

**ATTACHMENTS TO
SPOKANE RIVER RESTORATION SCENARIO
FOR THE
DISSOLVED OXYGEN TMDL COLLABORATIVE**

**SIERRA CLUB
UPPER COLUMBIA RIVER GROUP
NOVEMBER 2005**

Spokane-Coeur d'Alene Watershed
Regional Water Issue Matrix
Rev. September 2005

Prepared by
Sierra Club Upper Columbia River Group

Regional Water Issues	Lead Agency	Cooperating Agencies	Decision Dates	Notes & Weblinks
Idaho Panhandle National Forest Plan	U.S. Forest Service, Jodi Kramer, 208-765-7235, kjkipz_revision@fs.fed.us			Forest planning for 10-15 year period. http://www.fs.fed.us/fipn/eco/manage/forestplan/index.htm#fprev
Coeur d'Alene Basin Superfund Cleanup	U.S. Environmental Protection Agency, Sheila Eckmann eckman.sheila@epa.gov 206-553-0455	Idaho Basin Env'l Improvement Commission Terry Harwood, Exec. Dir. 208-783-2528, tharwood@deg.idaho.gov Wash. Dep't of Ecology Coeur d'Alene Tribe National Academies of Sciences, Karl Gustavson	NAS Review published July 15, 2005 2 Spokane River sites scheduled for cleanup starting July 2005	Cleanup of heavy metals (eg. lead, zinc, cadmium) throughout the Coeur d'Alene and Spokane River basins. Most of the metals pollution generated by historic mine waste disposal practices. http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/cda www.basincommission.com/ NAS report: Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin (2005): http://www.nap.edu/books/0309097142/html/ Agency for Toxic Substances & Disease Registry analysis of lead & other toxicity in the Coeur d'Alene Basin: http://www.atsdr.cdc.gov/HAC/PHA/region_10.html#idaho
Coeur d'Alene Lake Management Plan	Coeur d'Alene Tribe Phil Cermera, 208-667-5772, philc@cdatribe-nsn.gov Idaho Dep't of Environmental Quality, Ed Tulloch, 208-769-1422, etulloch@deg.state.id.us	US Env'l Protection Agency		Water quality mgt plan for Lake Coeur d'Alene; Idaho has requested this plan be used as basis to de-list Superfund status of lake. http://www.deg.state.id.us/water/data_reports/surface_water/water_body/es/cda_lake_mgmt_plan.cfm Funding: Coeur d'Alene Tribe has issued \$5 million challenge grant to feds and Idaho
Shoreline Master Plan Updates	Spokane County, Liberty Lake, Spokane Valley Jim Falk, 509-477-7228, jfalk@spokanecounty.org	Wash. Dep't of Ecology Doug Pineo, 509-329-3416, dpine461@ecy.wa.gov		Shoreline Advisory Committee convened by Spokane County meets regularly during 2005 to recommend updates to the program. http://www.ecy.wa.gov/programs/sea/sma/index.html

Regional Water Issues	Lead Agency	Cooperating Agencies	Decision Dates	Notes & Weblinks
PCB MTCA Action	Ecology Toxics Cleanup Program, John Roland Jrol461@ecy.wa.gov 509-329-3581		Draft Cleanup plan issued March 2005	Water quality cleanup plan for PCBs in sediments behind Upriver Dam. http://www.ecy.wa.gov/programs/tcpl/sites/spo_riv/Dr_FO_FS/Dr%20Final%20F-S%20Study_Part_1.pdf
PCB TMDL	Ecology Water Quality Program Ken Merrill, 509-325-3515 kmer461@ecy.wa.gov	Spokane Regional Health District Mike LaScuola 509-324-1574	Draft technical study due out spring 2005	Water quality cleanup plan for PCBs in the Spokane River and sediments. http://www.ecy.wa.gov/programs/wq/tmdl/watershed/spokaneriver/pcb/status.html www.srhhd.org/safety/environment/default.asp
Dissolved Oxygen TMDL	Ecology Water Quality Program Ken Merrill, kmer461@ecy.wa.gov 509-325-3515	US EPA - Wash. Operations Office Dave Ragsdale rags461@ecy.wa.gov 360-407-6589	Draft TMDL issued in October 2004 Implementation on hold pending outcome of Spokane River TMDL Collaboration Collaboration dialogue expected to continue to late 2005	Water quality cleanup plan for dissolved oxygen in the Spokane River. Most DO pollution generated by sewage treatment plants. www.ecy.wa.gov/programs/wq/tmdl/watershed/spokaneriver/dissolved_oxygen/problem.html http://www.ecy.wa.gov/programs/wq/tmdl/watershed/spokaneriver/dissolved_oxygen/spokane_revised_draft_tmdl_submittal_101504.pdf http://client-ross.com/spokane-river/
Dissolved Oxygen Use Attainability Analysis (UAA)	City and County of Spokane, Liberty Lake Sewer District, Spokane Valley, Post Falls, Hayden Sewer Board, Coeur d'Alene, Inland Empire Paper, Kaiser Aluminium Marlena Guhlke Marlena.guhlke@ch2m.com 509-747-2000		Submitted to Ecology Dec. 2004 UAA petition on hold pending outcome of Spokane River TMDL Collaboration	Proposal to lower dissolved oxygen water quality standard for Spokane River. http://projects.ch2m.com/spokaneriveruses/index.html Funding: approx. \$500,000 (Project Sponsors)
Total Dissolved Gas TMDL	Ecology Water Quality Program		To be done concurrent with Avista license	Water quality cleanup plan for total dissolved gas in the Spokane River. Most TDG is generated by dams. http://www.ecy.wa.gov/biblio/0503010.html

Regional Water Issues	Lead Agency	Cooperating Agencies	Decision Dates	Notes & Weblinks
Latah Creek TMDL	Spokane County Conservation District Rick Noll, rick-noll@sccd.org , 509-535-7274 Ecology Water Quality Program, 360-407-6486 Joe Joy, jjoy461@ecy.wa.gov		Project underway spring 2004	Water quality cleanup plan for Latah (Hangman) Creek focusing on phosphorous, fecal coliform and total suspended sediments.
Little Spokane River TMDL	Spokane Cty Cons. Dist., Walt Edelen, waldelen@sccd.org , 509-535-7274 Ecology Water Quality Prog., Paul Turner, 509-329-3580, plturn461@ecy.wa.gov		Project underway summer 2004	Water quality cleanup plan for Little Spokane River focusing on temperature, fecal coliform dissolved oxygen http://www.sccd.org/lisrwc.htm
Washington NPDES permits Liberty Lake, KACC, IEP City of Spokane County of Spokane Idaho NPDES permits: CdA, Post Falls, Hayden Sewer	Washington Dep't of Ecology Len Bramble, 509-329-3504, lbra461@ecy.wa.gov , or Richard Koch, 509-329-3519, rkoc461@ecy.wa.gov Bruce Rawls, County Utilities Director, 509-477-3604 Brian Nickel, EPA Region 10, nickel.brian@epa.gov	Bruce Rawls, County Utilities Director, 509-477-3604	Permits expired, On hold EPA permits due Aug. 2005	Water quality discharge permits for individual facilities. Dep't of Ecology does not have a website for Spokane River NPDES permits. Liberty Lake Water & Sewer District: http://www.libertylake.org/ City: http://www.spokanewastewater.org/ County: http://www.spokanecounty.org/utilities/wwfp/

Regional Water Issues	Lead Agency	Cooperating Agencies	Decision Dates	Notes & Weblinks
Middle/Little Spokane River (WRIA 55/57) Watershed Plan	Spokane City Water Quality Div. Rob Lindsay 509-477-7259 rlindsay@spokanecounty.org Ecology Watershed Planning Brian Farmer, 509-329-3561 bfar461@ecy.wa.gov	City of Spokane, Vera Water & Power, Whitworth Water District, Pend Oreille and Stevens Counties	Plan presented to Spokane, Stevens and Pend Oreille County Commissioners, August 2005	Water supply and instream flow plan for Spokane River between state line and Monroe Street and Little Spokane River. www.spokanewatershed.org/ASP/home.asp www.ecy.wa.gov/watershed/5557.html Funding: \$1.375 millions as of 12/04 (WA State)
Latah Creek (WRIA 56) Watershed Plan	Spokane County Conservation District Walt Edelen, walt.edelen@sccd.org 509-535-7274 Ecology Watershed Planning Brian Farmer, 509-329-3561 bfar461@ecy.wa.gov	City & County of Spokane, Whitman County, Hangman Hills Water District, SCCD; Coeur d'Alene Tribe	Draft Plan Published in May 2005 Pending approval by Spokane Co. Comm.	Water supply plan for Latah (Hangman) Creek. www.sccd.org/2514.htm www.ecy.wa.gov/watershed/56.html Funding: \$800K (as of 12/04) (WA State)
Lower Spokane River (WRIA 54) Watershed Plan	Spokane County Water Quality Program - Bill Gilmour billgilmour@spokanecounty.org 509-477-7260 Ecology Watershed Planning Brian Farmer, 509-329-3561 bfar461@ecy.wa.gov	Spokane Tribe, City of Spokane, Spokane, Stevens, Lincoln Counties, Stevens PUD	Plan due to Ecology Jan. 2009	Water supply and instream flow planning for Spokane River between Monroe Street and Columbia River. www.ecy.wa.gov/watershed/54.html Funding: \$50K (as of 12/03) (WA state)
Washington water rights	Washington Dep't of Ecology	Spokane County Water Conservancy Board	Ongoing	Washington has a de facto moratorium on new water rights from SVRP Aquifer. The agency is processing changes to existing water rights. http://www.ecy.wa.gov/programs/wr/conservancy_boards/cb-home.html
Great Gorge Park	Friends of the Falls Doug Siddoway, dis@randanco.com		Strategic Master Plan completed Dec. 2004	Proposal to protect Spokane River downstream of Spokane Falls. www.friendsofthefalls.org

Regional Water Issues	Lead Agency	Cooperating Agencies	Decision Dates	Notes & Weblinks
SVRP BI-State Aquifer Study	U.S. Geological Survey Mark Savoca, 253-428-3600 X 2660, mesavoca@usgs.gov	Idaho Dep't of Env'l Quality Hal Anderson, 208-327-7900 handerso@idwr.state.id.us WA Dep't of Ecology Keith Stoffel, 509-329-3464 ksto461@ecy.wa.gov	Study completion expected Dec. 2006	Technical study of Spokane Valley-Rathdrum Prairie Aquifer. www.water.usgs.gov/projects/svrv/ www.idwr.state.id.us/hydrologic/projects/svrv/ Funding: Shortfall caused USGS to cut back personnel in 7/05 FY 2006 request of 300K unsecured as of 9/01/05)
Idaho water rights	Idaho Dep't of Water Resources, Bob Haynes 208-769-1450, bhaynes@idwr.state.id.us		Ongoing Final Report issued	Idaho continues to issue water rights for the Spokane-Rathdrum Aquifer. http://www.idwr.state.id.us/ The ID legislature has established an interim committee to study SVRP Aquifer issues. Committee info at http://www.idwr.state.id.us/Committee/North%20Idaho/default.htm
Idaho Groundwater Mgt. Plan	Idaho Dep't Water Resources Bob Haynes, 208-769-1450 bhaynes@idwr.state.id.us		Draft mgmt plan submitted 7/26/2004	Groundwater management plan for Idaho portion of the SVRP Aquifer: http://www.idwr.state.id.us/
Avista Dam Relicensing	Fed. Energy Reg. Comm., John Cofrancesco 202-502-8951 IDEQ (401 Cert) WA Ecology (401 Cert) Brian Farmer, 509-329-3572, blar461@ecy.wa.gov	Avista Corp., Bruce Howard bruce.howard@avistacorp.com 509-495-2941	Avista filed two Applications with FERC 7/05, one For Post Falls, second for Other dams	Renewal of licenses for five of Avista's six Spokane River dams. http://www.avistautilities.com/resources/relicensing/spokane/ Idaho & Washington must certify the dams meet water quality standards. For info re WA's 401 certification program: http://www.ecy.wa.gov/programs/wg/ferc/index.html
Lake Roosevelt Cleanup	US Env'l Protection Agency Kevin Rochlin, 206-553-2106 rochlin.kevin@epa.gov	Colville & Spokane Tribes, Army Corps of Engineers, Bureau of Reclamation, WA Dep't of Ecology	Remedial investigation underway June 2004	Cleanup investigation relating to slag and mercury pollution in Columbia River from Trail, B.C. smelter http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/UpperC Colville Tribes/WA state v. Teck Cominco lawsuit pending
Midnite Mine Superfund Cleanup	US Env'l Protection Agency Ellen Hale, 206-553-1215 hale.ellie@epa.gov	Spokane Tribe Randy Connolly 509-258-7709 Connolly@spokanetribe.com	RIF/S due out est. Sept. 2005	Open pit uranium mine on the Spokane Reservation. Drainage to Blue Creek and the Spokane River arm of Lake Roosevelt http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/midnite

Environmental NGOs working on Spokane watershed water issues:

Advocates for the West, Sara Denniston Eddie, 208-342-7024, seddle@rmci.net
 American Rivers, Ross Freeman, 206-213-0330, rffreeman@amrivers.org
 Center for Justice, Bonne Beavers, 509-835-5211, bbeavers@cfjustice.org

Columbia River Keeper, Cyndy deBruler, 509-493-2808, crwa@gorge.net
 Eloika Lake Association, Greg Sweeney, 509-448-8055, greg@cgsweeney.com
 Friends of the Aquifer, Julian Powers, 509-838-5803, julianjane@icehouse.net

Friends of the Centennial Trail, 509-624-7188, friends@spokanecentennialtrail.org
Friends of the Falls, Doug Siddoway, 509-747-2052, djs@randanco.com
Hydropower Reform Coalition, Rebecca Sherman, 971-244-0836, rsherman@americandrivers.org
Idaho Conservation League, Justin Hayes, 208-345-6933, jhayes@wildidaho.org
Idaho Rivers United, Jenna Borovansky, 208-343-7481, jenna@idahorivers.org
Inland Northwest Whitewater Association, John Patrouch, 509-927-7256, patrouch@cet.com
Kootenai Environmental Alliance, Barry Rosenberg, 208-667-9093, barry@kealliance.org
Lake Spokane Protection Association, Galen Buterbaugh, galenb1@comcast.net
Neighborhood Alliance of Spokane, Bonnie Mager, 509-232-2772, bmager@neighborhood-alliance.org
North Idaho Flycasters, Earl Frizzell, 208-664-8020
Public Employees for Environmental Responsibility, Lea Mitchell, 350-528-2110, wapeer@peer.org

SHAWL (Saving Our Health Air Water & Land), Deb Abrahamson, abrahamsondeb@yahoo.com
Sierra Club Upper Columbia River Group, Tim Connor, (509) 456-3376, Tim.connor@sierraclub.org
Silver Valley Community Resource Center, Barbara Miller, 208-784-8891, paccro@imbris.com
Spokane Audubon, Steve Baran, rsrivers@comcast.net
Spokane Canoe & Kayak Club, Dick Rivers, rsrivers@comcast.net
Spokane Fly Fishers, Judy Kauffman, dv111@qwest.net
Spokane Mountaineers, 509-838-4974
Spokane River Coalition, John Osborn, 509-328-1087, john@waterplanet.ws
The Lands Council, Amber Waldref, 509-838-4912, awaldref@landscouncil.org
1,000 Friends of Washington, Bart Haggin, 509-466-4118, bartmh4118@msn.com
Trout Unlimited – Spokane Falls Chapter, Nancy McKelvey, 509-255-6107, njmckelvey@msn.com

Friendly amendments welcome. Contact Tim Connor at tim.connor@sierraclub.org or 509-456-3376.

Watershed Management Plan

Water Resource Inventory Area 55 - Little Spokane River

&

Water Resource Inventory Area 57 - Middle Spokane River



Prepared by:

Little Spokane River and Middle Spokane River Planning Unit

Lead Agency

Spokane County

Draft 02

February 2005

ATTACHMENT I

Reuse: Applying water that has been used, with or without treatment, to a second beneficial use. The water quality requirements of the follow up use are generally lower than that for the initial use.

Water purveyors, industrial and commercial well owners, and public and private entities that irrigate substantial areas from on-site wells (parks, schools, cemeteries, golf courses etc.) provided total amounts of water pumped (Table 4.I.A). Water use amounts for several categories of use were divided by the 2000 U.S. census data for the service area of the users to obtain a daily per capita water use figure. The water use data are presented in units of acre feet/year, million gallons/day, and cubic feet per second for comparison. The total amount of water pumped for all uses indicate a year around average production of water of approximately 327 gallons per person per day. During the winter municipal water production is about 157 gallons per person per day. During the peak water use months of July and August, the water production increases to approximately 700 gallons per person per day. These data indicate there is a significant increase in water use during the summer above the year round base water use for indoor use. The increase in water use is most likely caused by irrigation of lawns and gardens.

Use	Annual			July and August		
	Residential	Metered M& I	Total Production	Residential	Metered M&I	Total Production
	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day
Municipal Non-irrigation Use ¹	76.2	118.1	156.7	76.2	118.1	156.7
Municipal Irrigation	108.1	150.8	171.4	314.2	451.3	547.5
Municipal Subtotal	184.3	268.9	328.1	390.4	569.4	704.2
Commercial Industrial ²			105			107
Commercial Irrigation ³			4			12
Total			437.1			823.2

¹ average of November - March pumping represents "indoor" (Non-irrigation) use
² not supplied by municipal sources
³ parks, schools, golf courses etc. not supplied by municipal sources

Table 4.I.B summarizes daily per capita water use for Spokane County and other locations in the Western United States to provide a comparison with Spokane area water use.

**BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO**

IN THE MATTER OF MANAGEMENT)
OF GROUND WATER WITHIN THE)
RATHDRUM PRAIRIE GROUND)
WATER MANAGEMENT AREA)

**FINAL ORDER
ADOPTING GROUND WATER
MANAGEMENT PLAN**

The Director of the Idaho Department of Water Resources ("Director" or "Department") is responsible for managing the allocation and use of ground water resources in the state of Idaho. A ground water management area, with an associated advisory committee, has been designated to facilitate management of ground water in the area overlying the Rathdrum Prairie-Spokane Valley Aquifer within the State of Idaho. The advisory committee has submitted to the Director a "Recommended Ground Water Management Plan" that strives to balance the protection of existing ground water uses and water quality with the opportunity for future development, while encouraging water conservation. Based upon the recommended plan and his understanding of the law governing management of ground water resources, the Director enters the following Findings of Fact, Conclusions of Law, and Final Order adopting a ground water management plan for the Rathdrum Prairie Ground Water Management Area:

FINDINGS OF FACT

1. The Director designated the Rathdrum Prairie Ground Water Management Area ("RPGWMA") by order issued on December 11, 2002 ("Designation Order").
2. The area covered by the designation encompasses the Rathdrum Prairie-Spokane Valley Aquifer within the state of Idaho located in parts of Kootenai and Bonner counties and includes more than 200 square miles of land.
3. Ground water resources in the Rathdrum Prairie-Spokane Valley Aquifer supply much of the drinking water, irrigation, recreation, commercial, and industrial needs of the Rathdrum Prairie area.
4. The Designation Order also created the Rathdrum Prairie Ground Water Management Area Advisory Committee, comprised of nine members representing the interests of citizen groups, municipalities, counties, and other irrigation, commercial, and industrial water users within the designated area.
5. The Advisory Committee submitted a "Recommended Ground Water Management Plan" for the RPGWMA to the Director on May 4, 2004, together with letters of

comment that the Committee received from members of the public in response to their circulation of a draft plan.

6. The Department prepared a Draft Ground Water Management Plan based upon the recommended plan submitted by the Advisory Committee. Copies of the draft plan were made available to the public and the Department conducted a public meeting in Hayden, Idaho, on the evening of July 28, 2005, to discuss the draft plan with area residents. The Department received one letter of comment regarding the draft plan following the public meeting.

CONCLUSIONS OF LAW

1. The Rathdrum Prairie Ground Water Management Area was designated pursuant to the provisions of Idaho Code § 42-233b, which provides in pertinent part:

When the director of the department of water resources designates a ground water management area, or at any time thereafter during the existence of the designation, the director may approve a ground water management plan for the area. The ground water management plan should provide for managing the effects of ground water withdrawals on the aquifer from which withdrawals are made and on any other hydraulically connected sources of water.

2. A ground water management plan, incorporating as appropriate the recommendations of the advisory committee, should be adopted for the RPGWMA.

ORDER

IT IS HEREBY ORDERED that the Director adopts the Ground Water Management Plan for the Rathdrum Prairie Ground Water Management Area, as revised. The adopted plan is set out in full as "Attachment A" to this Order and is hereby made a part of this Order.

IT IS FURTHER ORDERED THAT this order is issued in accordance with Rule 740 of the "Rules of Procedure of the Department of Water Resources," IDAPA 37.01.01. Notice of the order shall be mailed to affected holders of pending applications to appropriate ground water and published in a newspaper of general circulation in each of the counties covered in whole or part by the RPGWMA.

DATED this 15th day of September, 2005.


KARL DREHER
Director

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 15th day of September, 2005, the above and foregoing document was served by placing a copy of the same in the United States mail, postage prepaid and properly addressed to the following:

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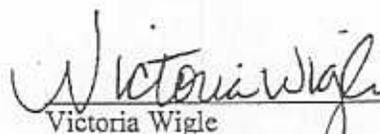
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Victoria Wigle
Administrative Assistant to the Director
Idaho Department of Water Resources

ATTACHMENT A

MANAGEMENT PLAN FOR THE RATHDRUM PRAIRIE GROUND WATER MANAGEMENT AREA

Adopted by the Director of the Idaho Department of Water Resources
September 15, 2005

1.0 General

- 1.1 The Rathdrum Prairie Ground Water Management Area ("RPGWMA") is located in Kootenai and Bonner Counties. The Rathdrum Prairie lies over the Idaho portion of the extensive Rathdrum Prairie-Spokane Valley ("RP-SV") Aquifer, which extends from Lake Pend Oreille to Long Lake, in Spokane County, Washington. The portion of the aquifer in Idaho is a prolific and provides an extensive ground water supply.
- 1.2 The RP-SV Aquifer is a thick layer (as much as 600 feet) of coarse sediments (gravels, cobbles, and boulders) deposited by catastrophic flooding associated with the rapid draining of ancient lakes when ice dams broke. This geologic feature extends southwest from the southern end of Lake Pend Oreille in northern Kootenai County, Idaho, past the Idaho-Washington border and then west towards Spokane, Washington, covering an area of about 320 square miles of which approximately 200 square miles are in Idaho.
- 1.3 Ground water within the aquifer occurs under unconfined, non-artesian conditions. The top of the saturated surface within the aquifer (the ground water table) is sufficiently lower than the surface elevation of all of the lakes and the reach of the Spokane River located within Idaho, such that ground water is not tributary to surface water within Idaho, but is tributary to the Spokane River and tributaries in Washington beginning about five to seven miles west of the state line.
- 1.4 While protecting the sovereign rights of the State of Idaho, the Idaho Department of Water Resources ("IDWR") supports the concept of regional water management for the RP-SV Aquifer. The aquifer is a regional resource that requires cooperation for comprehensive management and long-term viability.

2.0 Statutory Requirement and Authorities

- 2.1 Idaho Code § 42-226 declares all ground water in Idaho to be the property of the state, and charges the state with supervising the appropriation and allotment of the same. One of the purposes of this provision is to assure that early appropriators of ground water are protected in the maintenance of reasonable ground water pumping levels.
- 2.2 Idaho Code § 42-233b authorizes the Director of IDWR to designate a "Ground Water Management Area" when the water supply in the area may be approaching conditions that could lead to designation as a critical ground water area.

- 2.3 Idaho Code § 42-233b also authorizes the Director to approve a ground water management plan. The purpose of the plan is to provide for managing the effects of ground water withdrawals on the aquifer and any other hydraulically-connected sources of water.
- 2.4 Idaho Code § 42-235 provides that a permit to construct a well shall be required to protect the public health, safety and welfare, and the environment, and to prevent the waste of water or mixing of water from different aquifers.
- 2.5 Idaho Code § 42-237a.g, Idaho Code, empowers the Director to prohibit or limit the withdrawal of water from any well during the period that he determines that water to fill any water right is not available.

3.0 Management Plan ("Plan")

The following goals, strategies, and actions are adopted for use in future management of the ground water resources of the RP-SV Aquifer and associated activities.

Goal 1

Obtain adequate technical data and quantification of water availability to make knowledgeable and appropriate management decisions about the ground water resources of the Rathdrum Prairie.

- 3.1.1 IDWR supports and is participating in the ongoing, bi-state, hydrogeologic study for the entire RP-SV Aquifer. This study includes collection and analyses of data to understand the sustainable yield of the aquifer. The knowledge gained will be applied to modeling and other techniques for future management of the aquifer.
- 3.1.2 IDWR will modify its management of the aquifer as additional information becomes available and as change is warranted. Modifications to aquifer management may include changing the boundary of the RPGWMA, imposing special conditions on new and future water right permits, and other modifications deemed appropriate and consistent with the goals of the Plan and Idaho law.
- 3.1.3 IDWR will develop an appropriate process to take advantage of opportunities to obtain the following information during well construction and development of specific wells identified by IDWR in strategic locations:
 - (1) Depth to water
 - (2) GPS coordinates of well locations
 - (3) Detailed lithology
 - (4) Depth to bedrock
 - (5) Pump tests
 - (6) Water quality sampling

Goal 2

Obtain adequate technical data and quantification of water use to make knowledgeable and appropriate management decisions about the ground water resources of the Rathdrum Prairie.

3.2.1 IDWR will, as an interim measure, establish a Water Measurement District, as defined by Title 42, Chapter 7, Idaho Code until such time as a water district as described in Title 42, Chapter 6, Idaho Code can be created. A water measurement district will provide needed information about water use on the Rathdrum Prairie. Measurement and reporting to IDWR will assist in compiling water use information for developing and updating a water budget. Monitoring and reporting will be initiated for all consumptive water uses as follows:

3.2.1.1 New uses, 0.2 cubic feet per second (cfs) or less, are required to have a functional metering device, the water user must report the total ground water withdrawal once per year, and the water user must agree to a simple list of conservation measures;

3.2.1.2 Existing and new uses, 0.21 cfs to 1.0 cfs, shall have the same requirements as in 3.2.1.1 plus quarterly monitoring and reporting of ground water depth; and

3.2.1.3 Existing and new uses, 1.01 cfs or greater, shall have the same requirements the same as in 3.2.1.2 except the metering device and water depth must be measured monthly and reported quarterly. A conservation plan must be developed if application is made to appropriate water or to transfer a water right. Upon approval of the application, the plan must be reviewed by the right holder every five years, at a minimum, to evaluate the effectiveness in achieving the conservation goals.

3.2.2 IDWR will work with the advisory committee and local elected officials to determine the feasibility, cost, and potential funding mechanisms to begin an adjudication of water rights in the Coeur d'Alene Basin.

Goal 3

Manage the ground water resource efficiently and fairly for all users of the resource.

3.3.1 IDWR shall evaluate applications for transfer of water rights to ensure consistency with the conservation of the ground water resource and the local public interest.

