reclaimed Water for Garden Vegetables

Dr. Sally Brown, University of Washington

Greenhouse trial of Class A reclaimed water

Harvesting potatoes after luncheon

2012 Guideline Chapters (7-9)

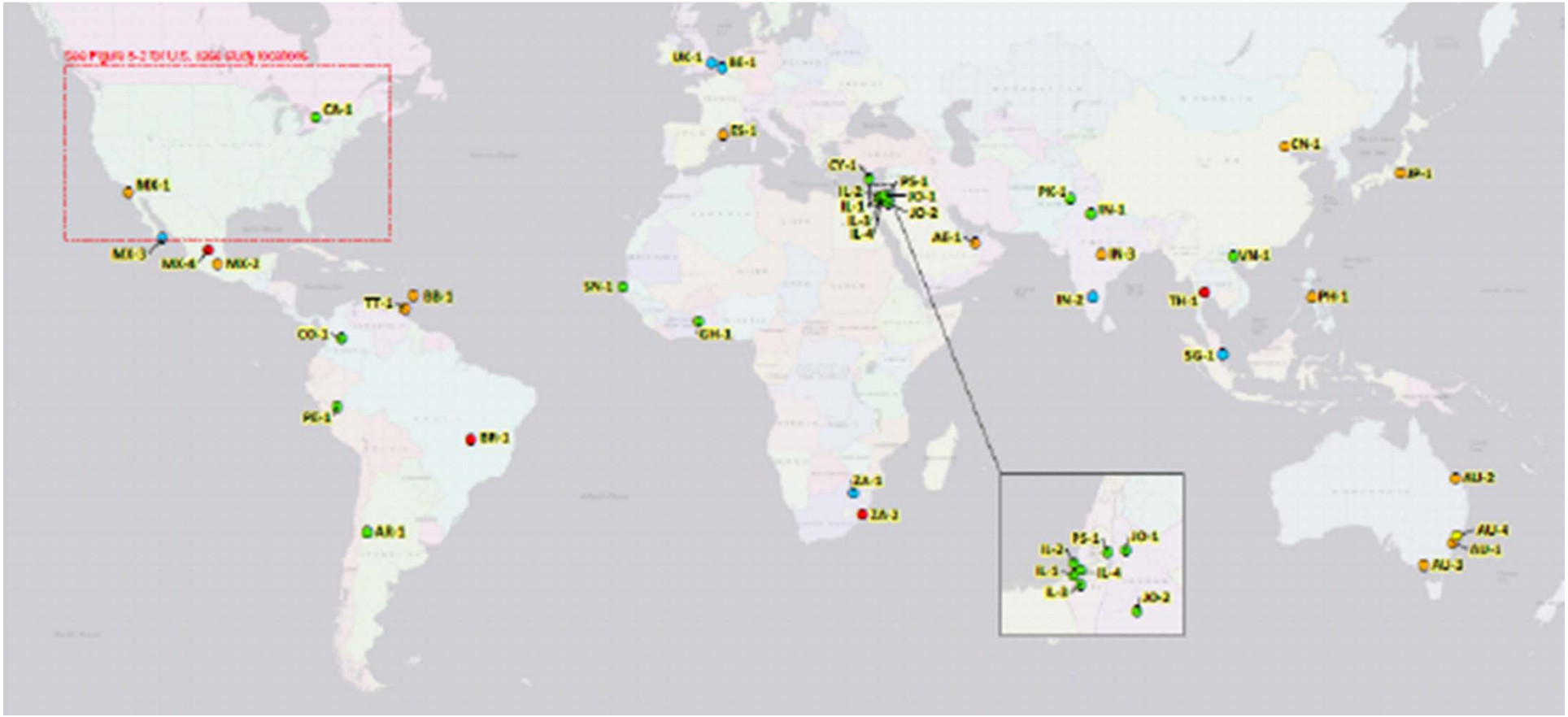
- 7 Funding Water Reuse Systems (13pp)
  - Funding, rate studies for integrated approach
  - Credit for societal and environmental benefits
- 8 Public Outreach, Participation & Consultation (18pp)
  - Project success by identifying options and benefits
  - Steps in successful public communication programs
- 9 Global Experiences in Water Reuse (24pp)
  - Wastewater use in resource-constrained countries
  - Public health threats of *not* focusing on improving water reuse in less developed countries

Public Outreach and Communications

- Words matter – consider the words we chose
- Public, staff and elected official education
- Perceptions of risks
- Shifting opinions on IPR
- Dealing with the media

International Drivers and Case Studies

Advancing technology to improve public health by reducing informal reuse practices