3.3.2 Upon completion of an adjudication of water rights, a water district shall be created to replace the water measurement district. Water administration under the direction of the water district will provide for the distribution of water in accordance with the elements of the decreed rights and prevent unauthorized uses of ground water.

Goal 4

Encourage water purveyors, regulatory agencies, and local & regional governments to plan for future water needs and incorporate the principles of this Plan in programs, policies, and ordinances.

- 3.4.1 Long-term planning for municipal and community needs should use the tools available to plan for and protect future water needs. The privileges accorded municipal water purveyors by Idaho law should be investigated for use by all local and regional bodies that qualify for that status.
- 3.4.2 IDWR encourages local jurisdictions to require connections to community systems when available in lieu of individual wells.

Goal 5

Encourage water conservation efforts by all users of the resource.

- 3.5.1 For all new water rights or changes to existing water rights held by municipal purveyors, IDWR will require conservation plans for all systems regulated as public water systems. IDWR will enforce adherence to the conservation plan provisions through water right conditions and civil penalties as allowed by law. The advisory committee specifically supports this element of the management plan.

Each plan may include the elements as listed in guidelines published by EPA ("Water Conservation Plan Guidelines", Environmental Protection Agency, 1998, <http://www.epa.gov/owm/water-efficiency/webguid.html>). These guidelines are primarily designed for public water supply systems. However, any water user can follow the steps described in the guidelines to evaluate the existing conditions and systems, identify and evaluate opportunities for conservations measures, and develop strategies and timetables to meet defined, measurable goals.

The advisory committee will identify elements to be considered by IDWR for inclusion based on system size. The conservation plan may include the following components:

- measurable conservation planning goals
- summary of existing system characteristics and water use conditions
 - water system profile
 - description of planned facilities
- current and future conservation opportunities
 - identification of water conservation measures
 - analysis of benefits and costs
- select water conservation measures
- implementation mechanisms, timetable, and assessment strategy

3.5.2 IDWR encourages the establishment of an aquifer-wide water conservation advisory committee representing municipal purveyors for purposes of water conservation planning, education, and implementation.

3.5.3 IDWR will encourage and assist, through management actions, the following measures:

- Economic support for water purveyors to develop conservation plans through access to federal and state programs, such as the Drinking Water State Revolving Fund (SRF);
- Landscaping efficiency demonstration projects and funding support through state and federal sources;
- Price structures for water use that encourage conservation of water resources;
- Development of water conservation educational activities by municipal purveyors regulated as public water systems; and
- Use of reclaimed water for existing or planned consumptive uses of ground water on the Rathdrum Prairie wherever it is readily available and meets water quality requirements. IDWR supports the investigation of using reclaimed wastewater from municipal wastewater facilities to lessen the impact of the wastewater on the Spokane River.

4.0 Additional Actions

4.1 New domestic uses defined by Idaho Code § 42-111 shall be authorized only upon IDWR approval of an application for a well drilling permit. New individual ground water domestic uses shall be discouraged if water can be reasonably supplied from a municipal source or community system.

4.2 Ground water rights with points of diversion located within the RPGWMA shall not be considered lost, abandoned, and/or forfeited for non-use, in whole or in part, if non-use is for the purposes of conservation or other conditions of this management plan. The five (5) year period of non-use for forfeiture of a water right shall resume upon termination of this Plan unless such non-use is otherwise excepted from forfeiture by Idaho law.

4.3 Any well to be abandoned in the RPGWMA shall require a well abandonment permit issued by IDWR. This requirement will protect water quality and limit wasting of water that might otherwise result from improper well abandonment techniques. Before any well is abandoned, the possibility that it could be used for monitoring should be explored.

4.4 The Director may require aquifer monitoring for any new ground water diversions approved surrounding the RPGWMA to the extent that such monitoring would be expected to yield data relevant to the boundaries and conditions of the RPGWMA.

- 4.5 IDWR supports the investigation of managed recharge of the RPSV aquifer. During periods of high flow in the Spokane River, the potential exists for enhancing the volume of water that enters the aquifer along the losing reaches of the river. The stored water could then be available for discharge to the river during the traditional low-flow time period. The investigations must evaluate the economics of augmented volumes while preserving the water quality of the aquifer.
- 4.6 The advisory committee shall continue to perform the duties and provide the representation described in the Order designating the RPGWMA, including recommending solutions to issues that arise in the RPGWMA. The advisory committee shall meet at least once a year no later than May 31. Minutes from this annual meeting shall be provided to the Director. Additional meetings may be convened to address specific issues that arise. Notice of meetings shall meet all requirements of state rules and statutes.
- 4.7 The Plan shall be reviewed annually by the advisory committee, and modifications shall be recommended to the Director as needed. At the end of each five (5) year period, starting from the date the Plan is approved, the advisory committee shall provide a summary report documenting the progress of the Plan to the Director.

RESOLUTION NO 2005 0112

A resolution regarding the development of a Water Stewardship Program.

WHEREAS, water is a valuable resource that should always be used as wisely and efficiently as possible; and

WHEREAS, protection of limited water resources is a significant issue because all water used in the Eastern Washington – Northern Idaho region is from the Spokane Valley - Rathdrum Prairie Aquifer; and

WHEREAS, long range water supply concerns present important issues that must be addressed in light of the significant growth potential of the region and the current consumption of water; and

WHEREAS, recognizing that the region's water supplies are adequate but not unlimited, and that ground and surface waters are interconnected, a Water Stewardship Program is essential for ongoing economic growth of the Washington/Idaho region served by the aquifer; and

WHEREAS, stewardship is a citizen driven effort which is dependent upon a strong partnership with water purveyors and stewardship can extend the water supply at a fraction of the cost of other alternatives; and

WHEREAS, an effective Water Stewardship Program will include at least five water conservation elements: Indoor Residential; Outdoor Residential; Education; Industrial, Commercial, and Institutional (ICI); and, Regulatory; and

WHEREAS, the City Council is calling upon each citizen of the City of Spokane to help protect our water by being good stewards of this phenomenal resource through reduction in water used; and

WHEREAS, it is the desire of the City Council to prepare and implement a Water Stewardship Program, with the cooperation of the City's Public Works and Utilities Department as well as other regional entities, in order to adequately address the sustainability of our sole source aquifer; and

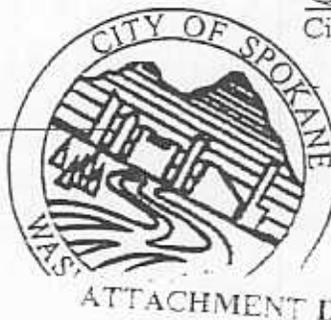
NOW, THEREFORE, BE IT HEREBY RESOLVED by the City Council that the City of Spokane shall develop, implement, and promote a Water Stewardship Program in the City and call on all our citizens to embrace this effort and become good stewards of this most important resource.

PASSED the City Council this 26th day of September, 2005.

Jenni K. [Signature]
City Clerk

Approved as to form:

[Signature]
Assistant City Attorney



REVISED
09.26.05



AGENDA SHEET FOR COUNCIL MEETING OF: September 26, 2005

Submitting Dept.
Office of the City Council

Contact Person
Council President Dennis
Hession

Phone No.
625-8255

ADMINISTRATIVE SESSION

- Contract
- Report
- Claims

LEGISLATIVE SESSION

- Emergency Ord
- Resolution
- Final Reading Ord
- First Reading Ord
- Special Consideration
- Hearing
- Public Safety
- Public Works 9/12/05

CITY PRIORITY

- Communications
- Economic Development
- Growth Management
- Human Services
- Neighborhoods
- Public Safety
- Quality Service Delivery
- Racial Equity/Cultural Diversity
- Rebuild/Maintain Infrastructure

STANDING COMMITTEES
(Date of Notification)

- Finance
- Neighborhoods
- Planning/Community & Econ Dev

CITY CLERK'S OFFICE
SPOKANE, WA

CLERK'S FILE _____

RENEWS _____

CROSS REF _____

ENG _____

BID _____

REQUISITION _____

Neighborhood/Commission/Committee Notified: _____

Action Taken: _____

AGENDA WORKING:

A resolution regarding the development of a Water Stewardship Program.

BACKGROUND:
(Attach additional sheet if necessary)

Recognizing that the region's water supplies are adequate but not unlimited, a Water Stewardship Program is essential for ongoing economic growth of the Washington/Idaho region served by the aquifer. Long range water supply concerns must be addressed in light of the region's potential for growth and current rates of water consumption. Stewardship is a citizen-led effort which can extend the aquifer's water supply at a fraction of the cost of other conservation alternatives. Additionally, in 2007, the Water Department is required to submit their seven year Water Comprehensive Plan to the Washington State Department of Health. Within this program, the Water Department is mandated to address five water conservation guidelines. These requirements include: Indoor Residential, Outdoor Residential, Education, Indoor Industrial, Commercial, and Institutional (ICI), and Regulatory. A Water Stewardship Program would fulfill the necessary requirements.

RECOMMENDATION:

Fiscal Impact: <input type="radio"/> N/A	Budget Account: <input type="radio"/> N/A
<input type="radio"/> Expenditure: \$	#
<input type="radio"/> Revenue: \$	#
<input type="radio"/> Budget Neutral	

ATTACHMENTS: Include in Packets:
On file for Review in Office of City Clerk:

SIGNATURES:

[Signature]
Councilperson

[Signature]
Legal

Division Director

Deputy Mayor for Mayor

Finance

[Signature]
Council President

DISTRIBUTION:

*ADOPTED BY
SPOKANE CITY COUNCIL:
September 26, 2005

COUNCIL ACTION:

[Signature]
CITY CLERK
* See Council Action
Memo dated 10-3-05

Water Conservation Memo

To: Spokane City Council Members

From: Rachael Paschal Osborn, the Sierra Club, Amber Waldref, The Lands Council,
and Greg Sweeney, Sweeney and Co. Consultants

Date: March 31, 2005

Re: Water Conservation Examples

Attached are a variety of resources for and examples of municipal water conservation programs that Spokane City Councilmembers may find useful:

Weblinks

Links to Websites about Water Conservation

Links to Water Conservation Websites in Western Cities

Policy Documents

San Antonio, Texas: Water Conservation & Reuse Ordinance (Jan. 2005)

Salt Lake City, Utah: Water Conservation Master Plan (2004)

Seattle, Washington: Water Conservation Potential Assessment, Executive Summary (1998)

Seattle, Washington: 2003 Annual Report, Saving Water Partnership, Regional 1% Water Conservation Program

Examples & Ideas

- **Rate Structures**

Salt Lake City, Proposed Water Rate Restructure for City Customers (brochure)

Seattle Public Utilities, Third Tier Water Rates (brochure)

Spokane, 2005 Residential Utilities Rates (utility bill insert)

- **Education**

H2ouse Water Saver, Save Water, Money, Energy Now! Top 5 Actions (website)

San Diego, Water Conservation Survey (website)

Southern Nevada Water Authority, Take the Conservation Challenge (interactive website) (visiting this website is highly recommended)

San Diego, Fun Water Facts (website)

San Diego, Water Conservation Poster Contest (website)

Phoenix, Reading List for Water Conservation and Water Science for elementary school, middle school, high school and adult (website)

American Water Works Association, Straight Talk on Water Conservation

- **Residential Programs**

Southern Nevada Water Authority, Water Smart Home Program (website)

San Antonio, Home Water Conservation Audit (website)

Seattle, Selecting a Water Efficient Toilet (brochure)

Las Vegas Valley Water District, Pool cover and car wash coupons (website)

Denver, Fall Rebate Program for multi-family residence submeters

- **Water Efficient Landscaping**

Denver, Xeriscape Myth Busting: Exploding Some Troublesome Misconceptions (article, 2005)

United Water (Boise), Water Efficient Landscaping Classes & Residential Water Audits (website)

Las Vegas Valley Water District, Spring Watering Limitations (website)

San Antonio, Seasonal Irrigation Program (website)

- **Commercial Customers**

Seattle, Commercial customers water conservation rebates and technical assistance (website)

Denver, Grand Opening of Denver's Water Recycling Treatment Plant and Recycled Water System Newsletter, Vol. 1, excerpt (2004)

Denver, Don't Drink from the Sprinklers! (signage for recycled water)

Links to Websites about Water Conservation

<http://www.h2ouse.org> This site offers a fun and well-designed virtual tour of a typical home. Stop in at each room and see how you too can save water in your own home. Developed by the California Urban Water Conservation Council.

http://www.seattle.gov/util/Directory/Conservation_Index/index.asp This site provides a wide range of basic and technical information about Seattle Public Utilities' water conservation programs and projects. It also contains lots of information about conservation techniques and some useful Web links.

<http://www.toiletology.com/index.shtml> Everything you ever wanted to know, and then some, about toilets. Includes instruction for toilet repairs on standard, two-piece, American-made fixtures, plus water conservation ideas specifically for toilets.

<http://www.getwise.org/> A fun-filled journey for kids. Questions that will pique your curiosity, test your knowledge and encourage you to be water- and energy-wise.

<http://www.americanwater.com/49ways.htm> 49 ways to save water and energy.

<http://www.waterwiser.org/> A participant-moderated discussion forum about water efficiency and water conservation. Technical in nature with links to other water and related industry Web pages.

<http://gardening.wsu.edu/> The Washington State University website explores gardening tips and techniques for use in Western Washington. When you garden correctly, you conserve and protect our precious water supplies.

<http://www.irrigation.org/ia/about/about.html> About the Irrigation Association, plus information about irrigation design and equipment for your landscaping needs.

<http://www.cee1.org> The Consortium for Energy Efficiency, a national, non-profit organization that promotes energy efficient products and services, offers a list of washers and other appliances with information about energy and water use ratings.

<http://www.epa.gov/owm/water-efficiency/wecongid.htm> Water Conservation Plan Guidelines, US EPA (1998)

<http://www.cuwcc.org/home.html> California Urban Water Conservation Council, a partnership of urban water agencies, public interest organizations, dedicated to increasing efficient water use in California.

<http://www.terrylove.com/> Love Plumbing and Contracting, an enthusiastic plumbing company in Bellevue, Washington, illustrates the connections between the environment, business, and the consumer

Links to Water Conservation Websites in Western Cities

Boise – United Water

<http://www.unitedwater.com/uwid/consrvid.htm>

Denver Water

<http://www.water.denver.co.gov/>

Las Vegas Valley Water District

<http://www.lvwd.com/html/index.html>

Phoenix Water Department

<http://phoenix.gov/WATERSERVICES/>

Salt Lake City Public Utilities

<http://www.slccgov.com/utilities/conservation/default.htm>

San Diego Water Department

<http://www.sandiego.gov/water/conservation/index.shtml>

Saving Water Partnership (Puget Sound water utilities)

<http://www.savingwater.org>

Seattle Public Utilities

<http://www.seattle.gov/util/Services/Water/index.asp>

Southern Nevada Water Authority

<http://www.snwa.com/html/index.html>

Tacoma Public Utilities

<http://www.ci.tacoma.wa.us/water/>

AN ORDINANCE 100322

**AMENDING CHAPTER 34, ARTICLE IV, DIVISION I,
OF THE SAN ANTONIO CITY CODE TO MAKE
PERMANENT A YEAR ROUND WATER
CONSERVATION ORDINANCE; PROVIDING FOR
CRIMINAL AND CIVIL PENALTIES; AND DIRECTING
PUBLICATION.**

* * * * *

WHEREAS, the San Antonio Water System ("System") and the City of San Antonio ("City") are committed to the protection of the Edwards Aquifer as a unique natural resource; and

WHEREAS, the System's Water Resource Plan and the Region L Plan include advance conservation when projecting water supply requirements for San Antonio and the San Antonio region's future water needs; and

WHEREAS, San Antonio has made significant progress in reducing the per capita usage from a high of 225 gallons per capita daily ("gpcd") in the mid-1980's to 139 gpcd in 2003; and

WHEREAS, to sustain an overall goal of 132 gpcd during drier times, water use reductions become more difficult to achieve; and

WHEREAS, in November 2000, Mayor Howard Peak requested the System to develop a year round water conservation ordinance that would result in a reduction of water use without significantly impacting the quality of life for San Antonio citizens; and

WHEREAS, System staff has drafted language that would increase water conservation standards with significant input from the Community Conservation Committee, general public, citizens groups, and stakeholders over the past three years; and

WHEREAS, the recommended provisions address a variety of water uses and center around specific methods, equipment, and behaviors, that, when undertaken, result in significant water savings; and

WHEREAS, amending Chapter 34, Article IV, Division I, of the San Antonio City Code to make permanent a year-round water conservation ordinance will assist in reaching the 132 gpcd goal without significantly impacting the lives of the citizens of San Antonio; and

WHEREAS, the San Antonio Water System Board of Trustees (the "Board") has requested that the City adopt an ordinance to make permanent a year-round water conservation effort; and

WHEREAS, the Board has found that the potential amount of water which will be saved annually through the implementation of a year-round water conservation ordinance is 4000 acre feet, including water savings of 515 acre feet for irrigation system audits; water savings of 664 acre feet for dining facility provisions; 250 acre feet for cooling tower provision; 165 acre feet annually for each 400 ton air conditioning unit collecting condensate; and 211 acre feet a year for residential landscape provisions; and

WHEREAS, the City Council of the City of San Antonio desires to amend Chapter 34, Article IV, Division I, of the San Antonio City Code to make permanent a year-round water conservation ordinance; **NOW, THEREFORE;**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SAN ANTONIO:

SECTION 1. The City Code of the City of San Antonio, Chapter 34, Article IV, Water Conservation and Reuse, Division I, is hereby amended as set forth in the appended text, Attachment "A," fully incorporated herein verbatim for all purposes. Language amended by omission from the City Code is indicated in Attachment "A" by a strike through (~~strike~~) and new language to be added to the City Code is identified by underline.

SECTION 2. Any penalty, fine, or forfeiture imposed for a violation arising from amended provisions, shall be effective five (5) days after publication, as required by law.

SECTION 3. Financial impact on the City of San Antonio has not been identified as of the passage of this ordinance. For any future financial impact, the Director of Finance may, subject to concurrence by the City Manager or the City Manager's designee, create allocations to specific Cost Centers, WBS Elements, Internal Orders, General Ledger Accounts, and Fund Numbers as necessary to carry out the purpose of this Ordinance.

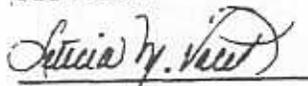
SECTION 4. The City Clerk shall publish this ordinance as may be required by law.

SECTION 5. If any part, section, paragraph, sentence, phrase or word of this ordinance is for any reason held to be unconstitutional, illegal, inoperative or invalid, or if any exception to or limitation upon any general provision is held to be unconstitutional, illegal, invalid or ineffective, the remainder of this ordinance shall nevertheless stand effective and valid as if it had been enacted without the portion held to be unconstitutional, illegal, invalid or ineffective.

SECTION 6. This Ordinance shall take effect on January 30, 2005.

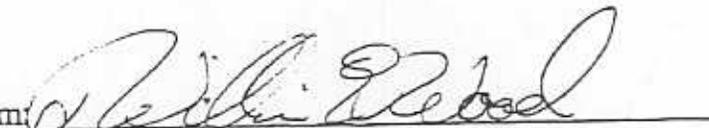
PASSED AND APPROVED this 20th day of January, 2005.

ATTEST:


City Clerk


MAYOR
EDWARD D. GARZA

Approved as to form:


City Attorney

ARTICLE IV. WATER CONSERVATION AND REUSE

Division 1. GENERALLY REGULATED ACTIVITIES

Sec. 34-271. Definitions.

As used in this article, the following terms shall have the following meanings:

Air conditioning system(s). A mechanical system generally consisting of a compressor, thermostat and duct work permanently installed in a building for the purpose of controlling humidity and temperature. For the purposes of this division, an air conditioning system does not include window units.

Automatic irrigation controller. A device that automatically activates and deactivates an irrigation system at times selected by the operator.

Blowdown meter. A meter that tracks the amount of water discharged from a cooling tower system.

Commercial dining facility. A business that serves prepared food and beverages to be consumed on the premises.

Concentration. Re-circulated water that has elevated levels of total dissolved solids as compared to the original make up water.

Conservation Department. The Conservation Department of the San Antonio Water System.

Conductivity controller. A device used to measure the conductivity of total dissolved solids in the water of a cooling system and control the discharge of water in order to maintain efficiency.

Cooling Tower. An open water recirculation device that uses fans or natural draft to draw or force air to contact and cool water through the evaporative process.

Director of Conservation. The Director of the Department of Conservation of the San Antonio Water System.

Impervious surface. Patios, pathways and other areas where firm footing is desired, constructed in such a way that does not allow water to penetrate the ground. Examples include but are not limited to concrete slab patios, sidewalks and driveways, asphalt streets or pavers set with mortar.

Irrigation system. A system with fixed pipes and emitters or heads that apply water to landscape plants or turfgrass, including, but not limited to, in-ground and permanent irrigation systems.

Irrigation system analysis. A zone-by-zone analysis of an irrigation system that, at a minimum, includes a review of the following elements:

- (1) design appropriateness for current landscape requirements
- (2) irrigation spray heads and valves
- (3) precipitation rates expressed in inches per hour
- (4) annual maintenance plan that includes irrigation system maintenance, landscape maintenance, and a basic summer and winter irrigation scheduling plan.

Large property. A land tract owned by a general customer that equals or exceeds five acres in size and has an irrigation system.

Low-flow toilet. A tank toilet that uses 1.6 gallons or less of water per flush.

Make-up Meter. A meter that measures the amount of water entering a cooling tower system.

NPDES / TPDES permit holders. Those entities that have valid state or federal permits commonly referred to as NPDES or TPDES [National Pollutant Discharge Elimination System / Texas Pollutant Discharge Elimination System] permits to satisfy requirements of the federal Clean Water Act.

Person. Any individual, corporation (including a government corporation), organization, state or federal governmental subdivision or agency, political subdivision of a state, interstate agency or body, business, trust, partnership, limited partnership, association, firm, company, joint stock company, joint venture, commission or any other legal entity.

Pervious Hardscape. Patios, pathways and other areas where firm footing is desired, constructed in such a way that allows for water to penetrate the ground. Examples include flagstone set in sand and wood plank decks, but exclude concrete slab patios and sidewalks or pavers set with mortar.

Positive shut-off. A valve that is held in a closed position by system pressure until overridden by an outside force.

Power washer. A machine that uses water or a water-based product applied at high pressure to clean impervious surfaces.

Rain sensor. A device designed to stop the flow of water to an automatic irrigation system when rainfall has been detected.

Recycled Water. Domestic or municipal wastewater which has been treated to a quality suitable for a beneficial use in accordance with applicable law.

Requestor. A customer who requests a variance under this Division.

Residential Customer. A single or multi-family dwelling unit containing two (2) or fewer family units.

Summer dormancy. The ability of turfgrass to survive without water for a period of sixty consecutive days during the months of May through September. Turfgrass with summer dormancy capabilities approved for use are set forth in the approved low water use plant list. The approved low water use plant list, as may be amended from time to time, shall be available from SAWS and located at www.saws.org/conservation.

Turfgrass. Perennial ground cover plants and grasses that are adapted to regular mowing and traffic through management.

Vacuum system. A system, often consisting of a pump, chamber, and tubes, that is used to create a vacuum for any of a variety of purposes, including but not limited to medical, dental and industrial applications.

Variance Administrator. Staff person in the Department of Conservation responsible for administering and hearing variance requests under this Division 1.

Vehicle wash facility. A permanently-located business that washes vehicles with water or water-based product, including but not limited to self-service car washes, full-service car washes, roll-over/in-bay style car washes, and fleet maintenance wash facilities.

Vehicle wash fundraiser. Any special-purpose vehicle wash event for which a fee is charged or donation accepted.

Water flow restrictor. An orifice or other device through which water passes at a restricted rate.

Xeriscape. A landscape consisting of a maximum of 50% turfgrass, with the remaining percentage of landscape incorporating low water use plants and/or pervious hardscape. The approved low water use plant list, as may be amended from time to time, shall be available from SAWS and located at www.saws.org/conservation.

Zonal irrigation system. An irrigation system that segregates by station areas of shrubs, ground cover, bedding plants, and turf to accommodate a diversity of watering requirements.

Sec. 34-272. Activities to be regulated on and after effective dates.

The following activities shall be regulated in the manner set out herein on and after the respective dates indicated in the sections and subsections. A person affected by such regulations may request a variance in the manner set out in Section 34-277. A violation of this section and subsections shall be subject to the enforcement provisions set out in Section 34-278. It shall be

and is hereby declared unlawful for any person to violate, refuse or fail to implement the requirements of this Division 1.

Sec. 34-272.1 Power Washers.

- (a) Effective January 1, 2006, a person who uses a power washer in any commercial manner or for compensation shall register with the Director of Conservation, and obtain a certificate for such use.
- (b) Exempted from this requirement are persons who use power washers for personal use at their own home and homebuilders who are performing a one-time clean up at a newly constructed house.
- (c) Holders of NPDES / TPDES permits are deemed certified.

Comment. This comment does not have force of law, but is offered for clarification only. The intent of this registration protocol is to complement and make effective mandates necessary to "critical period" conservation rules found elsewhere in the City Code. The conservation rules in question are intended to prevent water waste under certain circumstances when "critical periods" are observed. Examples of persons subject to year round registration are those hired, employed or contracted to clean sidewalks, parking lots, commercial / public buildings and other impervious areas associated with commercial or domestic properties; professional painters; businesses using their own in-house power washers such as chain stores, grocery stores, and any other entity, public or private.

Sec. 34-272.2 Vehicle Wash Fundraisers.

Effective March 1, 2005, any vehicle wash fundraiser shall be conducted at a vehicle wash facility using such facility's equipment.

Sec. 34-273. Activities to be regulated on and after January 1, 2006.

Except as provided by a specific and alternative application date, particularly systems analysis, the following activities shall be regulated in the manner set out herein on and after January 1, 2006. A person affected by such regulations may request a variance in the manner set out in Section 34-277. A violation of this section and subsections shall be subject to the enforcement provisions set out in Section 34-278. It shall be and is hereby declared unlawful for any person to violate, refuse or fail to implement the requirements of this Division 1.

Sec. 34-273.1 Minimum irrigation area and flow direction.

Newly installed irrigation systems using pop-up spray or rotor technology shall not be used in landscaped areas which have both: (a) dimensions less than five feet in length and/or width; and (b) impervious pedestrian or vehicular traffic surfaces along two (2) or more perimeters. Where pop-up sprays and rotor heads are allowed in newly installed irrigation systems, they (a) must direct flow away from any adjacent impervious surface and (b) shall not be placed within 4 ~~feet~~ inches from an impervious surface.

34-273.2 Annual irrigation system analysis for athletic fields, golf courses, and large properties.

(a) An annual irrigation system analysis shall be required for all athletic fields, golf courses and large properties and shall be submitted in writing to the San Antonio Water System Conservation Department on or before May 1st of each year, beginning on May 1, 2006. Golf courses, other than those utilizing recycled water for irrigation in accordance with an agreement with SAWS, shall comply with residential irrigation requirements on areas other than tee boxes, fairways and greens.

(b) Municipal tenants and lessees of golf courses, sports and athletic playing fields, and any other municipally owned properties, shall be responsible for compliance with this section and subsection. The SAWS shall look directly to such tenants and lessees for compliance unless the municipality concedes by contractual agreement with the tenant / lessee to assume the tenant / lessee's responsibility for compliance.

34-273.3 Cooling towers

Effective January 1, 2006:

(a) Cooling Towers, not utilizing recycled water, shall operate a minimum of four cycles of concentration.

(b) Newly constructed cooling towers shall be operated with conductivity controllers, as well as make-up and blowdown meters.

34-273.4 Ice Machines

Newly installed ice machines shall not be single pass water-cooled.

34-273.5 Commercial Dining Facilities

Commercial dining facilities shall:

- (a) Serve water only upon request.
- (b) Utilize positive shut-offs for hand-held dish-rinsing wands.
- (c) Utilize water flow restrictors for all garbage disposals.

34-273.6 Vehicle wash facilities.

- (a) Vehicle wash facilities, commencing operation on or after January 1, 2006, using conveyORIZED, touchless, and / or rollover in-bay technology shall reuse a minimum of fifty percent of water from previous vehicle rinses in subsequent washes.
- (b) Vehicle wash facilities, commencing operation on or after January 1, 2006, using reverse osmosis to produce water rinse with a lower mineral content, shall incorporate the unused concentrate in subsequent vehicle washes.

- (c) Regardless of date of operation commencement, self-service spray wands used shall emit no more than three gallons of water per minute.

34-273.7 Vacuum Systems.

Vacuum systems shall not be water-cooled with single-pass potable water when alternative systems are available.

34-274 Other Activities to be regulated on and after January 1, 2006.

The following activities shall be regulated in the manner set out herein on and after January 1, 2006. A person affected by such regulations may request a variance in the manner set out in Section 34-277. A violation of this section and subsections shall be subject to enforcement provisions set out in Section 34-278. It shall be and is hereby declared unlawful for any person to violate, refuse or fail to implement the requirements of this Division 1.

34-274.1 Condensate collection. Newly constructed commercial buildings installing air conditioning systems on and after January 1, 2006, shall have a single and independent

condensate wastewater line to collect condensate wastewater to provide for future utilization as (i) process water and cooling tower make-up and/or (ii) landscape irrigation water. Condensate wastewater shall not be allowed to drain into a storm sewer, roof drain overflow piping system public way or impervious surface.

34-274.2. Rain Sensors. Effective January 1, 2006, rain sensors shall be installed and maintained on all irrigation systems equipped with automatic irrigation controllers.

34-275 Landscaping Regulations generally applicable on and after January 1, 2006.

Except as specifically provided with alternative effective dates, persons affected by the regulations set out herein below shall comply on and after January 1, 2006, and may request a variance to such regulations in the manner set out in Section 34-277. A violation of this section and subsections shall be subject to the enforcement provisions set out in Section 34-278. It shall be and is hereby declared unlawful for any person to violate, refuse or fail to implement the requirements of this Division 1.

34-275.1 Xeriscape option. Effective January 1, 2006, homebuilders and/or developers subdividing lots and/or constructing new single family residential homes shall offer a xeriscape option in any series of landscaping options offered to prospective home buyers.

34-275.2 Model. Effective January 1, 2006, homebuilders and/or developers who construct model homes for a designated subdivision shall have at least one model home per subdivision landscaped according to a xeriscape design.

34-275.3 Zonal system. In-ground irrigation systems installed on and after January 1, 2006, shall be zonal irrigation systems.

34-275.4 Turfgrass soil support.

(a) Turfgrass installed during or associated with new construction on and after January 1, 2006, shall have a minimum of four inches of soil under the turfgrass.

(b) Drainage utility projects, water and power utility projects, public property maintenance or repair, and those governmental activities necessary to NPDES / TPDES compliance with federal or state rules and regulations implementing the federal Clean Water Act; or governmental actions to comply with the Americans with Disabilities Act, shall not be deemed new construction for purposes of this subsection.

34-275.5 Turfgrass dormancy qualities. Turfgrass installed after January 1, 2007, shall have summer dormancy capabilities.

Legal comment: This comment does not have force of law, but is provided here for informational purposes only. The Texas Property Code, Chapter 202, Section 202.001, et. seq., entitled "Certain Restrictive Covenants," reflects a growing public interest in water conservation and its relationship to the public health, safety, and welfare.

Texas Property Code, Chapter 202, Section 202.007, provides that a property owners association may not include or enforce a provision in a dedicatory instrument that prohibits or restricts a property owner from implementing certain efficient irrigation systems, including underground drip or other drip systems. Any dedicatory instrument provision, attempting to restrict a property owner from installing such efficient systems, is void. Therefore, such restrictions, running counter certain conservation efforts, cannot be enforced. Texas Real Property Code, Sec. 202.007(b). Added by Acts 2003, 78th Legislature, chapter 1024, § 1, Effective, September 1, 2003.

As used within the Texas Property Code, "dedicatory instrument" means a governing instrument for the establishment, maintenance, and operation of a residential subdivision, planned unit development, condominium, townhouse regime, or any similar planned development. Texas Real Property Code, Sec. 202.007(1).

The Texas Property Code also allows that a property owners' association may restrict the type of turf used by a property owner in the planting of new turf [in the future] in order to encourage or require water conserving turf.

According to the Texas Property Code, property owners' associations may regulate, by dedicatory instrument or other legal means, installation of efficient irrigation systems, including establishing visibility limitations for aesthetic purposes.

The SAWS endorses and advocates the use of dedicatory instruments and other legal obligations among private parties which understandings may support and promote a culture of water conservation.

Section 34-276 Variances.

The authority to grant a variance and an appeal from such variance to the provisions of Article IV, Division 1, is hereby delegated to the San Antonio Water System in the manner described herein. A determination by the San Antonio Water System pursuant to this section shall be deemed final for purposes of appeal. Appeal procedures are detailed below.

34-276.1 Variance. A person who is affected by these provisions may seek a variance in the manner set out herein. A person shall request a variance within thirty (30) days of the date a provision becomes apparently applicable to that person's activities and/or properties. For example, a person will have standing to seek a variance within thirty (30) days following receipt of a formal (citation) or informal notice of violation; prior to a notice of violation; or at the discretion of the variance administrator when, in the administrator's judgment, to deny standing to pursue a variance would clearly deny the applicant an opportunity to have justice and equity done for the applicant's case. In the latter situation, for purposes of justice and equity, the standard for allowing a variance application to be heard or considered are the common notions of rightness and fair play.

34-276.2 Time, date, place. A person seeking a variance under these provisions shall make such request in writing to the Conservation Department. Such request shall be reviewed by the variance administrator. If the application, on its face, warrants a variance, the administrator may grant the request without hearing. Otherwise, the administrator shall review such request within thirty (30) days of receipt and shall inform the requestor in writing of the time, date and place for variance hearing, if necessary.

34-276.3 Representation and notice of SAWS' response. First Hearing. The requestor may be represented by a duly authorized representative and may introduce such evidence as the requestor believes to be relevant. The administrator and appropriate Conservation Department personnel shall hear the request. The requestor shall receive written notification by the administrator within thirty (30) days of the date of the hearing whether such variance is granted or denied.

34-276.4 Appeal. In the event the variance is granted, the decision of the administrator shall be final. Should the variance be denied, however, the requestor shall have ten (10) days from receipt of the denial of the variance to seek an appeal in writing. Within thirty (30) days of the written request for an appeal from the denial of a variance, the Director shall hear the appeal.

The requestor shall be informed in writing of the time, date and place where such appeal shall be heard. The requestor and/or his authorized representatives may present evidence to the Director why such appeal should be granted. The Director shall inform the requestor within thirty (30) days of the date of the hearing of the appeal whether the appeal has been granted or denied. The determination of the Director shall be final and shall be in writing. If a judicial appeal is pursued, applicant must take such appeal to District Court or other court of competent jurisdiction within 30 days of the Director's final determination, which further appeal shall be pursued under appropriate standards of the substantial evidence rule.

34-276.5 Variance qualifications. Variances to the regulated activities in this Division 1 may be issued through the Department of Conservation's variance administrator provided that the general intent of Article IV, Division 1 has been met, and compliance with Article IV, Division 1, is proven to be impracticable to accomplish and to cause unnecessary hardship. The criteria to determine hardship shall include, but not be limited to, a showing of level of capital outlay and technical complexity in relation to conservation benefit to be derived, and time and effort required to accomplish compliance with this Division.

34-276.6 The SAWS Director of Conservation shall also develop specific criteria to be used for the granting of variances from the provisions of Article IV, Division 1, which are appropriate to the provision for which a variance is being sought. Such criteria shall be applied equally to each request for variance under a particular provision. A requestor shall be furnished with the criteria to be utilized by the administrator and/or Director prior to his/her variance application and/or appeal being heard.

34-277 Enforcement

34-277.1 The President/CEO or his designee of the San Antonio Water System is hereby authorized to enforce this Division in the manner and to the extent allowed by law, including, but not limited to, filing complaints with the city municipal prosecutor's office for such violations, serving notices of violations of this Division and filing civil enforcement actions. Such authorization does not diminish the City Attorney's authority in regard to enforcement of Chapter 34 provisions.

34-277.2 Presumption and Exception. For purposes of this Division, it shall be presumed that the person, in whose name a water meter connection is registered with the water purveyor servicing the property, is the responsible party who has made, caused, , allowed, or permitted a violation of the provisions of Article IV, Division 1. Proof that the particular premises had a water meter connection registered in the name of the defendant cited in a criminal complaint filed pursuant to this division shall constitute a *prima facie* presumption that the defendant is a person who made, caused, allowed or permitted a violation pursuant to the provisions of this Division. [Exception to this presumption is found in subsection 34-273.2 above, wherein a city, whose premises are used by a tenant / lessee, is generally not responsible for the tenant / lessee's compliance. In such cases the tenant / lessee of the city is responsible for compliance and the city shall have no duty to enforce against the tenant / lessee except to the extent the city's municipal courts may be fully utilized by the SAWS enforcement officers or other duly authorized governmental personnel charged with enforcement duties.]

34-277.3 The President/CEO or his or her designee is authorized and instructed to commence any action, in law or in equity, including the filing of criminal charges, deemed necessary for the purpose of enforcing this Division. The San Antonio Water System President/CEO or the designee may seek civil penalties, as may be allowed by statute, and any other legal or equitable relief available under common law, Chapter 54 of the Texas Local Government Code as it may be amended to address the subject matter of this Division, or any other applicable city, state or federal code or statute.

34-277.4 Criminal. Any person violating any provision of this Division 1 of Article IV shall be guilty of a Class C misdemeanor and upon citation and conviction, shall be punished by a fine not less than fifty dollars (\$50.00) and not more than one hundred dollars (\$100.00) for the first offense; a fine not less than two hundred and fifty dollars (\$250.00) and not more than five hundred dollars (\$500.00) for the second offense; a fine of not less than one thousand dollars (\$1,000.00) and not more than two thousand dollars (\$2,000) for the third and additional offenses. Each violation of a particular section of this Division shall constitute a separate offense, and each day an offense continues shall be considered a new violation for purposes of enforcing this Division.

Civil. Civil penalties, imposed by courts of competent jurisdiction in Civil Actions for violations of this division, may also be assessed as may be allowed by applicable state law in any amount to be authorized by the State of Texas. Under Chapter 54 of the Texas Local Government Code, the SAWS and the Office of the City Attorney may presently pursue civil enforcement for injunctive relief and the imposition of \$1,000.00 per day civil penalties appropriately imposed by the Court. This statutory remedy is in addition to the City's common law right to bring Civil Actions for injunctive relief to stop harmful acts, independent of authority found in the Texas Local Government Code.

34-277.5 If, for any reason, any section, sentence, clause or part of this Division is held legally invalid, such judgment shall not prejudice, affect, impair or invalidate the remaining sections of this Division, but shall be confined to the specific section, sentence, clause, or part of this Division held legally invalid.

Sec. 34-278-34-286. Reserved.

Agenda Voting Results

Name: 44. *Main motion*

Date: 01/20/05

Time: 05:05:06 PM

Vote Type: Multiple selection

Description: An Ordinance amending Chapter 34, Article IV, Division I, of the San Antonio City Code to make permanent a year round water conservation ordinance; providing for criminal and civil penalties; and directing publication. [Presented by Thomas G. Wendorf, Director, Public Works; Melissa Byrne Vossmer, Assistant City Manager]

Voter	Group	Status	Yes	No	Abstain
ROGER O. FLORES	DISTRICT 1		x		
JOEL WILLIAMS	DISTRICT 2	Not present			
RON H. SEGOVIA	DISTRICT 3		x		
RICHARD PEREZ	DISTRICT 4		x		
PATTI RADLE	DISTRICT 5	Not present			
ENRIQUE M. BARRERA	DISTRICT 6		x		
JULIAN CASTRO	DISTRICT 7		x		
ART A. HALL	DISTRICT 8		x		
CARROLL SCHUBERT	DISTRICT 9		x		
CHRISTOPHER "CHIP" HAAS	DISTRICT_10		x		
MAYOR ED GARZA	MAYOR		x		

Name: Item 44) Amendment #1 as presented by Councilmember Perez

Date: 01/20/05

Time: 05:04:33 PM

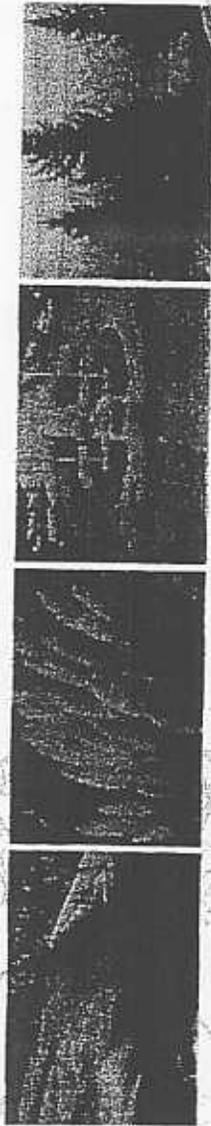
Vote Type: Multiple selection

Description: Change placement of sprinkler heads to 4 inches instead of 6 inches

Voter	Group	Status	Yes	No	Abstain
ROGER O. FLORES	DISTRICT 1		x		
JOEL WILLIAMS	DISTRICT 2	Not present			
RON H. SEGOVIA	DISTRICT 3		x		
RICHARD PEREZ	DISTRICT 4		x		
PATTI RADLE	DISTRICT 5	Not present			
ENRIQUE M. BARRERA	DISTRICT 6		x		
JULIAN CASTRO	DISTRICT 7		x		
ART A. HALL	DISTRICT 8			x	
CARROLL SCHUBERT	DISTRICT 9		x		
CHRISTOPHER "CHIP" HAAS	DISTRICT_10		x		
MAYOR ED GARZA	MAYOR		x		



SALT LAKE CITY DEPARTMENT OF PUBLIC UTILITIES

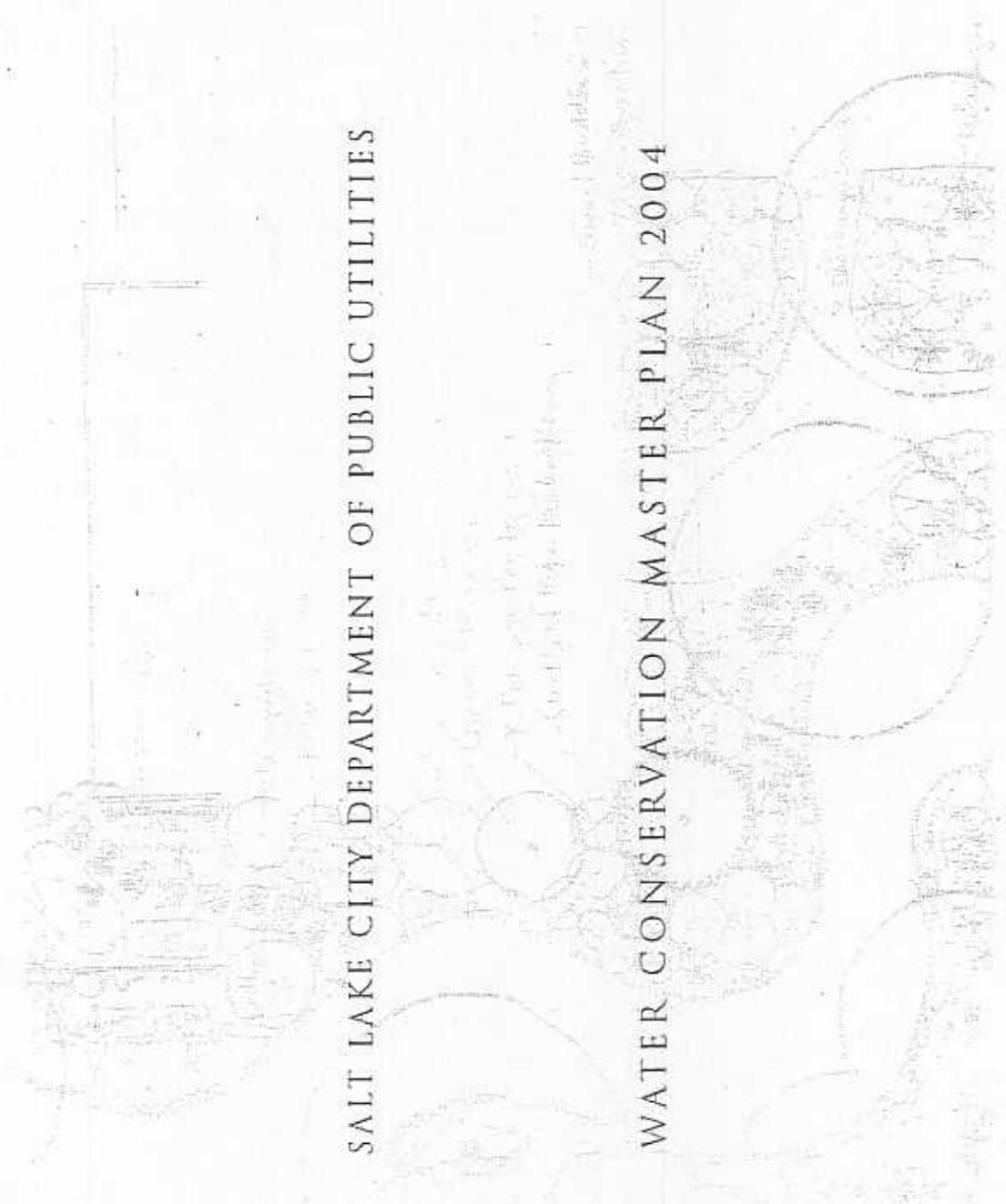


WATER CONSERVATION MASTER PLAN 2004



SALT LAKE CITY DEPARTMENT OF PUBLIC UTILITIES

WATER CONSERVATION MASTER PLAN 2004



Content Summary: Water Conservation Master Plan

S

In 1999, Salt Lake City submitted to the State Division of Water Resources a Water Conservation Master Plan. As directed in Utah Code 73-10-32, updates to these plans are required every five years, with the scheduled update for Salt Lake City due April 30, 2004. This document fulfills that obligation.

The Water Conservation Master Plan (WCMP) is organized into six sections, a glossary, and appendices. It should be noted that while the Department of Public Utilities is mentioned as the acting agency, it is only with the support and approval of the Administration and City Council that it does so. The content of each section is as follows:

- **Introduction:** Describes the dual role of the Utility and community in long-term water conservation efforts, establishes the long term water savings goal, and identifies the benchmark for measurement
- **Background:** Explains the system profile, including area of delivery, number of customers, current and benchmark average and peak delivery
- **History:** Portrays Salt Lake City's long history of water conservation and resource protection
- **Current and Ongoing Programs:** Describes programs currently being conducted by the Utility
- **Conservation Plan Initiatives:** Outlines the goals, objectives, selection criteria, and evaluative process for new and existing conservation initiatives. This section includes the list of proposed program initiatives, divided into target-customer categories
- **The Next Step:** Establishes a Water Conservation Annual Report, to describe initiatives for the coming year in detail, including time-lines, estimated budgets, and participants. This report will also include evaluations of current initiatives
- **Glossary:** Definitions of terms used in WCMP and in included documents
- **Appendices:**

o HB 153

- o System Profile: Statistical information pertaining to water delivery, demand, and water rights
- o Conservation Checklist: A checklist provided by the Division of Water Resources
- o No. 20 of 2003, Amending Sections 17.16.670 and 17.16.680 of the Salt Lake City Code, relating to water rates
- o Salt Lake City Water-wise Plant List: Originally drafted in 1995, this updated version has an extended plant list, cultural and descriptive comments, and a new feature, plant area value
- o Water Shortage Contingency Plan: Plan, ordinance, and response guidelines related to short and long term water shortage planning and response. Approved by City Council June, 2003
- o Best Management Practices: Action items in checklist form for a variety of water customers and usage, including lawn watering, restaurant and food service, hotels, commercial carwash, general commercial, green industry, and swimming pools
- o Sample brochures for lawn watering, park strips, and new water rates

The Department of Public Utilities would like to express its appreciation for the members of the Public Utilities Advisory Committee, who have spent countless hours assisting in the processes that have created the Rate Restructuring, the Water Shortage Contingency Plan, and this document. Those outcomes are better for your involvement. Thank you.

This document is stored electronically at H:\Water Conservation Master Plan\2004 Conservation Master Plan\2004 Master Plan finals.

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CONCLUSION

In 1999, Salt Lake City, acting through the Department of Public Utilities (the Utility), drafted and submitted to the State Division of Water Resources a Water Conservation Plan. The 1999 Plan does not, however, mark the beginning of conservation in Salt Lake City. The City has a long history of water conservation, from universal metering and watershed protection programs begun in the early 1900's, to volumetric sewer charges in the 1980's, to the adoption of conservation rates for culinary water in 1995. On into the 21st Century, water conservation continues to be an integral part of water planning for the Utility.

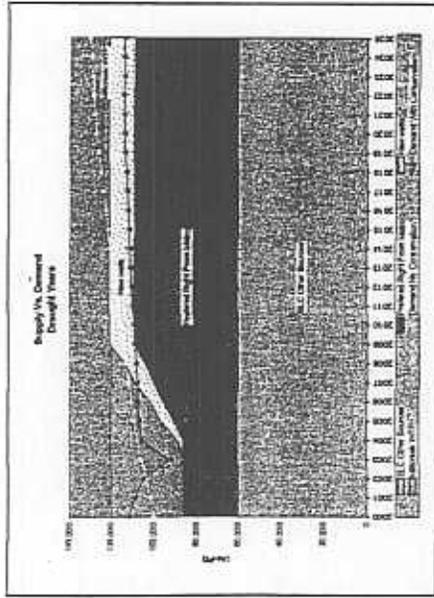
In order to meet the current and future needs of the community, the Utility has developed an integrated planning approach involving the protection of our watersheds, capital improvement projects and improved system efficiencies, acquiring new sources of water, and water conservation.

Water conservation is a strategy or set of strategies for reducing the volume of water withdrawn from a water supply source, for reducing loss or waste of water, for maintaining or improving efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. The purpose of water conservation is to provide those essential benefits as efficiently as practicable, given current knowledge, state of technology, and prudent cost considerations.

Every person, animal, and plant which resides within, works, or passes through our community benefits from water conservation. When water is used efficiently and with consciousness, more water remains for recreation, wetlands, open space, natural aesthetics, and habitat for fish and wildlife. When we conserve water, we increase the likelihood that we will have adequate supplies to meet our future needs and the needs of those who come after us. Customers benefit by extending supplies; extending the life of existing infrastructure; reducing or eliminating the need to obtain new sources of lesser quality, more expensive water, and protecting the environment.

Water conservation is not free and may not always be cheap. When customers' use less water, Public Utilities' costs do not decrease proportionally. On the other hand, conservation defers the need for supply expansion, thereby deferring some water rate increases. In any case, since not everyone conserves at the same rate, those who save more will definitely save more money than those who save less.

Water conservation is the duty of Public Utilities and many of the programs, for instance, leak detection, billing information, and water reuse programs, place the accountability on the Utility. Yet much of the potential savings must come from the actions and habits of our water customers. Water conservation is many small actions added together to make a real difference.



To identify future water needs and to address the means of meeting those needs, the Utility hired an outside consultant to conduct a study. The 1997 Water Master Plan projected an average annual demand of 130,500 acre feet of water, with peak demands of 318 millions of gallons per day (mgd) by the year 2025. Programs adopted and implemented by the City have proved to be effective in keeping peak demand at approximately 200 mgd. The Utility's goal is to reduce that future demand to 114,000 acre feet through a combination of conservation measures and the utilization of secondary and reuse water. This represents a savings of 16,500 acre feet of water annually, or enough for over 36,000 households.

The 2004 Water Conservation Master Plan Update (WCMP) describes the water conservation goals and programs to be implemented by the Utility over the next five years (2004 through 2009). It is important to note that by water conservation, the Utility means using water wisely; taking advantage of technological advances and best management practices to eliminate waste and reduce the need for water, including the utilization of alternative sources of lower quality water for landscape purposes. All water, regardless of the source, however, ought to be used as efficiently as is practicable, whether culinary, secondary, or reuse. The purpose of water conservation is not to deprive our community of essential benefits such as health, nutrition, and an appealing urban environment. Rather, water conservation is an integral component in the broad approach taken by the Utility in its continuing effort to provide adequate levels of water for all necessary uses as efficiently as practicable.

Achieving this goal will require that conservation measures be taken indoors as well as out of doors. The 1997 Master Plan states that indoor consumption will need to be reduced by 5 percent and outdoor consumption by 15 percent, for a weighted average reduction of 13 percent in total water use. It should be noted that during the 2002 and 2003 drought years, the City exceeded these reduction goals; however, conservation measures will need to be sustained in order to achieve the total reduction goal for 2025.

The Utility recognizes that water conservation cannot be imposed on people. Success of these programs depends on how well the public understands the need for conservation, perceives the fairness of policies, and has a willingness to comply with requests for demand reduction, long and short term. To be successful in its long-range conservation goals, conservation must be a shared responsibility between the Utility and the residents, business owners, and manufacturers that consume water.

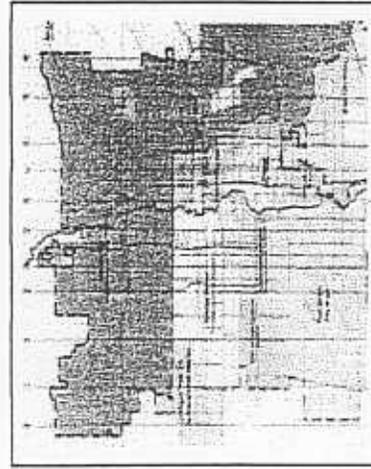
Reflecting this understanding, representatives of the Utility regularly attend neighborhood community meetings to share information and to listen to the concerns and issues of community members relating to water supply. When addressing specific policy issues such as the Rate Restructuring and Water Shortage Contingency Plan, the Utility actively solicits involvement through the establishment of citizen-based committees charged with the task of examining issues in-depth. Additionally, the Public Utility Advisory Committee meets monthly for the purpose of reviewing issues and making recommendations to the Utility. This committee is authorized by ordinance passed by the City Council; its members, citizen volunteers, are appointed to four-year terms.