2012 Guideline Appendices

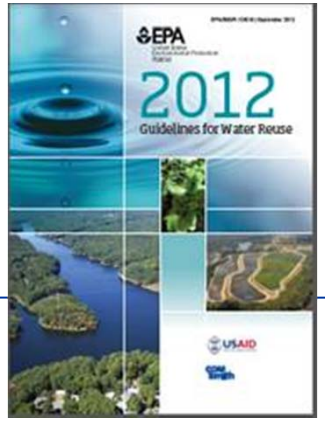
- A Funding for Water Reuse Research
- B Inventory of Recent Water Reuse Research Projects and Reports (11 pages of key references)
- C Websites of U.S. State Regulations and Guidance on Water Reuse – 44 states + CNMI

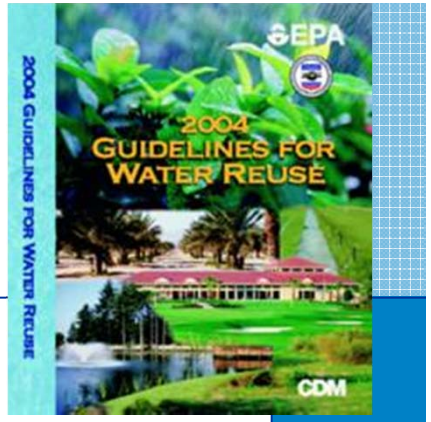
  Link to https://www.watereuse.org/government-affairs/usepa-guidelines WRA to maintain state links
- D U.S. Case Studies (67)
- E International Case Studies (41) and International Regulations
- F Case Studies in 2004 *Guidelines for Water Reuse*
- G Abbreviations

Appendix C – Pacific Northwest State Websites

State	Title of Regulations or Guidelines	Link to State Reuse Regulations or Guidance	Alternate Link to Reuse Fact Sheet or Report
Idaho	Idaho Administrative Code, Tittle 01, Chapter 17, IDAPA 58.01.17 - Recycled Water Rules	http://adminrules.idaho.gov/rules/current/58/0117.pdf	
Idaho - additional		http://adminrules.idaho.gov/rules/current/58/index.html	
Oregon	Oregon Administrative Rules, Division 55 - Recycled Water Use	http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_055.html	http://www.deq.state.or.us/wq/reuse/reuse.htm
Washington	Chapter 90.46 Revised Code of Washington - Reclaimed water use	http://apps.leg.wa.gov/rcw/default.aspx?cite=90.46&full=true	http://www.ecy.wa.gov/programs/wq/reclaim/index.html
Alaska	Alaska Administrative Code, Title 18 – Environmental Conservation, Chapter 72 - Wastewater Disposal	http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2072.pdf	

Current Status





- Document was approved by EPA and U.S.AID for release at WEFTEC '2012 in New Orleans, LA
- Internal EPA QA/QC detailed review was completed
- State Regulatory links at WRA https://www.watereuse.org/government-affairs/usepa-guidelines
- Final 2012 Guidelines document as well as 2004 version are posted on the EPA/ORD/NRML publications website http://www.epa.gov/nrmrl/publications.html

FEDERAL REGISTER

The Daily Journal of the United States Government

Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption

A Proposed Rule by the Food and Drug Administration on January 16, 2013

DEPARTMENT OF HEALTH AND HUMAN SERVICES

21 CFR Parts 16 and 112
[Docket No. FDA-2011-N-0921]
RIN 0910-AG35

SUMMARY: To minimize the risk of serious adverse health consequences or death from consumption of contaminated produce, the Food and Drug Administration (FDA) is proposing to establish science-based minimum standards for the safe growing, harvesting, packing, and holding of produce, meaning fruits and vegetables grown for human consumption. FDA is proposing these standards as part of our implementation of the FDA Food Safety Modernization Act (FSMA).

Highlights of FDA's Proposed Rule …

Agricultural Water. Water can be a carrier of many different microorganisms of public health concern. The rule proposes that all agricultural water be safe and of adequate sanitary quality for its intended use. The proposed rule would require that, at the beginning of the growing season, the agricultural water system components under a farm's control be inspected to identify conditions that are reasonably likely to introduce pathogens to produce or food-contact surfaces.

Biological Soil Amendments. Biological soil amendments of animal origin, such as composted manure, may contain pathogens of public health concern. To address this, the rule proposes reasonable time intervals between the application of a biological soil amendment of animal original and crop harvest. The proposed rule also has provisions pertaining to the handling and storage of biological soil amendments of animal origin.

Health and Hygiene. The rule proposes basic hygienic practices to prevent bacteria, viruses, and parasites that are frequently transmitted from person to person and from person to food.

Domesticated and Wild Animals. Pathogens can be introduced into fruit and vegetable production systems via animal feces. Where there is a reasonable probability that animals could contaminate produce, the rule proposes farms be required to take reasonable measures to prevent pathogens from being introduced onto the produce and not harvest produce that is visibly contaminated with animal excreta.

Equipment, tools and buildings. The rule also proposes standards for sanitation used for produce operations on farms and for certain equipment, tools, buildings, and sanitation.