In keeping with that tradition of facilitating public involvement, the Utility invites public comment on the WCMP, during both its drafting and implementation. It should also be noted that all programs and initiatives relating to water conservation proposed by the Utility are carried out through the continued support and approval of the Administration and the City Council.

This document does not include the Watershed Master Plan, Capital Improvements Plan, or other plans developed by the Utility and referenced in this Plan. Those documents can be viewed at the Utility offices at 1530 South West Temple. Additionally, while this plan does not address action plans during droughts or other delivery emergencies, a copy of the Water Shortage Contingency Plan has been included in the appendices.

BACKGROUND

The Utility provides culinary water to over 326,000 customers through nearly 92,000 connections within Salt Lake City and portions of unincorporated Salt Lake County, a service area of 135 square miles. Included in our customer base is one international airport,

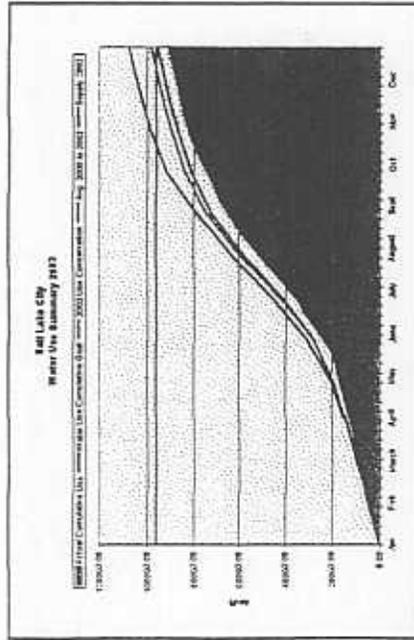


two universities, numerous hospitals, 210 public schools, and over 1400 acres of irrigated public parks and golf courses.

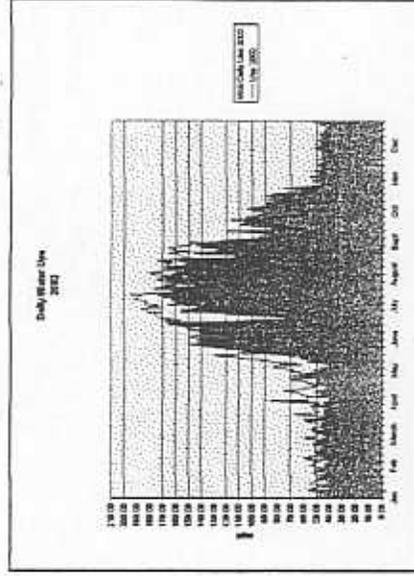
Additionally, Salt Lake City experiences an estimated day-time population of nearly 400,000; a result of employment, institutions of higher education, as well as visitors to the airport, hospitals, and tourist and convention guests.

Salt Lake City Service Area
Corporate Limits of Salt Lake City
Unincorporated Salt Lake County
Water System Extensions into other municipalities

In Fiscal Year 2002-2003 (July through June), the Utility delivered 30,078,800,000 gallons of water, or 92,308 acre feet. The highest volume of water delivered on a single day was 173 MG, delivered on July 16; this peak demand reflects a consistent decline, even during the hottest days of the one of the driest summers on record. Current average residential consumption per capita day is 140 gallons, with total per capita consumption of 218 gallons; these numbers also reflect a consistent decline in consumption, down from a total per capita consumption of 345 gallons in 1990 and below the current state average of 298 gallons per day per capita.



Water Use Summary 2003



Daily Water Use 2003

HISTORY

Water Development

Water planning and water conservation are not new to Salt Lake City. As early as 1847, settlers began the history of water development and the practice of artificial irrigation in the Great Basin. Water was diverted from City Creek to irrigate crops and provide the settlement culinary water.

As the City became the population center of the settlement, others moved out to the far reaches of the valley and began diverting the waters of Parleys, Mill Creek, and Big and Little Cottonwood streams. Cooperative irrigation companies were formed to expand the network of ditches placing more land under irrigation. Water law evolved from these early practices, where "first in time - first in right," and "beneficial use" are the basis and measurement of a water right.

Within the City, waters were diverted from Red Butte Creek and Emigration Creek to augment City Creek as the City's main water supply. Ditches lined each side of the City's streets conveying water to the homes and gardens of City dwellers. When Salt Lake City was incorporated in 1851, the elected City Council passed ordinances that regulated the flow of water through its corporate limits, established the position of water master, and prevented the pollution of the water. As the City's population grew, so did the shortage of water.

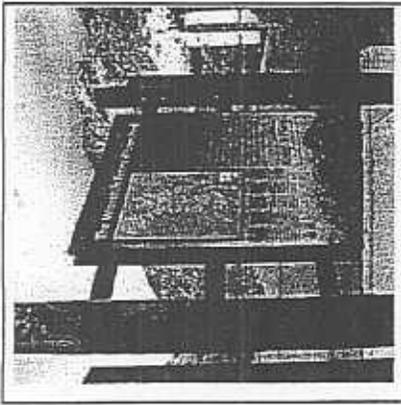
Water service within the Utility's delivery area has evolved since Salt Lake City first developed its water supplies and infrastructure. For the first 150 years of history the City pioneered water development by diverting City Creek, Red Butte, and Emigration Creeks for municipal uses, constructing the Salt Lake City and Jordan Canal, entering into exchange agreements with the other canyon stream owners, building dams, forming the Metropolitan Water District of Salt Lake City to build the Provo River Project, drilling wells and helping form the Central Utah Project. As the population in the valley has grown to over three-quarters of a million inhabitants, the delivery of water depends on a complex network of storage dams, aqueducts, water treatment plants, distribution reservoirs and main lines conjunctively managed by the major water supply entities to meet the greater public good. By planning for the future and acting in the present the Utility throughout its history has made good decisions regarding water management.

While some of those early actions helped to control water demand, such as metering and the seasonal peak rate structure, most have focused on water supply—actions undertaken by the Utility acting alone or in conjunction with other utilities, cities, or districts. Rights to most of the less-expensive and high quality water have been obtained, and the most recent major water development project, the Central Utah Project, will provide the additional water necessary to meet the needs of a growing community until the year 2020, but only if conservation measures take place.

Watershed Management

Salt Lake City's viability has historically been dependant on the limited flow of water from the mountain streams of the Wasatch Canyons. Quality and quantity of water supply has been a hinge pin for the development of the surrounding area. Water law and water rights have been highlighted throughout the history of the city and the state of Utah. The survival of the early pioneers and the subsequent urban growth and development of Salt Lake County have depended on the mountain streams for high quality drinking water in a region of the United States that borders the Great Basin desert. Climactic changes impact both quality and quantity of the water supply, as illustrated by the impacts of the drought conditions that have existed here during the past five years.

Utah Department of Natural Resources Executive Director Robert L. Morgan recently articulated the importance of protecting our watersheds and the quality of our drinking water, when he described watersheds as lifesheds. In 2003, Salt Lake City Department of Public Utilities has launched two planning programs meant to sustain our quality of life and to assure a quality, long term water supply: watershed protection and water conservation.



The *Keep It Pure* program is designed to help promote long-term public education on the source of our drinking water and the responsibility of local residents to help maintain water quality at the source. The second program is the development, implementation, and evaluation of this Water Conservation Master Plan.

Together these programs look forward to the future of Salt Lake City and its water service area in Salt Lake County and address the pressing needs of a safe and sufficient water supply. One without the other isn't much good, but together the synergistic combination provides a lifeline to the community. Water, safe and available for essential uses, even in times of limited supply, is a gift to the community made possible through the planning and foresight of professionals willing to address the future by making difficult decisions today.

CURRENT AND ONGOING PROGRAMS

- **Universal Metering and Meter Replacement**

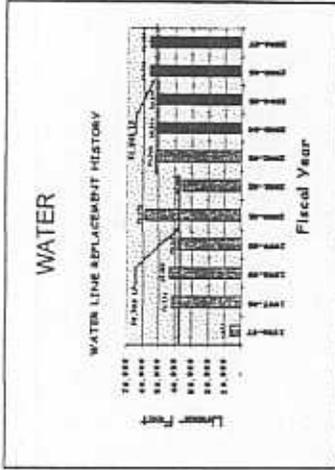
The City began a universal metering program in the 1920's that was completed by the early 1950's. It was recognized that the best way to ensure financial stability for the water department and to address consumer demand, and hence be able to change it, lay in the City's ability to accurately determine the actual volume of water being used by individual customers.

The department is currently in the third year of a five year meter replacement program. Over the last two years the utility has replaced 45,920 meters which were more than 10 years old to reduce the amount of unbilled water usage. It is the intent of the department to continue the program over the next two years, replacing an additional 17,000 residential meters. By reducing water loss 1 to 2 percent, this program is expected to recover the \$6 million program cost through additional revenue gained over the life of the five-year program.

- **Public Utility Advisory Committee**

The earliest use of a public advisory committee was in 1928 to address the need for water development. The Public Utility Advisory Committee (PUAC) continues this vital role of providing public involvement in the planning process. Its voluntary members, appointed by the City Council, have been instrumental in the creation of a number of water conservation programs including the recently adopted Rate Restructuring, the Water Shortage Contingency Plan, and this Plan. This committee regularly reviews existing conservation programs, and will be involved in the selection and review of new programs.

- **Loss Prevention**



Maintaining distribution lines is critical to reducing loss due to leakage and breakage. Through a combined strategy of prioritizing capital improvements, aggressive pipe replacement programs, highly trained personnel, and utilizing the latest technologies, the Utility maintains an average number of breaks per mile of pipe less than the national average, despite having one of the oldest distribution systems in the West. Since 2000, the Utility has replaced 48,443 linear feet of pipe at an average annual cost of \$6,435,000.

Additionally, the Utility has contracted with an independent consultant to conduct a Water Loss Study. The study, to be concluded in August of 2004, should provide recommended initiatives to reduce water loss within the system.

- **Leak Detection**

This program was developed to assist water customers in controlling and eliminating leaks. Winter demand levels are monitored and usage in excess of 20 percent of average winter usage triggers notification of the customer, providing for timely repair of the system.

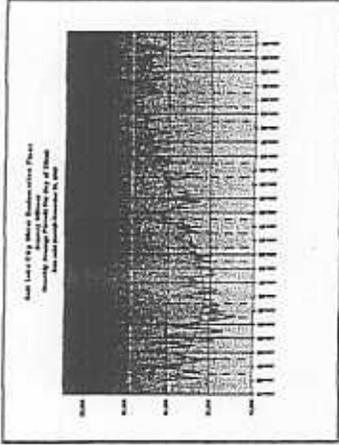
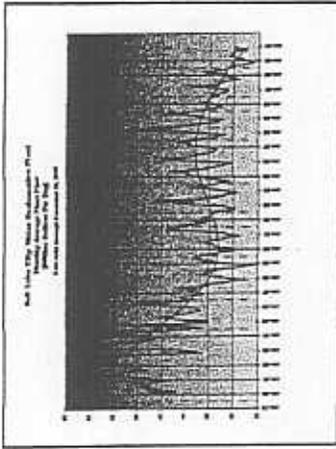
Another component of the Leak Detection Program is conducted through the Geographic Information Systems (GIS) group of the Utility. Using geophones leaking pipes are discovered quickly, reducing the volume of water lost and the cost of repair.

- **Monthly Billing**

A crucial component of conservation is being aware of consumption. The Utility bills its customers monthly, providing information on the volume of water used in each of three billing tiers and the price per unit and per tier. A comparison of water used over the previous twelve months is also provided. Bills also have simple messages and tips relating to water conservation and regularly include inserts with more detailed water conservation information.

- **Sewer Charges**

In 1982, the Utility implemented sewer rates based on metered winter water usage. This initiative resulted in a significant reduction in water waste as customers repaired leaking plumbing fixtures. During the next five years the Utility observed a 10 percent reduction in flows to the Waste Water Treatment Plant, including a 12.5 percent reduction in indoor residential use.



In 2000, the Utility launched an initiative targeted to commercial, industrial, and institutional customers to reduce the BOD loading. This was accomplished through both an educational campaign, and by the enactment of an ordinance affixing additional sewer charges based on the strength of the waste discharge. This initiative motivated customers to develop and implement more efficient water use and waste management practices. Ordinance No. 17.72.030, pertaining to sewer rates and load strength may be viewed on the City's web page at www.slcgov.com, or at the Public Utility Administration Office at 1530 South West Temple.

In 2001, the Utility launched a public education campaign, "*It's a No Drainer*," to discourage the use of garbage disposals amongst residential customers. Brochures mailed in utility bills inform customers that by not disposing of waste in the sink they can save money by reducing their water and energy bills. The brochure goes on to explain that those savings are also shared by the waste treatment facility and that by extending current capacity, we can all save even more.

- **Conservation Rate Structure**

Salt Lake City implemented its first conservation rate structure for culinary water in 1995, making it one of the first cities in Utah to do so. The Summer-Peak Rate Structure resulted in significant reduction in peak water usage.

In 2002, working with a citizen subcommittee and a consultant, the Utility began the process to review its existing seasonal peak rate structure. The subcommittee and the PUAC recommended a three-tiered seasonal peak structure, which was adopted by City Council in June of 2003. The new rate structure has several important conservation aspects, including: 1) extending the summer irrigation season to include April, May, and October; 2) the elimination of a 5 ccf base water allotment; and 3) increasing price of water through the three blocks, creating additional inducement to reduce summer peak demand. Amended Ordinance No. 17.16.680 establishing the new rate structure may be viewed at the Public Utility Administration Office at 1530 South West Temple, or on the City's web page at www.slcgov.com.

- **Landscape Ordinance, Water-wise Plant List, and HPG Initiative**

In 1995, Salt Lake City amended its landscape ordinances to encourage water conservation through the use of water-wise plants and by not requiring turf in landscapes. In addition to the ordinance, a Water-wise Plant List was created to assist contractors, designers, and homeowner in plant selection. In 1999, the City amended the Park Strip component of the Landscape Ordinance, removing the turf requirement and allowing for non-turf-type plants to occupy as little as one-third of the area of the park strip. The Plant List was updated in 2004, as a component of this Plan. The Landscape and Park Strip Ordinance (No. 21A.48 Landscaping and Buffers) may be viewed on the city's web page www.slcgov.com or in the City's Recorder's Office.

Additionally, the Utility assisted in the construction of the High Performance Building Initiative (HPBI), to be submitted to the City Council in the spring of 2004. This document will provide water and energy efficiency guidelines for construction and building rehabilitation projects conducted by the City.

- **Irrigation Audit Program**

Salt Lake City was the first community to sponsor the irrigation audit program conducted by the USU Extension Services, contracting with USU Extension to conduct irrigation audits at no cost to customers. In 1998, the City encouraged other communities and districts to participate, enabling an expansion of the Extension program with greater community participation. Besides receiving lawn water scheduling advice, auditors also provide each homeowner with a checklist for irrigation repairs and improvements. Since its beginning, The "Slow the Flow" Irrigation Check Program has performed over a thousand irrigation audits for Utility customers.

- **Demonstration Gardens**

In 2001, in an effort to provide both a learning opportunity and inspiration for commercial and home gardeners, the Utility, in conjunction with the Department of Public Services and the Central Utah Project, constructed the City's first demonstration garden, located at Washington Square. Future Demonstration Gardens are planned for the Public Utilities Administration Building, Modesto Park, and a number of other sites.

- **Brochures and Mailing**

The Utility produces several brochures for customers providing specific information on how to save water, including a Lawn Watering Guide, A Park Strip Guide, and an Indoor Watering Savings Guide. Additionally, the Utility provides articles for the city-wide newsletter mailed monthly to all residents. The articles and brochures are also available online at www.slcsaveh2o.com, and are distributed at events.

- **Web Page www.slcsaveh2o.com**

In 2002, the Utility launched a Water Conservation Web Page, designed to provide up to-date information regarding water conservation ideas and tools, as well as weekly updates on water supply and conservation goals. Visitors can even use an on-line Rate Calculator to estimate their water bill. The page is also used to advertise public hearings and committee meetings relating to conservation, and to provide

a mechanism by which the community could input on proposed plans. Copies of a number of documents are also posted on the page, including the Water Shortage Contingency Plan, the Rate Restructuring Ordinance, and the City's Landscape Ordinances.

- **Water Shortage Contingency Plan**

In the fall of 2002, the Utility began the process of drafting a water shortage contingency plan (WSCP). The purpose of the plan is to identify specific calls for action during water shortages, such as the current drought and other water shortage emergencies by anticipating the impacts of such shortages. By determining the actions and procedures for responding to a water shortage in advance of an actual emergency, the Utility and community can be better prepared and experience less disruption.

The water shortage contingency plan was written with the assistance of the PUAC, as well as a number of professional associations, including the Intermountain Turf Producers, Utah Irrigation Association, Utah Carwash Association, Tree Utah, and representatives of the hotel and lodging industry. After a review by the Administration, the WSCP was adopted by the City Council in June of 2003, and the text is included in the appendix of this document.

CONSERVATION PLAN INITIATIVES

Goals

The primary purpose of Salt Lake City's Water Conservation Plan is to promote the efficient use of water during times of plenty and to ensure a smooth transition to a reduction in demand during times of scarcity and drought.

The Utilities' approach to conservation, as with all of its other programs, is one of prevention, using effective planning and water management tools to forestall problems when possible, and lessen the inconvenience and hazards to our community during those events that are not preventable. Water conservation is currently and will continue to be an integral part of water management planning for Salt Lake City, and our ability to conserve water will be a factor in future decisions relating to the development of new water supplies.

The nature of this policy guide is that, unlike actions that reflect mitigation measures, prevention and avoidance are difficult to measure. Accordingly, while the Utility has identified numerous water conservation initiatives, it has identified only one primary goal; that is, to reduce the overall water consumption within the Utility service area by 13 percent by the year 2025; a volume of water equal to 16,400 acre feet or 5.4 billion gallons.

This goal will be realized through the achievement of two secondary goals:

- Reducing indoor water use by 5 percent, for a savings of 1.1 billion gallons per year
- Reducing outdoor water use by 20 percent, for a savings of 4.3 billion gallons per year

Objectives

To ensure that the selected initiatives assist us in achieving our goals, a subcommittee of the Public Utility Advisory Committee (PUAC) met with the Water Conservation staff and identified, for the purposes of program selection and implementation, the following objectives:

- Ensure adequate supply of high quality drinking water for our current and future customers
- Improve the mechanisms by which the Utility and the Water Conservation Office can benchmark and monitor water usage by customer category
- Promote an awareness that water conservation is the responsibility of all water consumers
- Strive for equity among customer categories for meeting water conservation goals
- Continue to maximize opportunities for partnerships between the Utility and other organizations, agencies, and interested groups
- Utilize funds and labor hours wisely, protecting and honoring our responsibilities to the community we serve
- Plan for scarcity to ensure minimal disruption and a smooth transition to reduced consumption
- Maintain financial stability
- Defer expansion of existing facilities and the acquisition of new water sources through the wise and selective use of existing water supplies

It is the desire of the Utility that water conservation initiatives meet not only the goals expressed in this Plan, but also that they are consistent with other goals of the Utility and community relating to resource management. With this in mind, the following secondary objectives were identified:

- Promote awareness that Salt Lake City, while situated near the Wasatch watershed, is also at the edge of the Great Basin Desert and receives on the average only 15 inches of precipitation annually
- Protect our watershed and water sources
- Preserve habitat and recreational opportunities
- Demonstrate the City's commitment to responsible, environmentally sound, and efficient use of natural resources
- Establish the City as a role model for our own and other communities in implementing, practicing, and achieving water conservation
- Select solutions which do not result in the waste of other limited resources or lead to decreases in environmental quality

Initiative Selection Criteria

The variety of water conservation programs is extensive, and while each initiative provides an opportunity for savings, it is important that we select those that maximize our savings potential while optimizing our limited resources. Also important is that the need for each selected initiative can be conveyed; that there is fairness and equity in implementation; and that there are no legal impediments to implementation.

Criteria were identified in order to facilitate: program selection; the identification of benchmarks; and to develop a mechanism for evaluation once implemented. The criteria were then organized into the following categories: Legal and Institutional; Fiscal; Resource and Environment; Fairness and Equity; Ease of Implementation. Initiatives will be ranked according to the extent to which it meets the criteria.

Prior to developing and implementing water conservation initiatives and as a part of evaluating those initiatives, the following criteria will be considered:

Legal and Institutional

- Ensure compliance with
 - Federal legislation
 - State statutes and administrative procedures for regulation of water supply and water use, including water rights laws, administrative regulations and procedures, environmental permits, water and energy programs, building and plumbing codes, and state legislation
 - Interstate compacts, court decrees, and local water agreements
 - City ordinances, resolutions, agreements, and programs, including current programs; rate structures and policies; land use and planning; and building and plumbing codes
- Verify Utility/Municipality jurisdiction and/or the existence of supporting ordinances

Resource and Environment

- Extends water supply
- Reduces energy usage
- Complements Watershed Master Plan
- Protects environment by diverting less water from streams, lakes, and reservoirs

Equity and Fairness

- Creates equity for responsibility among customer categories
- Provides for sustainable water savings
- Achievable acceptance of the program within applied category

Fiscal

- Defers or delays capital improvement projects relating to increased demand
- Defers or delays the need to acquire new water sources
- Implementation costs are less than the cost of acquired water
- Opportunities for outside funding

Ease of Implementation

- Measurable, positive outcomes can be achieved and documented
- Achievable with existing staff
- Opportunities for partnership

Program Initiatives

The following initiatives have been identified as meeting most or all of the above criteria and have been organized into three categories:

Utility Programs are actions directed within the Utility to improve our ability to assist our community in its water conservation efforts and to improve water efficiencies

City Programs are actions initiated by the Utility directed towards assisting the various City departments in enhancing their water conservation efforts

General Outreach Programs are intended to assist all water customers to improve or increase water use efficiency

The timeline for implementation and specific initiative details shall be established by the Water Conservation Subcommittee and made available in report form annually.

Utility Programs

- Construct a method of classifying customer accounts by category
- Develop a database of control and subject groups from each category for benchmarking purposes
- Improve the clarity and usefulness of the information on water bills
- Devise "pseudo bills" for each office or facility that has multiple meters
- Work closely with wholesale providers on conservation plans

- Share information with others in conservation-related organizations
- Explore opportunities for reuse and untreated raw or secondary water
- Determine the volume and cause of unaccounted for water and devise strategies for correction
- Make suggestions and contributions of research to the American Water Works Association Research Foundation for conservation research
- Assist in the review and revision, or development of City ordinance pertaining to water conservation
- Develop and implement a plan for customer feedback

City Programs

- Direct and work with city departments to evaluate policies and procedures for conformity with conservation master plan
- Develop Best Management Practices for each department and establish implementation plans
- Conduct interior audits of plumbing fixtures and develop plans for low water-use fixture retrofitting
- Develop a schedule for replacement of outdated irrigation systems with efficient and well designed systems
- Conduct regular irrigation audits and make repairs as necessary
- Communicate in-house conservation practices to the community
- Create and distribute conservation materials to elected, appointed, and career public officials and their employees

General Outreach Programs

- Develop educational plans for each of the main customer categories
- Distribute conservation materials to locations associated with water usage, such as garden centers and plumbing supply stores
- Create a collection of conservation information to be distributed at public locations such as libraries and city offices
- Utilize City newsletters, both internal and publicly distributed, to provide useful information regarding conservation and appropriate water use
- Maintain and promote the water conservation website with current information relating to demand and supply levels, tips, and information
- Participate in public events such as farmers' markets, festivals, and fairs
- Develop partnerships with business, industry, and commercial associations in order to increase participation in conservation programs by those sectors
- Develop Best Management Practices for each of the defined customer groups, and establish a program to facilitate the implementation of those practices
- Support adoption of water efficient building codes

Monitoring and Evaluation

There is a growing interest for water utilities and districts to implement programs that deliver what are called "hard fixes," programs that involve plumbing refitting or landscape rebates. These programs are attractive in that they create public relations opportunities, and also that the outcomes, or water savings, may be measurable. While these types of programs will be considered, it is felt that existing plumbing codes will correct fixture inefficiencies. An efficient appliance does not innately conserve water if the individual operating that appliance or fixture does not use it appropriately, therefore, public education will continue to be the primary focus of the Utilities' water conservation effort.

There are mechanisms to determine the success of initiatives through the identification of specific criteria as an evaluative tool, as well as such much as surveys and questionnaires. Every method is not applicable to all programs; selection of the most appropriate evaluative tools will be important in measuring actual success. Some of the tools that will be utilized in order to evaluate the success of these programs are as follows:

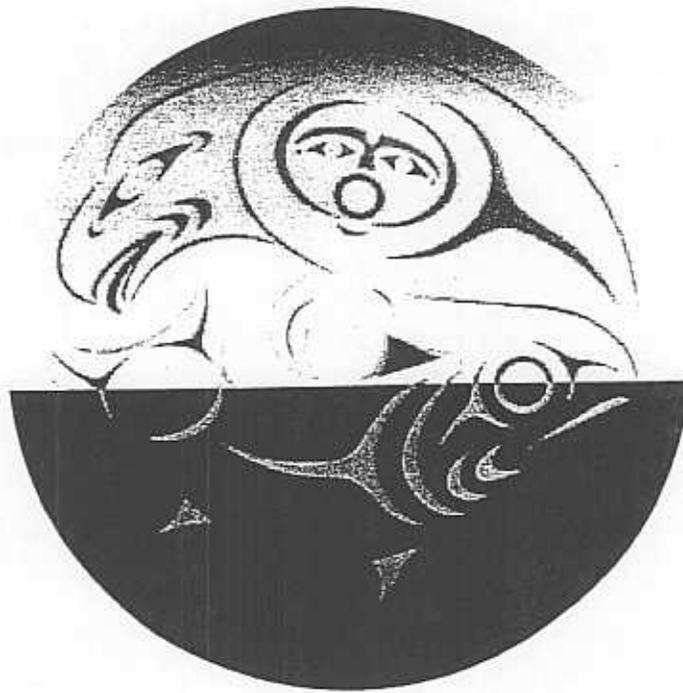
- Establish benchmarks within each customer category and for the community as a whole
- Gather information in a timely manner
- Define success, either in terms of water savings, costs saving, public perception, etc
- Design and maintain functional and durable databases
- Analyze periodically the success, acceptance, cost, and other relevant characteristics of each program and measure through the use of surveys, questionnaires, and focus groups
- Prepare annual reports of progress, costs, customer participation and acceptance.
- Prepare Action Plans for each program component, including Action description, timelines for implementation, financial expenditures, and estimated water savings

THE NEXT STEP

Working with the PUAC, representatives of various city departments, and other experts, the Utility will draft a Water Conservation Annual Report. This report will provide an evaluative update on existing programs, as well as descriptions of new conservation initiatives for the coming year. By providing an annual report, the Utility will increase its opportunities to work with the community and enhance the quality of information relating to program implementation. This report is to be completed by the end of each calendar year.

WATER CONSERVATION POTENTIAL ASSESSMENT

EXECUTIVE SUMMARY



Seattle
 Public
Utilities

MAY 1998

EXHIBIT No. FF

WHAT IS THE CPA?

In the Fall of 1996 the Seattle City Council requested that Seattle Public Utilities (SPU) complete a Water Conservation Potential Assessment (CPA). Specifically, Council asked that the CPA provide a rigorous analysis of the cost, volume, and reliability of conservation opportunities available within Seattle's wholesale and direct service areas through 2020. The CPA has been completed, using the criterion that *no measure identified and analyzed will result in a loss of service or satisfaction for the customer*. Water shortage actions such as irrigation bans that would reduce customer service were not considered. This executive summary provides an overview of the CPA findings.

The CPA found that substantial water savings, up to 31 million gallons per day (mgd) or 16% of water use in the peak season, can be achieved over the next 20 years with no reduction in customers' ability to use water nor in their satisfaction with water services. The cost of these savings is comparable to the current marginal cost of new peak season water supply.

PEAK SEASON

The regional water crunch occurs during Seattle's peak season (May 15th - September 15th) when irrigation, cooling and other seasonal demands rise and precipitation and streamflows decline. To address this peaking issue directly, all costs and volume savings in the CPA are shown as peak season values. Costs should be compared to SPU's 1998 marginal cost for new peak season water supply at \$2.41/ccf (hundred cubic feet = 748 gallons).

HOW DOES THE CPA FIT INTO THE REGIONAL WATER SUPPLY PICTURE?

Historically water supply planning and development has followed a predictable path of tapping a single, large water source every 30-50 years to meet growth in regional water demand. Today reliance on any single option to meet future demand is an increasingly high-risk gamble due to environmental, political, and demographic uncertainties. In response to this uncertain future, Seattle and its partners are creating a diverse portfolio of water supply and conservation options including new supply, water reuse, enhanced system efficiency, and conservation. The portfolio approach, or integrated resource planning and development, provides decision makers with many options to meet growing water demand efficiently and reliably.



During the last decade, Seattle's regional conservation programs have achieved demand reductions of approximately 1.5% per year. For the next five years, planned conservation savings roughly equal the growth in water demand in the existing service area (Figure 1). Conservation not only has proven to be a reliable way to stretch existing supplies; it also has been popular with customers. Numerous surveys conducted by SPU show strong preference for continued and expanded conservation programs. Current conservation efforts, in conjunction with added

water supply from the Tolt Filtration Project, will meet projected demand through 2013. After that, based on current projections, demand will exceed supply and new sources of supply and/or conservation initiatives will be necessary.

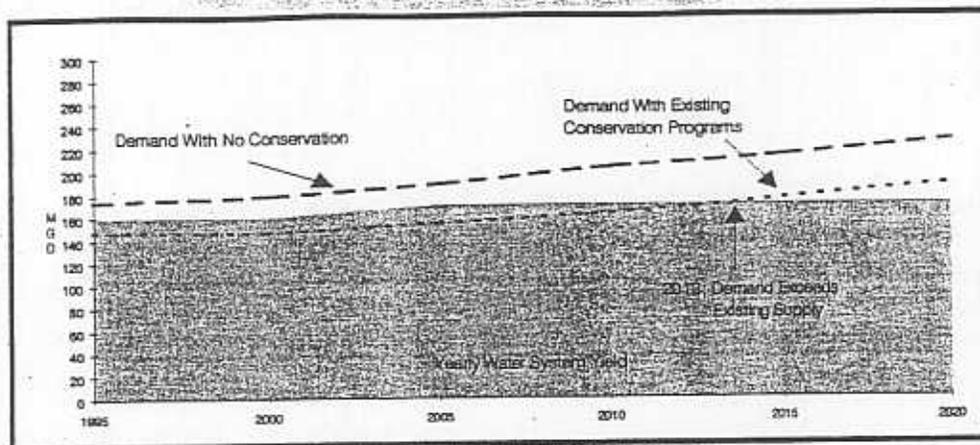


Figure 1
Regional Water
Supply & Demand
(MGD - Annual Average)

LEVELIZED COST

Levelized cost is the discounted present value cost per unit of water saved or produced over the lifetime of a measure. Conservation is cost-effective if its levelized cost is less than marginal cost of new supply, currently estimated to be \$2.41/ccf in the peak season. The amount of conservation that is cost-effective would be greater if the marginal cost of supply were to increase.

WHAT IS THE REGION'S CONSERVATION POTENTIAL?

The findings of the CPA are shown below in graphic and tabular formats. Note that all savings in the CPA are beyond those from presently implemented or planned conservation programs. In Figure 2, the Water Conservation Cost Curve shows all 74 identified conservation measures plotted in order of levelized cost by cumulative water savings. The 'marginal cost by measure' line represents the most expensive measure needed to achieve a particular volume of savings. The 'cumulative average cost' line indicates the average cost of all measures used to capture those savings. The graph provides a visual means to determine the cost of conservation savings at any volume. As an example, the point labeled 'Cost-effective Package' represents 31 mgd of savings at an average cost of \$1.52/ccf, with the most expensive measure at \$2.39/ccf, \$0.02 below the marginal cost of new peak season water supply.

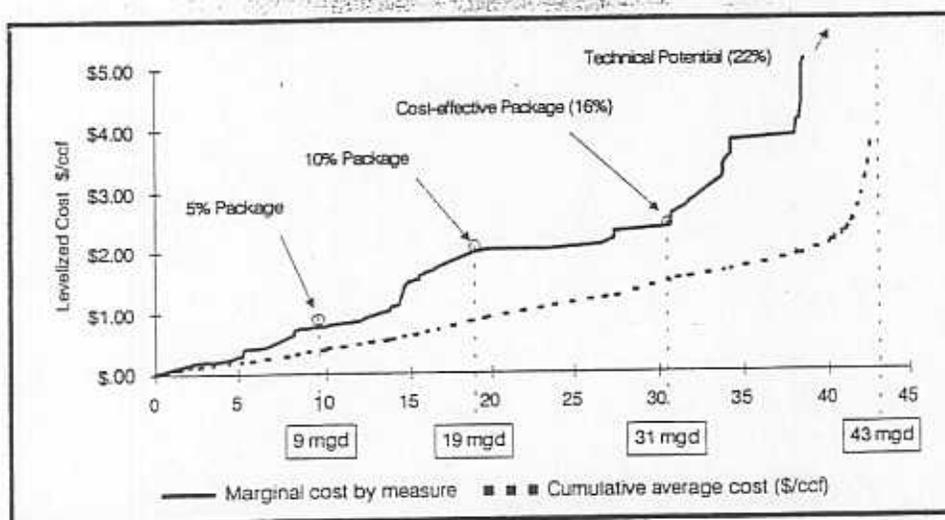


Figure 2
Peak Season Water
Conservation Cost
Curve

In Figure 3, the CPA findings are presented in a tabular format, showing four specific conservation packages (indicated as points in Figure 2). A package is a group of measures used to meet a specific cost or volume goal. For this report, four packages were selected, using the criteria described below. As shown, the savings achievable through these four packages range between 9 and 43 mgd.

- **Technical Potential Package**

(22% savings compared with projected peak season demand in 2020) represents all measures, regardless of cost, that could be implemented over the next 20 years without a loss of service or satisfaction for the customer.

- **Cost-Effective Package** (16%

savings) includes all conservation measures that could be implemented at a cost lower than the current peak-season marginal cost for new water supply, \$2.41/ccf.

- **Five and Ten Percent Packages** include the most cost-effective measures that could be combined to result in 5% and 10% savings in volume, respectively.

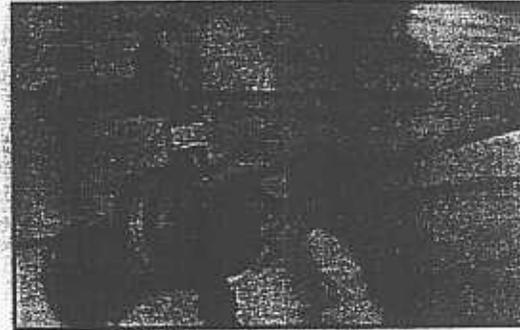


Figure 3
Conservation
Potential
Assessment
Package Results

Package	Year 2020 Savings ¹		Average Annual Cost ²	Average Cost ³	Marginal Cost ⁴	Seattle/ Purveyor
	mgd ⁵	% Projected Demand ⁶	1997 Dollars ⁷ (millions)	\$/ccf	\$/ccf	% Savings Shares
Technical Potential	43	22%	\$19	\$3.86	\$136	50 / 50
Cost-Effective Savings	31	16%	\$5	\$1.52	\$2.39	50 / 50
10% Savings	19	10%	\$2	\$0.86	\$1.99	46 / 54
5% Savings	9	5%	\$0.30	\$0.35	\$0.75	45 / 55

¹ Water savings have an uncertainty range of +/- 15%.
² Program costs have an uncertainty range of +/- 25%.
³ Average levelized cost of package.
⁴ Marginal levelized cost of package.
⁵ Peak season savings May 15th - September 15th.
⁶ Based on SPU's demand forecast.
⁷ Undiscounted 1997 dollars (does not equal present value of cost stream).

The annual average cost, representing the total cost of all measures associated with each package divided over the 20 year life of the program, varies between \$300,000 and \$19,000,000 per year. This cost represents the full economic cost of conservation measures, including all equipment, material, labor, and program administration costs. The Seattle/Purveyor column demonstrates that water savings from each of the packages is evenly split between Seattle's direct service area and wholesale regions. Purveyors would achieve a slightly higher share savings under the 5% and 10% savings packages. These savings only include conservation potential within SPU's existing service area and do not include conservation potential in adjacent unserved areas of King, Snohomish, or Pierce County.

Each of the four packages includes measures that capture water savings from all water use sectors (commercial process, residential domestic, commercial domestic, commercial landscape, and residential landscape). In all four packages, the residential domestic end-use sector (toilets, showers, clothes washers, and faucets) consistently offers the largest volume of savings. These savings are in addition to savings expected from implementation of the 1993 State Plumbing Code. Figure 4 shows the distribution of savings by program area from the Cost-Effective Package. The other three packages show a similar distribution of results.

While the CPA has identified substantial water savings available to the region over the next 20 years, these estimates are believed to be conservative. The CPA did not model the benefits of improved future technology, which will likely increase the potential savings while reducing the cost. In addition, the CPA did not calculate the non-water benefits, for example energy savings and process control improvements, that will likely make the conservation measures more cost-effective to implement.

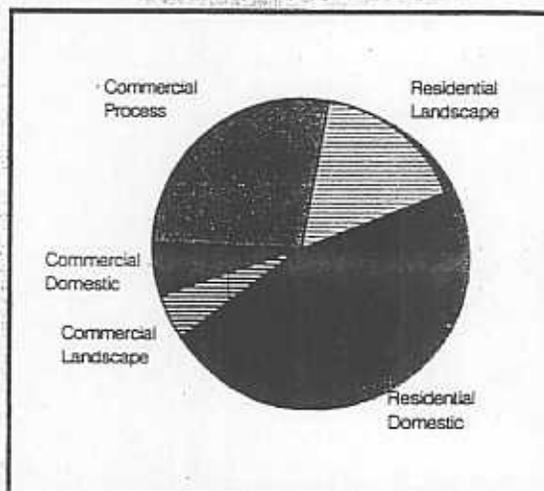
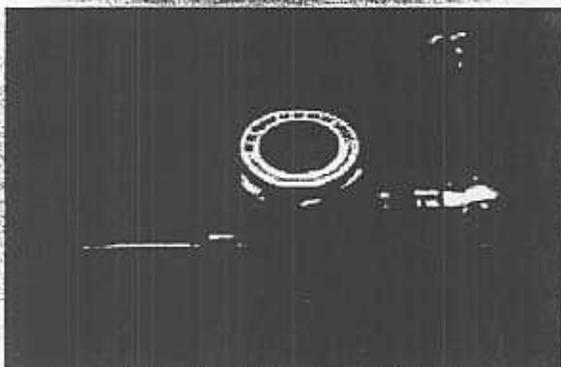


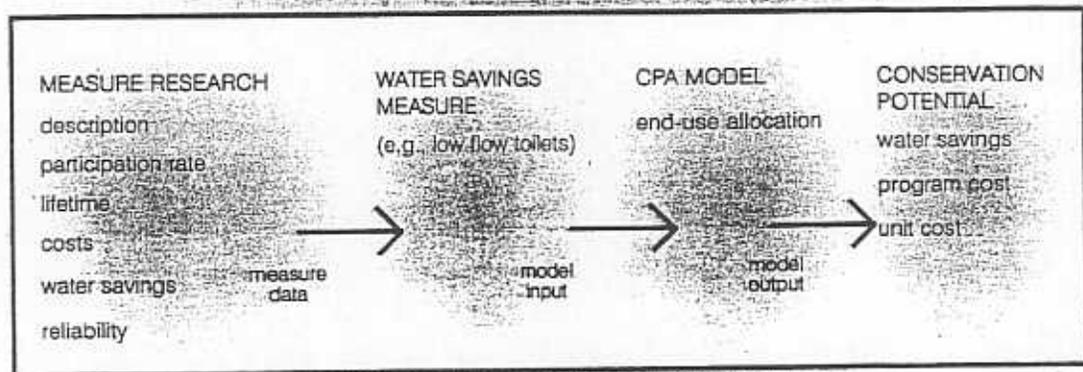
Figure 4
Distribution of
Savings for Cost-
Effective Package



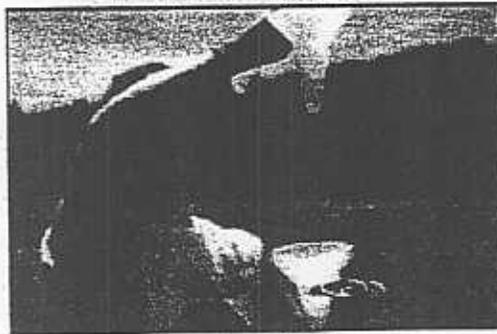
HOW HAS CONSERVATION POTENTIAL BEEN DETERMINED?

The CPA is the result of a substantial literature review and applied research into water use habits and conservation measures available to make water use more efficient. Extensive data were collected in order to define potential measures and determine each measure's impact (Figure 5). A conservation measure is defined as a change in water-using hardware or behavior that results in reduced water consumption. For example, the replacement of a 5 gallon per flush (gpf) toilet with a new 1.6 gpf unit was evaluated as a hardware measure. Improved irrigation scheduling was evaluated as a behavioral measure. The CPA uses an econometric demand model that predicts future water demand given demographic and economic information from the Puget Sound Regional Council (PSRC) and historical SPU and wholesale water purveyor consumption data. Starting with the econometric demand forecast's customer categories, the CPA model allocates

Figure 5
Measure Data
Collection and
Modelling



water usage within sectors, for example manufacturing and single family, to specific end-uses such as toilets, showers, and ice machines. The number of people who eventually adopt a particular conservation measure, and the eventual water savings, depends on the number of customers who potentially could adopt the measure (for example, households with high-volume toilets or inefficient clothes washers), the direct costs and benefits to customers, any external costs and benefits, and the information available to customers regarding the more efficient alternative. Each of the measures modeled in the CPA was assigned a participation rate that indicates the number of customers who would be expected to adopt the measure given an aggressive information and/or incentive effort by SPU.



The participation of technical experts, local business leaders, elected officials, wholesale water purveyors, and the environmental community, along with input from the public (Figure 6), ensured that decisions made during development of the CPA reflected both public policy and technical reality. The final version of the CPA incorporates comments from more

than 30 conservation and industry experts outside of SPU. For example, Sandra Postel, director of the Global Water Policy Project, commented, "I applaud Seattle Public Utilities for undertaking this assessment. Far too few water utilities and agencies take a far-sighted view of conservation's potential to meet new water needs." Marsi Steirer, CIP Program Manager for the San Diego Water Department, responded, "As a water resource planner, I would have great confidence in adopting the CPA and using it as the blueprint for how water savings can be achieved at a desired level over the course of the next 20 years. ... This is first class, cutting edge resource planning. All in all, an impressive undertaking."

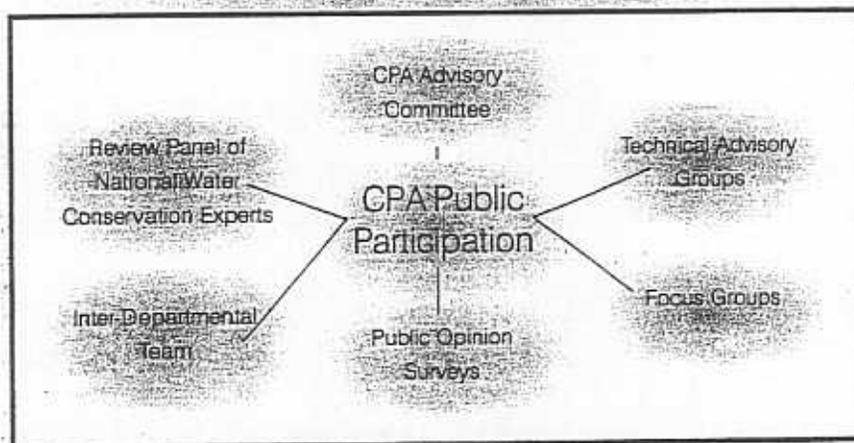


Figure 6
CPA Public
Participation
Process

WHAT'S NEXT?

The results of the CPA will be used by regional water supply planners in the evaluation of future water supply options, their costs, benefits, and uncertainties. Water conservation may also produce indirect benefits and costs. For instance, energy savings, wastewater reductions or environmental benefits may arise from water conservation. On the other hand, reduced water system flows associated with conservation may increase the cost and complexity of water quality operations required to meet high water quality standards. These and other important emerging issues will be addressed when planning future conservation strategies. Meanwhile, the CPA model, assumptions, and measure characteristics will continue to be refined as new information and comments are received. The CPA will provide a flexible planning tool as SPU and the region move into the next century.

The following CPA supporting documents are also available:

- Water Conservation Potential Assessment: Final Project Report
- Water Conservation Attitudes & Perceptions Study
- Model and Data Technical Documentation (Available June 1998).
- All CPA materials are available on the Seattle Public Utilities Website (www.ci.seattle.wa.us/util.)

Saving Water Partnership Regional 1% Water Conservation Program

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1. Summary Of 2003

This report reviews annual progress of the regional 1% Water Conservation Program (1% Program). For this review, the 'region' refers to all customers served by the Seattle Public Utilities (SPU) water supply system who participated in the 1% Program in 2003. Cascade Water Alliance utilities were participants in the 1% Program in 2003 and their conservation performance is included in this report accordingly.

The regional 1% Water Conservation Program (1% Program) is sponsored by the Saving Water Partnership (SWP). This Partnership includes the City of Seattle and a group of 22 utilities purchasing wholesale water from the City of Seattle. The City of Seattle administers the 1% Program in cooperation with these utilities, under terms of long term contracts.

The region continued to make good cumulative progress in reducing per capita water demands, although in 2003 the 1% program itself fell short of meeting its target water savings goal. Total cumulative regional water savings is a combination of the 1% program savings since its inception in 2000, plus other long term water savings produced from rates, codes, and water system efficiencies.

The primary reason the 1% savings target was not reached was a significant jump in the consumption of purveyor utility residential customers during an unusually warm and dry summer peak season and a corresponding lack of behavior related water savings. Weather-adjusted peak season consumption for customers within SPU's direct service area continued to decline consistent with the expectations of the 1% program. Equipment and hardware replacement savings continued to meet their respective targets.

The year 2003 experienced an exceptionally warm summer with high peak season irrigation water demands, perhaps most noted for a record number of continuous days without rainfall. However, when actual water consumption was adjusted for the warmer-than-usual weather, many customers still had unusually high irrigation use. A strong summer water supply reduced the need for an expensive, highly visible summer education message (summer campaign) possibly resulting in a lapse of customer attention to conservation. Public awareness of the need for conservation was not emphasized in 2003 with an emphasis placed instead on beginning a targeted recruitment of high peak use residential customers to make changes to their irrigation systems. The remaining, transitory carry-over effect of lower consumption following the 2001 drought largely disappeared over the course of the warm summer.

Interpretation of the data on purveyor customer consumption remains less than clear. Consumption for purveyor customers during the winter season actually declined consistent with expectations of the 1% Program. However, purveyor summer peak consumption jumped significantly; 38% greater than summer consumption in 2002 after adjusted for weather. This rise in consumption more than offsets a weather-adjusted decline in summer peak season consumption within the Seattle retail service area. The result is a total conservation savings of 0.9 MGD, 40% less than the target for 2003 of 1.5 MGD.

While the focus of this report is the 1% Program, efforts other than 1% will be discussed in order to describe total savings in the water system. Based on consumption analysis, 1% Program efforts helped customers implement equipment replacement and conservation behaviors that produced 0.9 million gallons per day in new long-term savings. Noteworthy:

- Relative to the 2010 savings target of 18 MGD, the cumulative 1% program (years 2000 to 2003) has now achieved 27% (or 4.9 MGD), which is still slightly ahead of the revised cumulative four-year target goal, largely due to good success in previous years;
- Cumulative cost of savings to date is \$14.3 million, or \$3 million per MGD;
- Water savings for the year 2003 from the 1% Program fell below the target goal by 40%;
- 0.8 MGD of the 2003 conservation savings was from new fixtures and equipment, 60% higher than hardware savings achieved in 2002;
- The remaining 0.1 MGD was generated by new permanent conservation behaviors, only 14% of the long-term behavior savings achieved in 2002;
- Transitory savings noted in 2002, originally from the 2001 drought voluntary water curtailment, largely disappeared in 2003 as customers returned to pre-drought water using behaviors; and
- Good progress continues to be made in Non-1% Program regional conservation savings. These included an additional .75 MGD from the impacts of water rates and plumbing codes (predicted in existing demand forecasts), 0.5 MGD from non-revenue system water savings, and 0.1 MGD from a slower than expected business economy.

The Regional 1% Program

The 1% Program was created in 1999 and expanded to include the entire Seattle service region in 2000. The 1% Program is based on conservation measures identified in the *Conservation Potential Assessment (CPA, Seattle Public Utilities, 1998)* that were cost effective (i.e., less than or equal to Seattle's avoided cost of new supply). These measures were incorporated into the 1% Program and are designed to reduce personal and business water consumption in the regional service area by 1% each year through 2010, for a total savings goal of 18 MGD. This savings goal roughly corresponds to the forecasted growth in water demand in the service region over this same time period. Achieving the 1% goal will hold water demand in the Seattle service region at the end of 2010 to approximately the same level as in 1999.

The 1% goal was selected to achieve a number of objectives, including:

- *Keeping up with demand.* If each person and business in the region became 10% more water efficient over the next ten years, the region will save approximately 18 million gallons of drinking water per day. This amount of water will meet the needs of 130,000 people, or approximately the amount of projected growth within the Seattle service region over the next ten years.
- *Resource stewardship and endangered species protection.* Leveling out the impact of growth on the region's water supplies means there is less need for additional river diversions, preserving more water for salmon, other aquatic life, recreation, water quality, and other important purposes. The federal Endangered Species Act (ESA)

listing of the Chinook salmon has added emphasis to these goals for governmental agencies whose operations may have impacts on the Chinook.

- *Cost effective extension of existing supply.* The measures identified in the 1% Program are less costly on a per unit basis than developing most traditional new sources of water supply. This benefits customers by keeping rates lower than they would be if a new source of supply were added to the system to meet demand in lieu of reducing demand through conservation.
- *Customer service.* Conservation provides a direct benefit to participating customers by giving them more control over their individual water bills. Participation in conservation measures has other benefits including lower wastewater, electric, and gas utility bills, convenience, labor savings, and in some cases like clothes washing, improved performance.
- *Reliability.* Developing traditional new water supply sources have lengthy regulatory approval processes. Conservation programs can be implemented quickly by utilities without permits, approvals, or revisions to comprehensive plans. Furthermore, because these programmatic savings are largely technology based, savings can be obtained with certainty.

A *Ten Year Water Conservation Program Plan* (Seattle Public Utilities, 2002) was completed in 2002, detailing program budgets, savings targets and implementation strategies through 2010.

The regional program began in 2000. The first two years were ramp up years for program measures, staffing, and funding. Accordingly, the savings targets for 2000 and 2001 were lower than 2003-2010.

2003 Goals and Strategies

The 1.73 MGD target shown in the *Ten Year Water Conservation Program Plan* (Seattle Public Utilities, 2002) was adjusted to 1.5 MGD, in early 2003 to reflect budget availability. The revised 2003 goal of 1.5 MGD was considerably higher than the 2002 goal of 1.1 MGD, and higher than the 1% savings obtained in 2002 of 1.2 MGD. The average annual targets for subsequent years identified in the *Ten Year Water Conservation Program Plan* will be adjusted in 2004 to reflect Cascade Water Alliance utilities' departure from the regional 1% Program.

The 1% Program fixture and equipment rebate programs for residential and commercial customers expanded upon 2002 efforts and customer contacts. Rebates were re-tooled in some instances, new incentives were introduced, and new utility partnerships were formed to leverage resources and increase services to customers. Customer receptiveness to new conservation measures was also tested in one utility service area. 1% Program outreach and technical assistance was expanded for large and small commercial customers, and for vendors and contractors.

Marketing strategies to increase rebates and long-term conservation behaviors focussed on target recruitment of different types of customers for specific conservation programs. These strategies employed mass media, direct mailings, new program materials, new web and hotline resources, seminars and workshops, agency and trade association partnerships and a host of targeted promotions. The Saving Water Partnership also contributed to a multi-county water conservation awareness media campaign organized by the Water Conservation Coalition of Puget Sound.

2003 Program Performance

The decade plus trend of excellent progress on regional water conservation continues. Regional per capita use is declining when normalized for variation in weather conditions. Chart 1 shows how a combination of factors, including the 1% Program, have affected per capita use since 1975. The strong dip seen in the chart in 1992 was due to a mandatory lawn watering ban in that drought year. Voluntary curtailment of water use associated with a second drought contributed to another notable decline in water use in 2001. The 1% program along with carry-over effects from drought curtailment in 2001 and a continuing economic slowdown have contributed to the reduced water use seen today. More detail about Chart 1 is provided in Chapter 4.

Chart 1: Regional Per Capita Customer Use

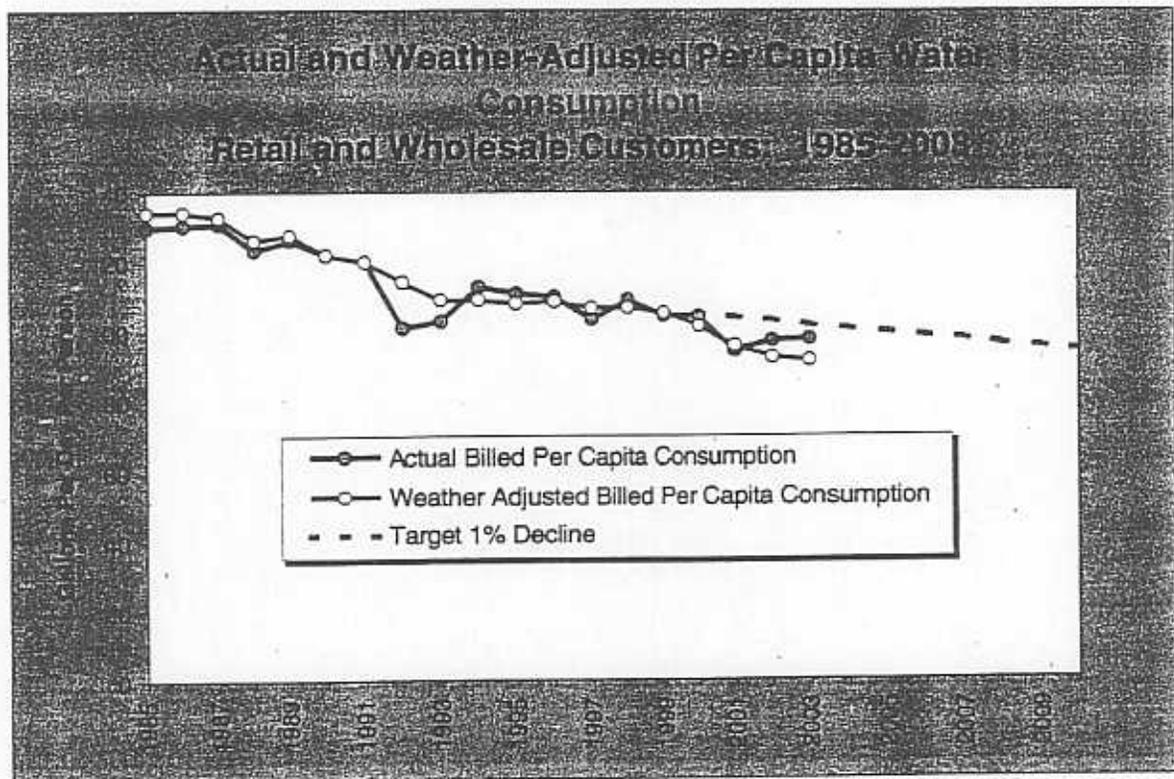


Table 1 shows estimated long-term savings in 2003, with more detailed analysis provided in Chapter 4. New water savings achieved in 2003 include both long-term savings and transitory, or temporary savings. **Long-term** savings include both the direct and indirect impacts from implementation of the 1% Program – these savings are the focus of this report. Long-term savings in addition to 1% Program savings also come from higher water rates and plumbing fixture codes. **Transitory** savings are short-term in duration and come from above-normal utility system savings (non-revenue water reductions), from temporary drought curtailment actions and the residual effects of these actions, and from the slowing of

economic activity in the regional service area. All long-term savings are included in SPU's demand forecast, whereas transitory savings are not.

Total long-term savings remain slightly ahead of target in relation to the *Ten Year Water Conservation Program Plan* (Seattle Public Utilities, 2002). However, the 2010 savings goal for the 1% program will be reviewed and adjusted as needed in 2004 to reflect the change in the conservation service area with the departure of the Cascade Water Alliance utilities from the 1% program.

Table 1: New Peak Season Water Savings Achieved in 2003 (in MGD)

	New Long-Term Customer Savings					Other Savings		Total
	Rates	Code	Seattle Low Income	Total	Economy	System non-revenue		
Residential Indoor	0.1	0.4	0.14	1.0		-	1.0	
Residential Landscape	0.1	-	-	.2		-	.2	
Commercial Domestic	<0.1	0.1	-	.26		-	.26	
Commercial Process	0.05	-	-	.25			.25	
Commercial Landscape	<0.1	-	-	.1		-	.1	
Other Savings					.1	.4	.5	
2003 Total	0.25	0.5	0.14	1.8	.1	.4	2.3	

Also shown in Table 1, but not part of the 1% Program, are savings for rates, codes, Seattle low-income projects, transitory economy-related savings, and system non-revenue water savings. Table 2 shows 1% Program performance relative to expenditures, savings goals and targets for each customer sector, by hardware (equipment), and by behavioral incentives and outreach efforts.

Hardware Incentive Savings include new fixtures and equipment upgrades that were supported with program incentives, as well as accelerated fixtures (beyond rates and code) that were upgraded without rebates. Based on program records, these savings are estimated to be 0.8 MGD in 2003.

Behavioral Incentives and Outreach Savings include permanent conservation achieved with and without incentives from customer changes in water using behaviors. These savings are estimated to be 0.1 MGD in 2003. These estimates are explained in greater detail in Section 4.

Table 2: 2003 Performance

PROGRAM SECTOR	EXPENDITURE (\$1,000)	2003 WATER SAVINGS	
		Goal	Conservation Achieved
Residential Indoor			
Behavioral & Outreach	80		0
Hardware Incentives	1206		348
Commercial			
Behavioral & Outreach	224		100
Hardware Incentives	424		3
Industrial			
Behavioral & Outreach			0
Hardware Incentives	450		99
Public Buildings			
Behavioral & Outreach			
Hardware Incentives	768		267
Government			
Behavioral & Outreach			0.1
Hardware Incentives	140		88
Other			
Behavioral & Outreach			
Hardware Incentives			
Total			
Behavioral & Outreach	654		100
Hardware Incentives	3,782		804

Sector Highlights

Residential Indoor sector demonstrated increased water savings, despite reduced per-fixture incentive levels for both the standard Multifamily Toilet and WashWise rebate programs. The Multifamily Toilet Program showed great progress for the second straight year. The number of WashWise washing machine rebate applicants slightly exceeded last year's levels. Puget Sound Energy contributed to rebates in their service territory for

the first time in 2003 and manufacturers matched their rebate during a special promotion in late Spring and early Summer. Customer testing of toilet flapper replacement incentives was also completed in 2003.

Residential landscape developed new approaches to reaching the target audience of high water users by appealing to their aesthetic desires. Market research showed that a primary motivator for this group was having a beautiful garden and that environmental messages would be less effective in causing them to change their resource-intensive behavior. This led to development of a new tagline - *A Better Way to Beautiful* - that emphasizes a key customer benefit and aesthetic desire while cleverly inferring this is a different approach to gardening. The approach is based on sound ecological and horticultural practices. The tagline became the focus of the 2003 landscape campaign and connected strongly to the five key practices that correspond to the five Natural Lawn and Garden Guides. Seventeen nurseries partnered with the SWP on this campaign that included print and radio advertising. A new program addition in 2003 was residential rebates for efficiency upgrades to automatic irrigation systems incorporating the *Better Way to Beautiful* theme.

Commercial, industrial and institutional facilities implemented sixty financial incentive projects in 2003. A number of additional projects were also completed by facilities without financial incentives as a direct result of the 1% program's information and outreach to businesses. Completed or significant incentive projects underway included the University of Washington (campus sterilizer retrofit, campus toilet retrofit), Seattle Tacoma International Airport (complete toilet retrofit), King County Facilities (fixture retrofits, once-through cooling, water-cooled air compressor), Swedish Medical Center (three campus sterilizer retrofit, once-through cooling) and Bank of America-Bellevue Branch (water-cooled chiller). Significant outreach and technical assistance to the business community included a direct mailing to 20,000 small businesses in partnership with Seattle City Light and Puget Sound Energy and completion of more than 20 facility audits and assistance visits at commercial facilities such as Bunge Foods, Four Seasons Hotel, Alaska Airlines, Cabrini Medical Tower, King County South Transit Base, and the Washington State Trade and Convention Center. Promotional and workshop presentations were made to business organizations such as the Building Operators and Managers Association, numerous local chambers of commerce, and the Medical Industry Roundtable. Articles were published in several newsletters, and water conservation became a main feature on the Resource Venture website.

Commercial irrigation emphasized customer landscape efficiency assessments and audits, and an additional 20% rebate if customers submitted applications by June 30 and completed projects by December 31. A professional irrigation auditor reviewed the performance of customers' irrigation systems and made recommendations for improving efficiency. To increase program awareness in 2003, customers of wholesale partners were targeted. Workshops were conducted for landscape and irrigation professionals, property managers and other irrigation customers to educate them about the costs of poorly managed systems, efficiency opportunities, and how to qualify for financial incentives. New promotions and expanded technical assistance more than doubled program participation and water savings achieved compared to last year.

Youth education activities provided education and customer recruitment support for measurable savings achieved by the residential indoor and landscape conservation

programs. The number of students and classrooms participating in SWP activities exceeded 2003 targets. Accomplishments included development of a new version of the home water savings kits, development of an interactive computer educational tool, hosting professional teacher development opportunities, information/activity booths at community events, on-line activities, and child-oriented TV messaging.

Five wholesale customer working groups met throughout the year to guide the implementation of Residential Indoor, Landscape, Marketing, Commercial/Industrial/Institutional, and Education programs.

1% Program Total Savings to Date

Table 3 shows the combined savings for the 1% Program since it began in 2000. This table is laid out similarly to the long-term savings table presented in the *Ten Year Water Conservation Program Plan* (Seattle Public Utilities, 2002).

Table 3: Cumulative 1% Conservation Program Savings to Date (1,000 GPD peak)

	"Ramp-Up" 2-Year Total	2002	2003	2004	2005	2006	2007	2008	2009	2010
Residential Indoor	1,150	386	349							
Residential Landscape	400	304	103							
Commercial Domestic, Process, Landscape	1,250	525	452							
Actual Annual Savings	2,800	1,215	904							
Target Annual Savings*	2,100	1,120	1,500	1,200*	1,200	1,500	1,500	1,500	1,480	1,434
Actual Savings Cumulative	2,800	4,015	4,919							
Target Savings Cumulative	2,100	3,220	4,720	5,920*	7,120	8,620	10,120	11,620	13,100	14,534

*2004 target and years thereafter adjusted 27% to reflect withdrawal of Cascade Water Alliance utilities from 1% Program

Looking Ahead

The annual 1% Program savings target and budget has been adjusted in 2004 to reflect departure of Cascade Water Alliance utilities that represented 27% of the annual peak

season consumption in the 2003 SWP service area. This adjustment will also begin a reexamination of customer targets for the different program sectors. In 2004, the regional Conservation Potential Assessment will be updated further assisting the effort to reexamine conservation savings targets and sectors, and the measures to achieve savings.

The 2004 1% Program will continue to build on the success of ongoing program implementation. New federal clothes washer energy efficiency standards that take effect in 2004 will allow for further refinement of water conservation rebates and marketing strategies. National research results about toilet performance will enable a narrowing of rebate eligibility for the multi-family toilet rebate program and establish a foundation for development of a single family toilet rebate program. Results from limited customer testing of toilet flapper replacement will form the basis for development of a regional leak repair and flapper rebate program. First year experience with residential irrigation system rebates will lead to expansion of this effort in 2004 with an increased focus on landscape contractors and equipment vendors.

In 2004, the commercial program will scale back its recruitment efforts from the record levels in 2003 because of a smaller regional service area. However, the program will continue to emphasize assistance to both small businesses and the largest commercial customers who made important conservation progress in 2003.

Although not part of the 1% Program, Seattle Public Utilities continues its implementation of the Everyone Can Conserve low-income housing conservation assistance program within the City of Seattle. As this program nears completion of the first phase of assistance to Seattle Housing Authority and the major non-profit low-income housing providers in Seattle, the Mayor and Seattle City Council will review the program's progress and determine the next phase of conservation assistance for implementation beginning in late 2004.

Ongoing Performance Monitoring

The 1% Program regional ten-year conservation goal requires significant conservation expenditures through the year 2010. Carefully tracking and evaluating program performance through efforts such as those included in this report will help meet the 1% goals in a timely and cost-effective manner. Monitoring program performance will ensure that resources are put to their best use and that the programs are managed for highest efficiency. This information will also help identify the need for mid-course corrections and fine-tuning adjustments as the program proceeds toward the goal. This document is the third of an annual series of reports designed to inform and guide the program toward its goal.

Quick Facts

TYPICAL OUTDOOR WATER USES

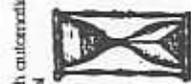
We use as much water outside as we do inside. Between 20-40% of that is wasted. Here's how we can save water outdoors.



Use a broom to clean walks and drives.



A garden hose puts out 10 gallons of water per minute. Attach a positive pressure nozzle to save water.



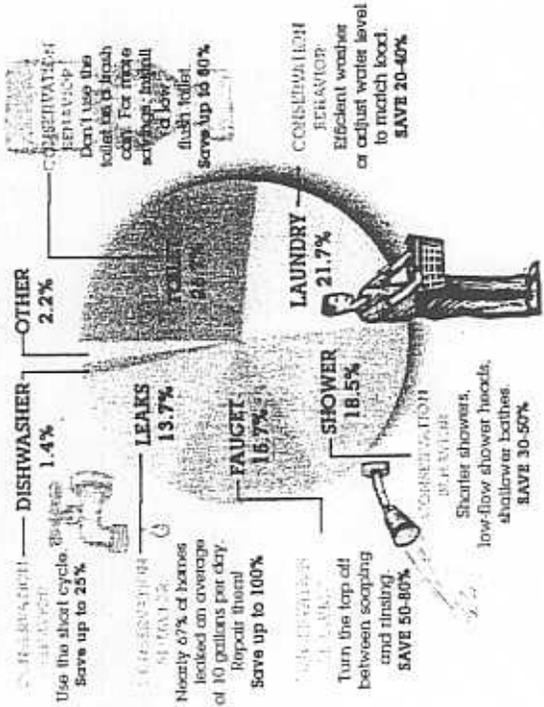
Households with automatic timers to control irrigation use 47 percent more water outdoors. Remember to change the clock with the season.



Mow your lawn between 2-3" in height.

TYPICAL INDOOR WATER USES

The average Salt Lake City household uses 6800 gallons per month indoors. Here's how we use water and some suggestions for conservation.



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SALT LAKE CITY

proposed

WATER
Restructure

FOR CITY CUSTOMERS

From City of Seattle Public Utilities Website
http://www.seattle.gov/util/Services/Water/Rates/THIRDTIER_200312020910308.asp

Third Tier Water Rates

Peak residential water rates go into effect from **May 16 through September 15, 2005**. Peak rates incorporate a three-tiered rate structure with progressively higher rates as water consumption increases. Third-tier water rates are included in this rate structure.

2004-2005 Residential Water Rates

Water Usage	Inside City Limits	Outside City Limits
Off-Peak Usage (Sept. 16 – May 15)	\$2.35	\$2.88
Peak Usage (May 16 – Sept. 15)		
First-Tier: Up to 10 CCF in 60 days	\$2.88	\$3.28
Second-Tier: Next 26 CCF in 60 days	\$3.35	\$3.82
Third-Tier: Over 36 CCF in 60 days	\$8.55	\$9.75

Note: One ccf equals 100 cubic feet or 748 gallons of water.

Eligible low income customers can receive a 50% credit on their bill. For more information please see the Low Income Assistance Program related link listed below.

Historically, roughly one out of ten residential customers have some consumption at the third-tier level. Third-tier water rates affect single-family residential (SFR) and duplex customers who use more than 36 CCF for a 60-day billing period (or more than 18 CCF for a 30-day billing period). (The thresholds for a duplex are double the SFR level.)

History of third-tier rates

A two-tiered residential summer rate was first introduced in 1989. A third-tier was developed during the 1992 drought along with rate surcharges and mandatory restrictions on water use. However, these temporary measures were rescinded as soon as the drought was over. Residential customers were reintroduced to third-tier water rates during the 2001 drought to discourage discretionary summertime water use. The third-tier rate was continued for 2002, but the Mayor and City Council reduced the rate and increased the ccf threshold effective July 16, 2002. Seasonal third-tier rates have not changed since then and will remain constant through 2005.

Third Tier Water Rate Appeal Process

How to appeal a third-tier water rate charge

- Circumstances eligible for appeal:
- One or more household members who require water-intensive medical treatments or convalescent care
- More than one single family residence served by a single water meter
- Boarding house or multi-family living arrangements
- Hardship circumstances that merit special consideration

Note: For any of these circumstances, you may be eligible for exemption from third-tier water rates or a recalculation of your third-tier consumption threshold.

Appeal process

- First, a customer must receive a bill containing third-tier water charges that they wish to appeal. Appeals for billed third-tier charges in 2005 will be accepted after May 16.
- Submit a written request explaining why the charges are being appealed, and how the request fits within the circumstances listed above as eligible for appeal.
- Enclose a copy of the bill showing the third-tier charges being appealed, or be sure to provide complete identifying information including name, address, account number, bill date and amount of third-tier charges being appealed. Please include a daytime phone number.
- Bill payment should be made in the usual way and not sent with the appeal. Be sure to pay all charges on the bill other than third-tier water charges.
- The appeal information should be sent to:

Seattle Public Utilities
Attn: Utility Hearing Officer
700 Fifth Avenue, Suite 2777
PO Box 34027
Seattle, WA 98124-4027
OR fax items to: (206) 684-3811
OR e-mail appeal to: Respond.SPU@seattle.gov

Customers can expect a response within 30 days. Pending response, unpaid third-tier charges will not be subject to credit action or late payment charges. Approved appeals will be retroactive to May 16, 2005 and will apply to Year 2005 third-tier charges only.

Important note for customers who submitted a third-tier appeal in 2003 or earlier: If an appeal was approved in 2003 or earlier for other than a hardship circumstance, it is not necessary to resubmit an appeal for 2004. However, if an appeal was denied in 2004 or earlier, but circumstances have changed or a hardship circumstance exists for 2005, a new appeal should be submitted for 2005.

Understanding Your Utility Bill

Here's an explanation of the line items on your bill:

REFUSE
Most residential properties have a single garbage can and may also have a yard waste cart. It is listed on the bill with the number of carts, followed by the cart size. The most used rates and descriptions are:

1-32GAL REFUSE CART This is the smallest normal cart
1-68GAL REFUSE CART This is the most popular size of cart
1-95GAL REFUSE CART This is the largest cart
YARD WASTE CART RECYCLE This is the large green lawn clipping cart.

SEWER

Each residence will have four monthly sewer rate charges.

SEWER RATE STABILIZATION Money is used for capital projects
SEWER RESIDENTIAL COLLECT Money covers the cost of maintaining existing infrastructure (the pipes in the ground)

SEWER RESIDENTIAL TREATMENT Money covers the cost of operation of the Water Reclamation Facility
STORMWATER Money is used for storm water run off projects

WATER

Each residence will have two monthly charges.

WATER RATE STABILIZATION Money is used for capital projects
WATER SERVICE CHARGE Money is used for the operation of the Water Department

WATER CONSUMPTION

In addition to the base service charge, the City also bills customers for actual use of water. City water meters measure the water used in cubic feet, and the City bills customers in units of 100 cubic feet, or about 748 gallons. City water meters generally are read every other month.

OTHER CHARGES

A bill may also contain one or more additional items. For example, you may be billed for an extra bag of trash or water valve operation. If you have a question about one of these charges, you can contact the Utilities Billings office at 625-6000 for an explanation.

CITY OF SPOKANE

2005

UTILITIES RATES



Additional information

can be found on
the City's web site at
www.spokanecity.org

Utilities Billings Department

(509) 625-6000

UTILITY SERVICES

The City of Spokane is proud to offer you a variety of critical utility services, including delivery of clean water, collection and processing of wastewater, and collection and disposal of solid waste. Our goal as your utility purveyor is to provide quality services at a reasonable price.

As we begin the new year, we would like to update you on our 2005 rates. We hope the rate information to the right will assist you in planning your household budget for 2005.

On the back of this brochure, you'll find an explanation of the line items found on your monthly bills. The City's Utility Billings Office itemizes each customer account so you can easily track what you're paying for. In addition, this itemization assists our utility departments in their accounting processes, streamlining their work and saving you money.

We appreciate all of our customers and strive to serve. More information on our services can be found at www.spokane.net. You can sign up for e-bill and pay on line with Master Card or Visa, Debit or Credit. We also invite any questions you may have about this information or your monthly bill. We're also happy to provide rate information on commercial accounts. Please call us at 625-6000.

CITY OF SPOKANE 2005 RESIDENTIAL UTILITIES RATES

SINGLE FAMILY RESIDENTIAL

REFUSE

(There is no change from 2004 rate)

1-32GAL. REFUSE CART	\$14.46	each month
1-68GAL. REFUSE CART	\$22.32	each month
1-95GAL. REFUSE CART	\$30.18	each month
YARD WASTE CART RECYCLE	\$12.00	each month

This is billed only March through December each year.

SEWER

	Inside City Accounts	Outside City Accounts
SEWER RATE STABILIZATION	\$7.00	\$7.00
SEWER RESIDENTIAL COLLECT	\$4.48	\$8.96
SEWER RESIDENTIAL TREATMENT	\$12.74	\$25.48
STORMWATER	\$3.25	no charge

WATER

	Inside City Accounts	Outside City Accounts
WATER RATE STABILIZATION	\$3.50	\$3.50
WATER SERVICE CHARGE	\$7.51	\$10.76

WATER CONSUMPTION CHARGES

In addition to the base service charge, the City also bills customers for actual use of water. City water meters measure the water used in cubic feet, and the City bills customers in units of 100 cubic feet, or about 748 gallons. City water meters generally are read every other month, and the following chart is for two months of water usage.

WATER CONSUMPTION

If usage is at least	and not more than	Inside City Accounts	Outside City Accounts
1	9,000 gallons (1-12 units)	\$0.23 (per unit)	\$0.46 (per unit)
9,001	15,000 gallons (13-20 units)	0.49 (per unit)	0.98 (per unit)
15,001 gallons	(21 units)	0.64 (per unit)	1.28 (per unit)

FOR INFORMATION ABOUT COMMERCIAL ACCOUNT BILLS, CONTACT THE UTILITIES BILLINGS OFFICE AT 625-6000

From H2ouse Water Saver Home Website
<http://www.h2ouse.org/index.cfm>

SAVE WATER, MONEY, ENERGY NOW! TOP 5 ACTIONS

With so many ways to save water, here are the highlights for 5 key actions to help you capture the water savings around your home. Click on the "Learn more" to find out additional information for each action. Remember, every drop counts!

1. Stop Those Leaks!

Check your indoor water using appliances and devices for leaks. Check out [Leak Detection](#) and [Repair](#).

Many silent leaks allow water and your money to go down the drain. To help detect unseen leaks go to [Read Your Meter](#). Studies have shown homes can waste more than 10% due leaking, which costs both you and the environment.

Another large water waster can be leaks in your irrigation system. Fix irrigation system leaks quickly and check for water in the gutters or mud puddles. Inspect your sprinklers and drip sprayers regularly for leaks during the daytime since the optimal time to water is in the nighttime hours when you cannot observe leaks. If you have an older irrigation system, over 50% and even more than 75% of the water can be lost to leaks. Learn more about [irrigation systems...](#)

2. Replace your old Toilet, the largest water user inside your home.

If your home was built before 1992 and the toilet has never been replaced, then it is very likely that you do not have a water efficient 1.6 gallon per flush toilet. You can check the date stamp inside the toilet by lifting the lid and looking at the back of the toilet at the manufacturer's imprint of the make, model and date of manufacture. Learn more about [toilets...](#)

3. Replace your Clothes Washer, the second largest water user in your home.

Energy Star™ rated washers that also have a Water Factor at or lower than 9.5, use 35-50% less water and 50% less energy per load. This saves you money on both your water and energy bills. There is a current [qualifying products listing of water efficient clothes washer models](#) maintained by the Consortium for Energy Efficiency. Learn more about [clothes washers...](#)

4. Plant the Right Plants with Proper Landscape Design & Irrigation

Whether you are putting in a new landscape or slowly changing the current landscaping at your home, select plants that are appropriate for your local climate conditions. Having yard with 100% lawn turf area in a dry desert climate uses significant amounts of water. Also consider the trend towards [Xeriscape™](#) and a more natural landscape or wildscape. Learn more about [landscaping...](#)

5. Water Only What Your Plants Need

Most water is wasted in your garden by watering when you plants do not need the water or by not maintaining the irrigation system. Be attentive if you are manual watering by setting your oven timer or some other reminder to move the water promptly. Make sure your irrigation controller has a rain shutoff device and that it's appropriately scheduled. Most water is wasted in months prior to or just after the rainy season when intermittent rains occur. You can also consider installing a weather adjusting ET irrigation controller (see description in [glossary](#)) that automatically saves water by not watering when the plants don't need the water, check with your local water provider to inquire if ET controllers work in your area. Learn more about using the features that you have in your [garage](#) for efficient watering like your hose and irrigation controller timer...

Be sure to call your local water provider for more information and potential incentives.

On this web site are many book and web site resources available to help research choices for water saving home appliances and landscaping choices. Check out the [Library](#), [Bookstore](#) and [Links](#) web pages under Resources for more information.

Water Conservation Survey

The City of San Diego's Water Conservation Program is continually looking for ways to improve our service to our customers. In order to get better, we need to hear from you! Please fill out this short survey about the ways you conserve water, and what you think of the programs and services we offer. In appreciation for your time and effort, you will receive a free *Southern California Heritage Gardening Guide* CD. Thanks for your help!

This survey must be completed by a person over the age of eighteen. Please verify by checking the box below.

I am eighteen years old or older.

Please enter your 5-digit zip/postal code:

1. How often do you hear about water conservation in the media?

Daily Weekly Monthly Bi-monthly

Other

2. How do you access water-saving tips and programs? (Check all that apply.)

Hotline Water Dept. Newsletter Website
 Word of mouth Local Media Water Dept. Bill

Other

3. What techniques have you used to save water? (Check all that apply.)

Turn off water while brushing teeth/shaving Take shorter showers (5 minutes or less)
 Wash full loads of dishes or laundry Adjust sprinkler schedules regularly
 Sweep debris off driveways, patios, etc. Redirect downspouts towards lawn/plants
 Collect cold water for other uses while waiting for water to heat up Use California Native or Low Water-Use plants

Other

4. How do you set your sprinkler schedule?

- According to the weather
- According to the Landscape Watering Calculator
- Landscape maintenance professional sets schedule
- Schedule remains the same all year long
- I have no irrigation system that I maintain
- Other _____

5. Do you plan to landscape your property in the near future? Yes No

If yes, for what type of property? Residential Commercial

6. How often do you check your faucets/fixtures for leaks?

- Monthly
- Bi-monthly
- Annually
- Bi-annually
- Never
- Other _____

7. Have you participated in one of the City's Water Conservation programs?

- Yes
- No

(If YES, continue to question 8. If NO, skip to question 14.)

8. If yes, select a program below which you participated in most recently.

--select one--

9. Please rate the service you received:

	Exceptional	Good	Satisfactory	Needs Improvement
Friendliness of telephone operator?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Answers to technical questions?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friendliness of program staff?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional appearance of staff?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall experience?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Would you recommend this program? Yes No

11. Have you participated in other programs? Yes No

12. If yes, which ones? (Check all that apply.)

- | | |
|--|---|
| <input type="checkbox"/> Residential Water Survey Program | <input type="checkbox"/> Irrigation Fixture Reimbursement Program |
| <input type="checkbox"/> High-Efficiency Clothes Washer Voucher Program | <input type="checkbox"/> Commercial Landscape Survey Program |
| <input type="checkbox"/> Ultra-Low Flush Toilet Voucher Program | <input type="checkbox"/> Commercial Landscape Incentive Program |
| <input type="checkbox"/> Landscape Watering Calculator | <input type="checkbox"/> Plumbing Retrofit Upon Resale Ordinance |
| <input type="checkbox"/> Commercial, Industrial, and Institutional Water Conservation Survey Program | |

13. Are you interested in telling us your water conservation story to share with local media? Yes No

If YES, please check your level of participation:

Telephone interview Written description of water conservation story below.

14. Additional comments and ideas for how we can improve:

15. To receive information on Water Conservation Programs and Services, check all that apply:

- | | |
|--|---|
| <input type="checkbox"/> Residential Water Survey Program | <input type="checkbox"/> Irrigation Fixture Reimbursement Program |
| <input type="checkbox"/> High-Efficiency Clothes Washer Voucher Program | <input type="checkbox"/> Commercial Landscape Survey Program |
| <input type="checkbox"/> Ultra-Low Flush Toilet Voucher Program | <input type="checkbox"/> Commercial Landscape Incentive Program |
| <input type="checkbox"/> Landscape Watering Calculator | <input type="checkbox"/> Plumbing Retrofit Upon Resale Ordinance |
| <input type="checkbox"/> Commercial, Industrial, and Institutional Water Conservation Survey Program | |

16. To receive your FREE *Southern California Gardening Guide* CD please complete the following:

Name Address

City

State

Zip Code

Phone

Email

For information about recycled water, visit the [Recycled Water Program](#) and [Water Resuse Study](#) web pages.



From San Diego Water Department Website

<http://www.sandiego.gov/water/conservation/kids/funfacts.shtml>

Fun Water Facts

Did You Know?

- The average San Diegan uses about 88 gallons of water each day at home for both indoor and outdoor uses.
- San Diego imports 80% to 90% of its water.
- If placed into gallon bottles, the 168 million gallons of water San Diego imports daily would encircle the earth more than one and a quarter times.
- More than half of the water we use in the warmer months is used for outdoor irrigation.
- 97% of the world's water is salty or otherwise undrinkable. Another 2% is locked in ice caps and glaciers. That leaves just 1% for consumption by all living creatures, including plants and animals.
- If everyone in the US used just one less gallon of water per shower every day, we could save some 85 billion gallons of water per year.
- If everyone in the US flushed the toilet just one less time per day, we could save a lake full of water about one mile long, one mile wide and four feet deep.
- Every glass of water brought to your table in a restaurant requires another two glasses of water to wash and rinse the glass. Since nearly 70 million meals are served each day in US restaurants, we'd save more than 26 million gallons of water if only one person in four declined the complimentary glassful.
- If you sprinkle your lawn too lightly, it prevents water from getting deep into the soil. The grass then develops shallower roots and becomes less drought-resistant. It's better to deep soak your grass, but doing it less frequently. To find out exactly how much water your lawn needs, any time during the year, create a free customized watering schedule.
- Getting a cover for your pool can help prevent evaporation. An averaged-size pool with average sun and wind exposure loses approximately 1,000 gallons of water per month. A pool cover cuts the loss by 90%.

The above information has been adapted from the following brochures:

- "Who, Where, When and Water Conservation Questions & Answers" originally published by the City of San Diego Water Department, Water Conservation Program, San Diego, California.
- "55 Facts, Figures & Follies of Water Conservation," published by the American Water Works Association (AWWA). The City of San Diego has received copyright permission from AWWA to post this information on this website.

San Diego Water Department

Water Conservation Poster Contest

- Theme
- Rules
- Prizes
- Judging
- Official Entry Form
- 2004 Poster Contest Winners
- 2003 Poster Contest
- Wallpaper Images
- Screensaver



The Water Conservation Poster Contest is an annual event held for all 1st through 6th grade students attending public and private schools (including home-schooled students) within the City of San Diego. Students are encouraged to use their artistic talent and water conservation knowledge to creatively share their ideas on how San Diegans can save water, our most precious resource.

Each student that creates a poster to enter into the contest will receive a certificate of participation.

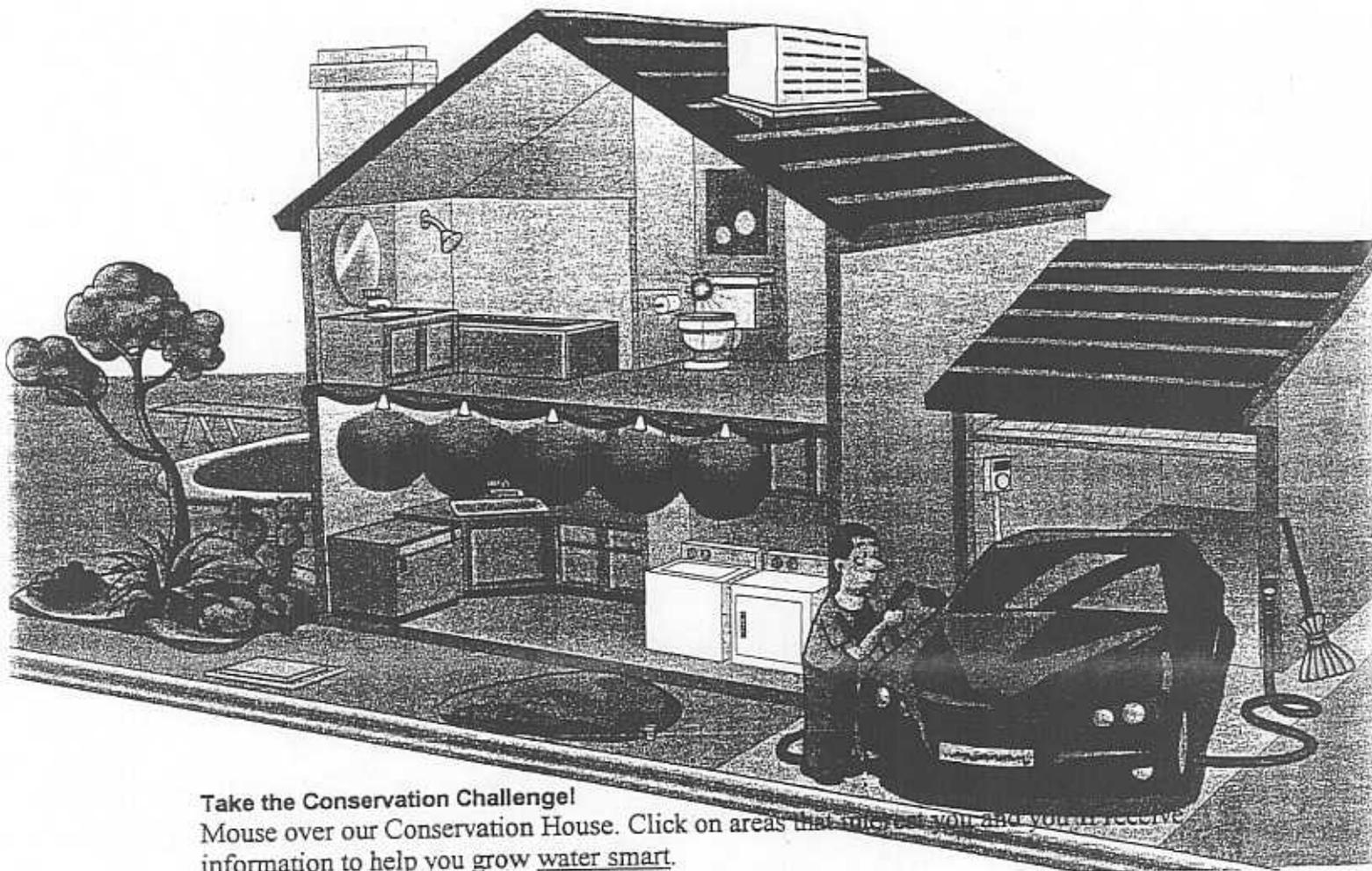
Winners of the Poster Contest will receive a U.S. Savings Bond, four tickets to the Reuben H. Fleet Science Center and a Certificate of Excellence during an awards ceremony.

Winning posters will be on display at the City Administration Building, May 9-20, 2005 and at the San Diego County Fair Kids Best Art Exhibit, June - July, 2005. The posters will also be featured in the 2006 Water Conservation Calendar.

The **deadline** for the contest is Wednesday, March 30, 2005.

For more information about the Annual Water Conservation Poster Contest, call the City of San Diego Water Department at (619) 235-1984 or via e-mail at water@sandiego.gov.

The Water Department thanks the following sponsors for their support of the poster contest: Metropolitan Water District, Nassco, Reuben H. Fleet Science Center, and the San Diego County Water Authority.



Take the Conservation Challenge!

Mouse over our Conservation House. Click on areas that interest you and you'll receive information to help you grow water smart.

From Southern Nevada Water Authority Website
http://www.snwa.com/html/conservation_house.html

You must visit this
website to fully appreciate
this wonderful interactive page!

From Phoenix Water Department Website

<http://phoenix.gov/WATER/books.html>

Reading List for Water Conservation and Water Science

These books are available in your city of Phoenix Public libraries and most public schools in the Phoenix Water Services area.

● Elementary School

● Middle School

● High School and Adult

Elementary School:

1. ***Bear Loves Water.*** (Preschool) By Ellen Weiss. Bear teaches readers about water in all its forms - puddles, bubbles, snowflakes and clouds.
2. ***Brother Eagle, Sister Sky: A Message from Chief Seattle.*** (4-8 years) Illustrated by Susan Jeffers. A story about Native American beliefs and how each generation deserves to breathe fresh air, drink pure water and to enjoy all the beauty that the earth offers.
3. ***Common Ground: The Water, Earth, and Air We Share.*** By Molly Garrett Bang. Explains how everyone in the world depends on each of us individually to protect resources and maintain respect for the environment.
4. ***The Drop in My Drink.*** (9-12 years) By Meredith Hooper and Chris Coady. Water takes on fascinating new significance as readers discover the amazing complexity of a substance we take for granted. Includes a detailed depiction of water cycles, amazing facts and important environmental information.
5. ***A Drop Of Water: A Book of Science and Wonder.*** By Walter Wick. Shows the different forms of water in amazingly detailed photographs; explains water's properties.
6. ***The Earth and I.*** (4-8 years) By Frank Asch. Explains the friendship between the earth and a young child and what each can do for the other.
7. ***Follow the Water from the Brook to the Ocean.*** By Arthur Dorrons. Explains how water flows from brooks, to streams, to rivers, over waterfalls, through canyons and dams to eventually reach the ocean.
8. ***The Four Elements: Water.*** (Preschool) By Carme Solé Vendrell and J.M. Parramón. Text and illustrations explain the properties of water and its uses. Includes a special section to help adults answer children's questions.
9. ***Gullywasher.*** (4-8 years) By Joyce Rossi. In English and Spanish. A grandfather tells tall tales of his life as a cowboy (vaquero) and of the harsh life in the desert, flash floods, and wildlife.
10. ***I Am Water.*** (4-8 years) By Jean Marzollo. A first book about water in its different forms and uses.
11. ***Magic School Bus: At the Waterworks.*** By Joanna Cole. Mrs. Frizzle, the science teacher, drives the magical school bus into a cloud where the children shrink to the size of water droplets and follow the course of the water through the city's waterworks system.
12. ***Magic School Bus: Se Salpica Toda.*** (4-8 years) By Joanna Cole. In Spanish, experience the earth's water cycle first hand as Mrs. Frizzle's class rises into the air, forms a rain cloud, a drizzles down to earth just like rain.
13. ***Magic School Bus: Wet All Over.*** (4-8 years) By Joanna Cole. Experience the earth's water cycle first hand as Mrs. Frizzle's class rises into the air, forms a rain cloud, a drizzles down to earth just like rain.

14. **One Small Square: Cactus Desert.** (6-10 years) By Donald M. Silver. Teaches about all the plants and wildlife that exist in one small square of desert - an excellent introduction to ecosystems and biodiversity.
15. **River Ran Wild: An Environmental History.** By Lynne Cherry. A history of New Hampshire's Nashua River starting 7,000 years ago until its recent reclamation. This is a good explanation of what can happen over time to a body of water and its wildlife -- what people can do to the environment and what they can do for it.
16. **Snail Girl Brings Water.** (6-10 years) By Geri Reams. A retelling of a traditional Navaho creation myth which explains how water came to earth.
17. **Splish, Splash, Splosh.** (4-8 years) By Mick Manning and Brita Granström. Join the adventures of a young boy and his dog and ride the waves, float on rain-filled clouds, shoot down fast-flowing rivers, and splash through sewers until you get where all water ends...and begins.
18. **This Place is Dry.** By Vicki Cobb, Barbara Lavallee (Illustrator). Surveys the living conditions in Arizona's Sonoran Desert for the people and the unusual animals that live there. Also describes the engineering accomplishment of the Hoover Dam.
19. **Water.** By Frank Asch. Aimed at very young children, this book artfully describes water in its many forms, its uses, and its role in our lives.
20. **Water (My First Nature Book).** By Andrienne Soutter-Perrot, Etienne Delessert (Illustrator). Explains water in its different form and why every living thing needs water.
21. **Water Science, Water Fun: Great Things to Do with H₂O.** (9-12 years) By Noel Fiarotta and Phyllis Fiarotta. Lessons and experiments teach about floating, refraction, leaching temperature gravity, buoyancy, flow and other water properties.
22. **Water, Water Everywhere (Discovery Readers).** By Melvin Berger, Gilda Berger, Bobbi Tull (Illustrator). A book about the water cycle, treatment, distribution, and wastewater treatment.
23. **Where Do Puddles Go?** (4-8 years) By Fay Robinson. An early book to explain water cycles and water in all its forms.
24. **Where Does Water Come From?** (6-10 years) By C. Vance Cast. Clever Clavin shows how much water there is on earth, how wells are dug to bring it out of the ground, and how water treatment plants work.
25. **The Woman Who Outshone the Sun/La Mujer Que Brillaba Aún Más Que el Sol.** By Alejandro Cruz Martinez, Fernando Olivera (Illustrator). A bilingual tale from ancient Mexico that tells of a beautiful woman who arrives in a mountain village and is driven out because she is different, taking the river with her.
26. **The Wonder Thing.** By Elizabeth Hathorn, Peter Gouldthorpe (illustrator), and Libby Hathorn. In a poetic guessing game comprised of pictures and words, young children can guess what the "wonder thing" is, as well as identify landscapes and places.

Middle School:

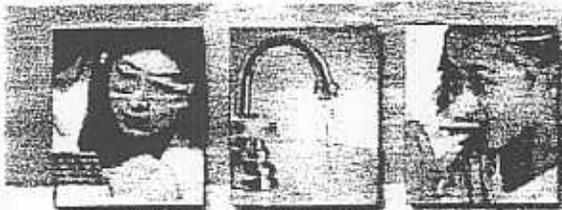
1. **Biodiversity.** By Dorothy Hinshaw Patent. Stresses the importance of protecting the planet's rich gene pool for the survival of all species.
2. **Clean Water.** By Karen Barss. Discusses the problems of maintaining a clean water supply and relates this issue to such topics as pollution, depletion of resources, and other environmental concerns.
3. **Deserts and Drylands.** By Steve and Jane Parker. Explains why deserts have developed, where they are, and why overfarming has caused them to spread. Shows how plants and animals cope with extreme temperatures and lack of water.
4. **A Drop Of Water: A Book of Science and Wonder.** By Walter Wick. Shows the different forms of water in amazingly detailed photographs; explains water's properties.
5. **Drought.** By Christopher Lampton. Investigates the causes and disastrous effects of drought, giving the history of some of the most severe droughts on record in the U.S. and elsewhere.
6. **Every Drop Counts.** By Jill C. Wheeler, Angela Kamstra (illustrator), and Kristi Schaeppi (illustrator). Full of ideas on how kids can stop water waste at home, outside, and in school. Also talks about water pollution.
7. **Ground Water and Surface Water: A Single Resource.** U.S. Geological Survey Circular 1139. Presents an overview of the interaction of ground water and surface water, in terms of both quantity and quality, as applied to a variety of terrains across the country. Discusses the firm

- scientific foundation for policies governing the management and protection of aquifers and watersheds.
8. ***Our Endangered Planet: Rivers & Lakes.*** By Mary Hoff and Mary M. Rodgers. Explains the way rivers and lakes work together and how we have harmed them. It tells stories of success in reviving dying rivers and lakes and of failure to preserve our fresh water.
 9. ***Protecting Our Rivers and Lakes.*** By Rosa Costa-Pau. Presents overviews of the problems facing the survival of rivers and lakes in light of the effects and solutions to pollution and the mismanagement of resources.
 10. ***Rivers: Make It Work!*** By Andrew Haslam, Barbara Taylor. Explains where rivers come from, why people settle near them, and how rivers form valleys and underground caves. Discusses how rivers create energy and why it's important to control flooding.
 11. ***Water : A Resource in Crisis.*** By Eileen Lucas. Discusses the quality and quantity of water on a global scale and includes discussions of resources, the ways we use water, pollution, making water safe, taking care of our water, and taking action.
 12. ***Water Conservation: Student Edition.*** By Leslie Crawford, Jeri Hayes (Editor), Cathy Anderson (Editor) Shows students different ways to analyze, consider options, and take action on issues such as sources of water pollution, community water supply, the school water system, reading a water bill, conservation technologies and practices, and assessing costs and benefits.
 13. ***Water (Designs in Science): How Technology Mirrors Nature.*** By Sally Morgan and Adrian Morgan. Investigates the use of water from water for energy and transportation to water as a solvent. Other topics include filtration, desalination, recycling and conservation.
 14. ***Water Squeeze.*** By Mary O'Neill. Discusses the importance of water in our lives and the dangers we create when we pollute the waters of the planet.
-

High School & Adult:

1. ***Cadillac Desert: The American West and Its Disappearing Water.*** By Marc Reisner. This is a history of the American West's water and its great water projects that transplanted water to allow the phenomenal growth of California and the Southwest. The book's perspective of water rights, and ecologic and economic consequences of such actions focuses on government and business tactics.
2. ***Food and Water: Threats, Shortages and Solutions.*** By Bernard S. Cayne (Editor), Jenny E. Tesar. Discusses the vital importance of having an adequate supply of food and water and the effects of pursuing this need through various forms of storage and farming methods.
3. ***From Reclamation to Sustainability: Water, Agriculture and the Environment in the American West.*** By Lawrence J. MacDonnell. Tells the stories of four places in the West where development and use of water, primarily for irrigated agriculture, have been central to economic and social development.
4. ***Gila: The Life and Death of an American River.*** By Gregory McNamee. Follows the ecologic history of the Gila River from its source in New Mexico, through its confluence with the Colorado River and into Arizona. Today, half of the Gila is dead, due to overgrazing, damming, and other practices.
5. ***Ground Water and Surface Water: A Single Resource.*** U.S. Geological Survey Circular 1139. Presents an overview of the interaction of ground water and surface water, in terms of both quantity and quality, as applied to a variety of terrains across the country. Discusses the firm scientific foundation for policies governing the management and protection of aquifers and watersheds.
6. ***Last Oasis: Facing Water Scarcity.*** By Sandra Postel, Linda Starke (Editor). The worldwide water crisis, according to this book, is due to its ready availability, low cost, people's overuse, and lack of respect for this life-sustaining resource. Solutions are giving for restoring and sustaining this essential lifeline.
7. ***A River No More.*** By Philip L. Fradkin. This is a definitive history of the development of the Colorado River and the claims made upon it from its source in the Wyoming Rockies to the Gulf of California, where it evaporates in the sand.
8. ***A Story That Stands Like a Dam: Glen Canyon and the Struggle for the Soul of the West.*** By Russell Martin. A narrative history of hydroelectric dams and their impact on ecological processes downstream and its drownings of natural landscapes behind their headwalls.

9. ***Tapped Out: The Coming World Crisis in Water and What We Can Do About It.*** By Paul Simon. Discusses increasing global population and a water supply that cannot increase; faced with this crisis, what can the average citizen do?
10. ***Vision in the Desert: Carl Hayden and Hydropolitics in the American Southwest.*** By Jack L. August. Focuses on longtime Arizona senator, Carl Hayden, whose career was centered on water and its distribution, inseparable from the history of the West and development of arid lands.
11. ***Water: A Natural History.*** By Alice Outwater. Takes us on a journey 500 years past to present to recover a lost knowledge - how the land cleans its own water, how natural ecologically interacting systems can create healthy waterways.
12. ***Water : A Resource in Crisis.*** By Eileen Lucas. Discusses the quality and quantity of water on a global scale and includes discussions of resources, the ways we use water, pollution, making water safe, taking care of our water, and taking action.
13. ***Water: Almost Enough for Everyone.*** By Stephanie Ocko. Through case studies, anecdotes, facts, and theoretical explanations, this book provides a look at the social and environmental implications of severe droughts, their causes, and some possible solutions.
14. ***Water Conservation: Student Edition.*** By Leslie Crawford, Jeri Hayes (Editor), Cathy Anderson (Editor). Shows students different ways to analyze, consider options, and take action on issues such as sources of water pollution, community water supply, the school water system, reading a water bill, conservation technologies and practices, and assessing costs and benefits.
15. ***Water Wars: The Fight to Control and Conserve Nature's Most Precious Resource.*** By Olga Cossi. Discusses how we have to change our habits and our ways of thinking in order to preserve the earth's water resources - the crucial role water plays in nature and how dwindling supplies are affecting the various ecosystems of the world.



Your Water. Your Health. Our Priority.™

Straight Talk On Water Conservation

As a society, we have become more and more environmentally conscious and better informed about the effect our lifestyles can have on the world around us. Yet, the demand for our most valuable natural resource – drinking water – continues to grow while local supplies can be threatened by drought conditions. Only one percent of the earth's water is available for human consumption and yet, according to the latest U.S. Geological Survey, the United States uses 408 billion gallons a day. On the industrial level, numerous water-saving technologies have been employed to help conserve water. And while strong progress has been made, there are several simple steps that consumers can take to help preserve our water supply for future generations.

What can you do?

- Water your lawn early in the morning or at night to avoid excess evaporation. Do not over water your lawn. Use lawn chemicals only when necessary.
- Fully load the dishwasher and clothes washer before running.
- When washing dishes by hand, or when brushing your teeth, do not leave the water running.
- Repair dripping faucets and leaky toilets. Dripping faucets can waste up to 2,000 gallons of water each year in the average home. Leaky toilets can waste as much as 200 gallons per day.
- If you have a swimming pool, use a cover. By so doing, you can cut the loss of water by evaporation by 90 percent.
- Use a broom, rather than a hose, to clean sidewalks or driveways.
- Defrost frozen food in the refrigerator or in a microwave instead of running hot water over the food.
- Do not pour toxic chemicals (such as cleaning products, motor oil, weed-killers, or paints) down the drain. Dispose of them properly.

Together, we share in the benefits of some of the safest drinking water in the world, and it is incumbent upon us all to protect this valuable natural resource for future generations. By making simple changes in our daily routines, we can feel confident that we are doing our part.



American Water Works Association

The Authoritative Resource for Safe Drinking Water®

www.awwa.org

From Southern Nevada Water Authority Website

http://www.snwa.com/html/news_conservation.html



Water Smart Home program announced

The Southern Nevada Water Authority (SNWA) and the Southern Nevada Home Builders Association (SNHBA) announced a new Water Smart Home program in January. The program is the first of its kind in the nation. It certifies qualifying new homes and neighborhoods as Water Smart, ensuring that home buyers are purchasing a home that can save as much as 75,000 gallons of water per year.

Water Smart homes will include water-efficient landscaping and irrigation systems, hot water recirculation systems and water-efficient appliances. Builders will have the option of building individual homes or entire neighborhoods that qualify as Water Smart. The result is a home that exceeds current drought and plumbing codes, helping the community to conserve water.

"The drought made everyone rethink what it means to be water-efficient," said SNWA General Manager Pat Mulroy. "Water Smart homes show that water-efficient doesn't mean doing without the comforts of a new home. It simply means creating a quality home and landscape using less water. These homes model the life of the future here in the West."

"The Water Smart Home program is one more way home builders are helping to enhance the quality of life that Southern Nevada residents enjoy," said Irene Porter, SNHBA Executive Director. "The program will provide home buyers with a more water-efficient new home and it will assist the community in conserving water. Southern Nevada's home builders are proud of their involvement in water conservation efforts in our community."

Water Smart homes may be available as early as Spring 2005.

Features of a Water Smart Home:

- Irrigation systems designed to eliminate runoff potential
- Maximum of 1,000 square feet of turf/pool area in the backyard, without regard to how large the yard is (current code allows half of back and side yards, no matter how large)
- No ornamental water features, even if they conform to the current 25 square-foot limit
- Specific requirements for irrigation systems that don't exist in code (pressure regulators, separate valving, filtration, minimum 4" sprinkler pop-up, multi-program digital controller, etc.)
- Requirement to audit and meet minimum efficiency standards on private community parks

Swimming Pools

- Limited surface area for community pools (20 square feet per home maximum vs. average single family pool of 425 square feet per home)
- Sewer cleanout in protected, marked enclosure to ease proper pool draining
- Limitations (24") on pool features that drop or propel water, such as waterfalls or fountains

Plumbing

- 60 psi pressure (current code is 80 psi); lower pressure reduces water use, equipment failures and leaks
- Prohibited from installing multiple showerheads or body spa systems if the combined flow exceeds 2.5 gallons per minute
- Efficient hot water systems required such as recirculating pumps, manifold systems and/or point-of-use systems

Appliances

- Only high-efficiency dishwashers and washing machines may be offered
- Water softeners required to be demand-based regeneration (rather than timer based) and accept potassium
- Drinking water treatment devices must have a yield of 85 percent of the water available for beneficial uses in the home
- Air conditioning systems must have zero net consumptive use (no evaporative systems)

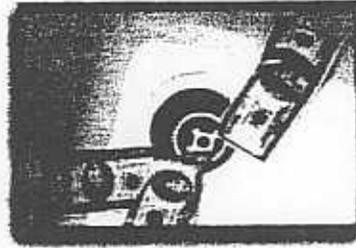
The Southern Nevada Water Authority is a regional agency that manages water quality, water conservation and water resources. Member agencies are: Big Bend Water District (Laughlin), the cities of Las Vegas, North Las Vegas, Henderson and Boulder City, the Clark County Water Reclamation District and the Las Vegas Valley Water District.

The Southern Nevada Home Builders Association is the oldest and largest local trade organization representing the residential construction industry with some 750 members working in all facets of the homebuilding industry. SNHBA members build 90 percent of the new housing constructed annually in Southern Nevada.

From San Antonio Water System Website
<http://www.saws.org/conservation/programs/homeaudit.shtml>

HOME WATER

CONSERVATION AUDIT



Want to keep money from going down the drain? Get a free audit.

Is your water bill as low as it can be? There's only one way to find out. Get a free home water conservation audit.

The San Antonio Water System can perform a simple water audit of your home usage. It only takes a few minutes but it could save you quite a bit on your water bill. Here's how it works:

- A trained conservation water auditor checks all your water connections: toilets, faucets, spigots—for any leaks.
- The auditor can also check your irrigation system to determine how it's performing and evaluate existing turf and soil conditions.
- The auditor will also recommend effective ways to conserve and, if needed provide you with low-flow shower heads and aerators—FREE!

Why Should You Be a Water Saver?

Saving water makes sense for so many reasons:

- You can save money on your water bill.
- You're helping our community and its long-term water needs.

To learn more or request your free home water audit, call 704-7354.

Water Saving Tips

- ◆ Install a low-flow shower head in each shower.
- ◆ Repair leaks as soon as possible.
- ◆ Install aerators (flow restrictors) on each faucet.
- ◆ Use cut-off nozzles on each water hose.
- ◆ Replace your old toilet with a new ultra-flow toilet.
- ◆ Ask about our program where we give away toilets, you may qualify.
- ◆ Replace your old washing machine with a high efficiency model and SAWS will give you a \$100 credit on your water bill.

SELECTING A WATER EFFICIENT TOILET

There is a lot to think about when choosing a water efficient toilet. Consumers tend to make their toilet purchasing decisions based on a variety of factors such as style, color, name brand recognition, and price. Often toilet flushing performance is not given thorough consideration.

One of the best ways to insure satisfactory flushing performance is to ask the advice of plumbers or plumbing suppliers for suggestions on models that have high customer satisfaction. Another popular decision tool is to select toilet models that friends and neighbors have installed and that they recommend. A number of popular consumer publications have ranked various toilet models as "best" based on a many factors, including price and performance. Unfortunately, these consumer publications sometimes don't list toilet affordable locally-available models.

Most of the popular toilet models for sale in the greater Seattle area were tested for flushing performance by the National Association of Home Builders Research Center (NAHB) during the summer of 2002. For the full report including detailed results see www.savingwater.org

Many customers ask if they must spend a lot of money to get a toilet that performs well. The following table includes toilet models tested by NAHB, showing performance results in the top half of all toilets tested, available in the Saving Water Partnership service area, and generally available for under \$100.

Manufacturer	Model Name	Model number or Tank/Bowl Numbers
American Standard	Compact	4010.012.020/3027.012.020
American Standard	Plebe	4392.312.020/3344.312.020
Briggs (Proflo 3212T/2200B)	Abington III	4229 = 4440T/4857B
Briggs (Proflo Altima)	Altima III	4232 = 4430T/4320B
Corona	Orchid	
Crane/Universal Rundle	Atlas	4471/4290
Kohler	Wellworth	4620-0/4277-0
Lamosa (Sanitarios Azteca)	Sahara	411
Mansfield	Alto	130/160
Niagara	Flapperless	N2216
Niagara	Turbo	N2220
Toto		CST703
Western Pottery	Aris	822

- many toilets selling for more than \$100 also performed well in the NAHB testing. Visit savingwater.org for the full report and rankings of all toilets tested
- ** it is best to ask for the specific model number of the toilet you are looking for. Some manufacturers use the same name for more than one model number.

From Las Vegas Valley Water District Website

http://www.lvwwd.com/html/news_conservation_programs.html

SNWA introduces pool cover coupon and car wash coupons



The Southern Nevada Water Authority (SNWA) has teamed up with local businesses to offer coupons for pool covers and to commercial car washes.

Get a coupon for half off the purchase of a pool cover up to \$50 for a solar cover and up to \$200 off a permanent pool cover as part of SNWA's Water-Smart Pool Management Program.



Get coupons to local commercial car washes through the Water Smart Car Wash Program. The new program encourages residents to use commercial car wash facilities instead of a bucket and hose at home. Washing your car at home can use two to three times as much water as at a commercial facility.

Plus, commercial facilities recycle the water on site or return it to the water cycle via the sewer system. When you wash your car at home, the water flows into the gutter and is lost to our water cycle.

Visit the [Water Smart Car Wash](#) section on [snwa.com](#) to get coupons or find a car wash near you. And, visit the [Pools section](#) on the Web site for the pool cover coupons and tips to help you know when and how to drain your pool.

Water Smart Home program first in the nation

SNWA and the Southern Nevada Home Builders Association (SNHBA) have joined forces to create the new Water Smart Home program. The first of its kind in the nation, the program certifies new homes and neighborhoods as Water Smart.

Water Smart homes will include water-efficient landscaping and irrigation systems, hot water recirculation systems and water-efficient appliances. Builders will have the option of building individual homes or entire neighborhoods that qualify as Water Smart. The result is a home that exceeds current drought and plumbing codes, helping the community to conserve water.

The program is expected to be available as early as Spring 2005. See [snwa.com](#) for more information.

To find more water-saving tips, visit SNWA's [Conservation House](#).

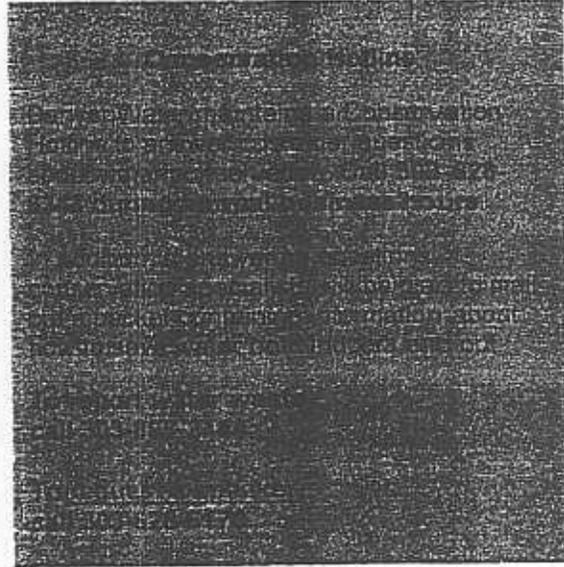
From Denver Water Website

<http://www.water.denver.co.gov/>

Water Is Too Precious To Waste

Fix leaks as soon as possible. Begin with an indoor audit. Check toilets by putting a few drops of food coloring in the tank and waiting 15 minutes. If color appears in the bowl, you have a leak. Check the water supply lines under your sink for bulges in the hose or damp spots. And watch faucets and showerheads for drips. Outdoors, check for broken or misaligned sprinkler heads. Also look for wet spots in your lawn that could indicate leaks in underground pipes.

Save water; save money.



Fall Rebate Program: Submeters

Note: 2004 Summer Drought Rebates Expired September 30, 2004

New Rebate Program for Submeters

Denver Water is offering a rebate to its multi-family inside city customers (owners and developers of apartment and condo complexes and other multi-plex buildings with a single water service line). A rebate of \$40 per dwelling unit is available for installing a submeter in each unit of the entire multi-family dwelling.

In order to qualify for the rebate:

- The buildings where the submeters are installed must be within the City and County of Denver.
- All units within a building must be submetered.
- Installation must have taken place after August 16, 2004.

The rebate is open to both new installations and retrofits of existing buildings.

For more information, please call 303-628-6330.

**Submeter Rebate
Application Form (PDF)**

XERISCAPE MYTH BUSTING:

Exploding Some Troublesome Misconceptions

Jim Knopf
Feb. '05

Xeriscaping is all good news. There is no downside. It saves water. It typically costs far less both to build, and to maintain than "traditional" landscapes. It attracts charismatic critters while discouraging wildlife mischief. It provides many great business opportunities. It offers new ways to provide year-round beauty. It is the best way ever to make gardening great by being something to do, rather than to be done with. It is simply all good news. However, many myths and misconceptions discourage people from reaping the rewards of this wonderful waterwise way to landscape.

Myth Busting

Myth #1 Xeriscapes are dry only...NO!

The original meaning of the word xeriscape was simply waterwise, or water-efficient landscaping. Even though dry-only landscaping can be spectacularly colorful and even lush, limited areas of highly watered landscape are completely consistent with wise water use, if the return justifies it -- for example, heavily irrigated athletic field turf.

Myth #2 Xeriscapes are rocks and gravel only...NO!

Although dry (xeric) rock gardens can be truly marvelous, there are an unlimited number of other choices for the xeric portions of xeriscape designs, even in the driest climates.

Myth #3 Xeriscapes are lawnless...NO!

Some lawn can be consistent with the concept of overall waterwise landscaping... "Less-lawn, not lawn-less" is a more appropriate phrase.

Myth #4 Xeriscapes are native only...NO!

Although there is a vast array of wonderful native plants for any region, introduced plants that are well-adapted, and not invasive, are an important addition to native flora for waterwise landscapes.

Myth #5 Xeriscapes cost too much to build and maintain...NO!

Xeriscapes can cost far less both the build and maintain than traditional landscaping which is usually dominated by high cost, manicured lawns that must be mowed weekly. A good waterwise landscape can be designed to avoid expensive automatic irrigation, and the money saved can be used for more plants. Many xeriscape designs need little or no regular maintenance, then maintenance by putting becomes a wonderful reality. Xeriscaping actually saves money!

Myth #6 Xeriscapes are a single style...NO!

Xeriscapes can be any style. There are lush tropical xeriscapes, fascinating Sonoran desert xeriscapes, delightful Rocky Mountain xeriscapes, eastern woodland xeriscapes, formal, and informal xeriscapes. Xeriscaping is not a single style.

Myth #7 Xeriscapes are difficult...NO!

Xeriscaping is not difficult. In fact, it can be easier than traditional landscaping. Trying to create a manicured lawn on a rocky site, is far more difficult than creating a ground

cover area with vines planted in only a few spots on the same site. Xeriscaping can be truly easy. Xeriscaping might mean learning a few new things, but that's not a downside, and it can be both easy and a lot of fun.

Myth #8 Xeriscapes need plants you can't get...NO!

There are more than enough xeric plants for xeriscapes. It is never hard to get shrubs like junipers, or rabbitbrush, or flowers like iris or penstemons, or ground covers like snow-in-summer. Plants for xeriscapes are just as available as plants for "traditional" landscaping.

Myth #9 Xeriscapes need more water to get started...NO!

Most plants in good xeriscape designs need less water (even the first year) than it takes to satisfy established high water landscapes. In fact, many low and very low water plants need only be watered when first planted. Even Turf-type Tall Fescue and Buffalograss sod need less water the first year than it takes to satisfy established Bluegrass. Overall, most parts of most xeriscapes need less than half the water of established high water landscapes, even the first year.

Xeriscape: Wow...It's Wonderful!

The program, "Xeriscape: Wow...It's Wonderful!" illustrates what xeriscaping looks like in lots of typical situations, and in many climates. It includes a study showing the dramatic savings possible during construction. Another study illustrates the dramatically reduced irrigation and water bills from simply changing the plant selection.

When it's important to save water in landscaping, the first and most important thing is to put plants of similar water needs together, and then avoid excessive irrigation.

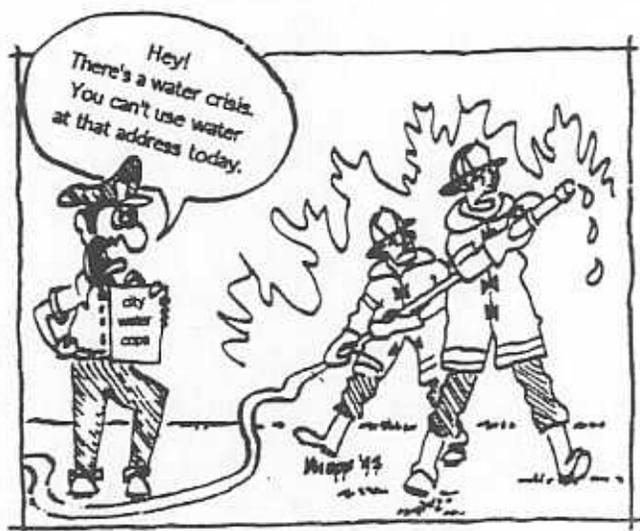
The following information illustrates how plants can be grouped in Denver or Salt Lake City. The same thing can be done in any climate by adjusting the number of zones, and the actual amounts of water needed, based on local experience.

How Much Water Does Landscaping Really Need?			
The following chart shows how to divide landscaping into different zones, based on the water needs of plants. Numbers illustrate typical Denver & Salt Lake City conditions.			
High Water Zones	Moderate Water Zones	Low Water Zones	Very Low Zones
Bluegrass turf (always wet at surface)	Half of Bluegrass turf (like Turf-type Tall Fescue)	Buffalograss turf (like Denver without irrigation)	Too dry for any turf (drier than Denver & SLC)
18-20 gals./S.F./season .5" - 3 times per week	10± gals./S.F./season .75" - once per week	0-3 gals./S.F./season .5" per 2 weeks, optional	No irrigation No irrigation
Typical plants: Kentucky Bluegrass, Redtwig Dogwood, Pansies	Typical plants: Turf-type Tall Fescue, Potentilla, Purple Coneflower, many shade trees	Typical plants: Buffalograss lawns, Rabbitbrush, Mexican Hat Coneflower	Typical plants: Pifion Pine, Yuccas, Apache Plume, Agaves, Penstemons

The program will also show how this information can be used to create designs that satisfy specific water budgets (or allotments). Water budgets can then be used to assure proper watering. Increasingly, water budgets are being required in the dry Southwest, and

are enforced by monthly meter readings, with penalty pricing for excessive irrigation. Water budgets are very popular with both customers and water departments. Compared

with daily and hourly restrictions enforced with water cops, water budget programs save more water and provide customers with much more choice about landscaping. During extreme droughts, residents and cities can save critical landscapes like sports fields and trees, by eliminating watering in some areas and focusing water on the most critical things.



Xeriscape your yard, and help save water for really important things.

To reap the benefits of xeriscaping, it's necessary to practice waterwise landscaping in both dry and wet times. It's always a good idea. Xeriscape...It's all good news.

"Industrial-Strength" Perennials... Season-long Waterwise Color, and Deer Resistant Too!

Knopf Mar., '03

The perennials on this list are so durable and showy that they are useful for general landscaping. Among other things, they can be used for showy "filler" plants while shrubs are maturing. By consulting the blooming time list, it is possible to make selections that will provide color throughout the growing season.

For a list with month of bloom for each species, see
WaterWise Landscaping with Trees, Shrubs, and Vines
Jim Knopf, Chamisa Books

Alphabetical "Shopping" List

Achillea filipendulina 'Coronation Gold' (VL-L)	Coronation Gold Yarrow
Achillea x 'Moonshine' (VL-L-M)	Moonshine Yarrow
Agastache cana (M+/-)	Double Bubble Mint
Aster porteri (VL-L)	Porter's Aster
Aurinia saxatilis (L-M)	Basket-of-gold

<i>Berlandiera lyrata</i> (VL-L)	Chocolate Flower
<i>Callirhoë involucrata</i> (L-M)	Poppy Mallow
<i>Centranthus ruber</i> (L-M-H)	Centranthus
<i>Cerastium tomentosum</i> (L-M)	Snow-in-summer
<i>Crocus</i> spp. * (L-M)	Crocus species
<i>Datura meteloides</i> (L-M)	Sacred Datura
<i>Delosperma cooperi</i> (M+/-)	Hardy Pink Ice Plant
<i>Gaillardia aristata</i> (L-M)	Native Gaillardia
<i>Helianthus maximiliani</i> (M+/-)	Maximilian Sunflower
<i>Iris bucharica</i> (M+/-)	Buchara Iris
<i>Iris germanica</i> cvs. (L-M)	Bearded Iris varieties
<i>Lavandula</i> spp. (VL-M)	Various Lavenders
<i>Liatris punctata</i> (VL-L)	Dotted Gay Feather
<i>Limonium latifolium</i> (L-M)	Sea Lavender
<i>Mirabilis multiflora</i> (VL-L-M)	Native Four O'clock
<i>Narcissus</i> spp. (L-M)	Daffodils
<i>Nepeta x faassenii</i> (L-M)	Faassen's Catnip
<i>Penstemon pinifolius</i> (L-M)	Pineleaf Penstemon
<i>Penstemon strictus</i> (L-M)	Rocky Mountain Penstemon
<i>Perovskia atriplicifolia</i> (VL-L)	Russian Sage
<i>Phlomis russeliana</i> (M+/-)	Russel Phlomis
<i>Phlox subulata</i> (M+/-)	Moss Phlox
<i>Salvia azurea</i> var. <i>grandiflora</i> (L-M)	Pitcher Sage
<i>Salvia officinalis</i> (L-M)	Cooking Sage
<i>Santolina chamaecyparissus</i> (VL-M)	Santolina
<i>Saponaria ocymoides</i> (L-M-H)	Soapwort
<i>Scabiosa ochroleuca</i> (L-M)	Yellow Pincushion Flower
<i>Silene laciniata</i> (M+/-)	Mexican Campion
<i>Tanacetum niveum</i> (L-M)	Silver Tansy
<i>Zauschneria arizonica</i> * (L-M)	Arizona Zauschneria
<i>Zinnia grandiflora</i> (VL-L)	Prairie Zinnia

Criteria for selecting plants in this list:

- Deer resistant (exceptions are noted on the alphabetical list with *)
- Low water requirements (like Buffalograss turf, or as noted)
- Long-lived
- Complementary bloom times
- Showy from a distance

From Las Vegas Valley Water District Website

http://www.lvwwd.com/html/news_watering_spring.html

Spring watering limited to 3 assigned days

In March and April, sprinkler irrigation is limited to three assigned days per week.

Drip irrigation also is limited to three days per week, but you can choose which days to operate drip systems. For more information, see the [drought watering schedule](#).

When to water

Groups A, C and E water on Monday, Wednesday and Friday.
Groups B, D and F water on Tuesday, Thursday and Saturday.

Sunday is not an optional watering day under current [Drought Alert](#) status.

Water before sunrise in warmer weather to minimize water lost to evaporation. Turn off your sprinklers on windy or rainy days.

How long to water grass

To ensure the water seeps into the ground, use the cycle and soak method for sprinklers:

- 3 cycles per watering station set one hour apart
- 4 minutes each watering

This allows your landscape to absorb more water and prevents runoff. See the Southern Nevada Water Authority [cycle and soak demonstration](#) for details.

How long to water plants

Run drip irrigation in one long cycle from 12 minutes to 2 hours. The drip watering time depends on the plant and the type of emitter. See our [drip watering tips](#) for more information.

Maintain your irrigation system

Avoid water waste by checking the heads of your pop-ups and drip emitters after each mowing. Make sure they're intact and pointing in the right direction. If needed, replace with the same brand of heads used on the rest of the system.

[Aerate](#) grass and areas around shrubs and plants. After aerating, apply a balanced fertilizer sparingly and don't over water.

Spring forward for daylight-saving time

Daylight-saving time begins April 3. Don't forget to set your irrigation clock ahead an hour. This also is a great time to check your clock's batteries.

Call 822-8571 if you need a 30-day watering exemption to apply extra water to a newly-seeded or sodded area. The Water District allows one exemption per calendar year.

Check out SNWA information

Visit the Southern Nevada Water Authority (SNWA) Web site, snwa.com, for more information:

- [Irrigation tips and videos](#)
- [Conservation House](#)
- [Gardens around the valley](#)
- [Landscape Designs](#)
- [Landscape Tips](#)
- [Turf Tips](#)
- [Water Smart Landscapes rebate](#)

Watering Group	Spring / Fall March - April / September - October
A	Monday, Wednesday, Friday
B	Tuesday, Thursday, Saturday
C	Monday, Wednesday, Friday
D	Tuesday, Thursday, Saturday
E	Monday, Wednesday, Friday
F	Tuesday, Thursday, Saturday

Related Topics

[Drought Watering Schedule](#)
[Drip Watering Tips](#)
[Spring Plant Selection Tips](#)
[Water Waste Policies](#)

From United Water (Boise) Website
<http://www.unitedwater.com/uwid/consrvid.htm>

Water Efficient Landscaping Classes

Free classes on Water Efficient Landscaping will be offered February through March 2005. United Water Idaho partners with the University of Idaho, Ada County Cooperative Extension System and the City of Boise for this program. Local landscape professionals, horticulturists, master composters and gardeners donate their time to help United Water Idaho educate area residents about enhancing the beauty of their landscapes, while becoming more efficient with their water usage.

View our flyer on landscaping [classes](#).

Class Schedule:

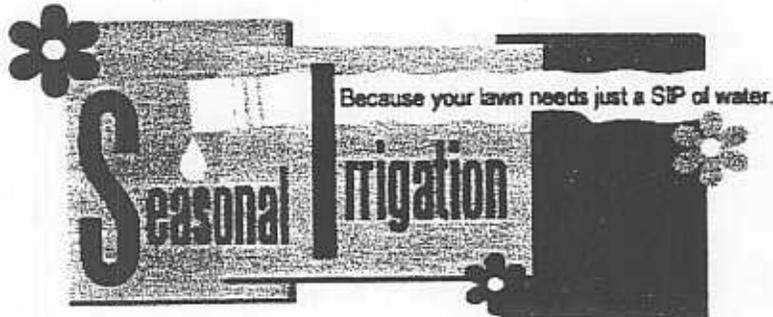
Location: Boise City Public Library (715 S. Capitol Blvd.)
Time: 6:00 p.m. to 8:00 p.m.

Date:	Class Title
Feb. 16	Improving Your Soil
Feb. 23	Composting
Mar. 2	Turf Selection and Proper Care
Mar. 9	Appropriate Plant Selection (Annuals, Perennials and Shrubs)
Mar. 16	Appropriate Tree Selection
Mar. 23	Landscape Design and Mulches
Mar. 30	Proper Irrigation and Landscape Maintenance

RESIDENTIAL WATER AUDITS

We offer this complimentary service to any customer concerned about high water use, and high water bills, during summer months. Outdoor components of the audit determine sprinkler zone efficiency, root depth and soil type, residential meter leaks, and water pressure. Indoor components include a free kit which contains low-flow showerheads, toilet dams, leak detection dye tablets, and faucet aerators. For more information on our residential water audit program, please send a note to uwid@unitedwater.com.

From San Antonio Water System Website
<http://www.saws.org/conservation/SIP/>



The amount of water your lawn needs is probably less than you think. But how do you know how much it takes to keep it healthy? Just follow the "Seasonal Irrigation Program" or SIP advice each week.

The weekly SIP of water for your lawn is based on a concept called "Evapotranspiration" or "ET" for short. It's a way of measuring the amount of moisture a plant loses through its leaves and soil. This measurement determines how much water a plant actually needs to thrive. It is calculated from weather data each day and adjusted for your type of grass and sun exposure.

The ET/SIP concept has been tested in San Antonio for five years and has been proven to save water and money for participants. In fact, the average homeowner saves over 5,000 gallons or about \$15 a month.

SIP advice is available many ways. It is printed each Saturday in the Home & Garden section of the San Antonio Express-News. A telephone hotline, (210) 281-1478, provides a recording with SIP advice every day. Or, you can even [register online](#) to receive a [weekly e-mail or phone message](#) with SIP advice personalized for your grass type, sun exposure and watering day.

To request a free SIP workshop for your neighborhood, contact SAWS Conservation at conserve@saws.org or (210) 704-7479.

The Seasonal Irrigation Program is brought to you through a partnership between San Antonio Water System and the Texas Cooperative Extension.



Ready to Get Started?

To sign up for our weekly SIP e-mails, [click here.](#)

Already signed up? Log in here!

User Name:

Password:

Enter

From City of Seattle Public Utilities Website

http://www.seattle.gov/util/Services/Water/For_Commercial_Customers/WATERCONS_200311261707523.asp

Commercial Customers Water Conservation Rebates and Technical Assistance

Water Smart Technology Program

Water Smart Technology is a water conservation program for regional commercial, industrial and institutional customers, brought to you by local water providers in the Saving Water Partnership, including Seattle Public Utilities. You can receive financial assistance for both technical studies and project installation that makes it cost effective for your business to realize the benefits of water efficient technologies. Enhance productivity and see substantial savings on your utility bills!

Eligibility

All commercial, industrial and institutional customers of the Saving Water Partnership may apply for the Water Smart Technology Program.

Financial Incentives

Water Smart Technology offers an array of financial incentives for qualified water conservation projects completed by small and large businesses alike. These incentives will often reduce participant paybacks from over 3 or more years, down to a very manageable 1 to 2 years, or less. There are opportunities in a variety of business sectors such as hospitality, medical facilities, schools and other institutions, manufacturing, recreation, and many more. A partial list of available incentives includes:

- Replace water-cooled commercial ice machines with air-cooled – rebates from \$200 up to a maximum of \$1,000 depending on size of existing machine.
- Commercial coin-op laundromats – \$250 per qualifying machine.
- Replacement toilets and urinals – \$60 to \$120 per fixture
- All cost-effective projects including cooling, refrigeration, process water, commercial laundry, vehicle washing, and other unique water use technologies – up to 50% of the project cost.
- Large commercial and multifamily irrigation systems – up to 50% of the

Additional Benefits and Services

You can also take advantage of the following conservation services:

- Technical information on water efficient technologies
- Bill analysis
- On-site water audits
- Life cycle cost analysis
- Free brochures and speaking engagements on water conservation
- Water efficient irrigation information
- End-use metering

Contact information

For more information, or take advantage of these incentives, contact:

Philip Paschke

Water Smart Technology Program Manager

(206) 684-5883

phil.paschke@seattle.gov

Related links

[Water Smart Technology Application Form \(PDF File\)](#)

[Water Efficient Irrigation Audits and Financial Assistance](#)

Links to other sites

[Saving Water Partnership participating utilities](#)

[Puget Sound Energy conservation](#)

[Seattle City Light conservation](#)

[Resource Venture conservation assistance for businesses](#)

From Denver Water Website

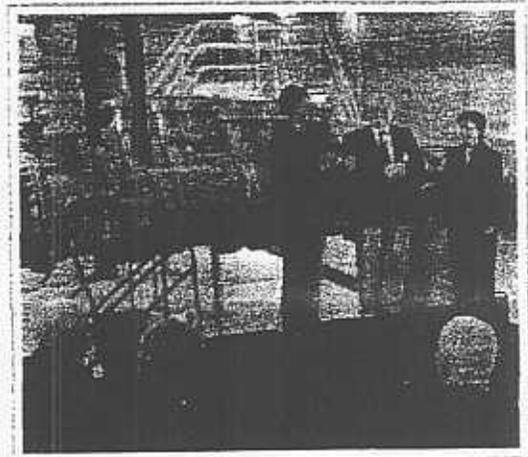
<http://www.water.denver.co.gov/>

Grand Opening of Denver's Water Recycling Treatment Plant April 15, 2004

Denver Mayor John Hickenlooper called Denver Water's new recycling treatment plant an example of cooperation among city agencies and good planning by Denver Water when he spoke Thursday, April 15, at the grand opening of the plant. The mayor also joined President Denise Maes of the Denver Board of Water Commissioners and Water Board Manager Chips Barry in turning the valve to officially inaugurate the new plant.

David Wilks, President of Energy Supply for Xcel Energy, accepted a plaque recognizing Xcel as Denver Water's largest and first customer for its recycled water system. Xcel uses the water for cooling in its power plant.

Following ceremonies at the plant, officials from Denver Water, the city, Denver Parks and the Denver Public school buses rode in buses behind a flat bed truck carrying a stack of the purple pipe that Denver Water is laying over an 18-mile course to deliver the recycled water. At the first stop at Bruce Randolph Middle School, the mayor presented eighth grade students with awards for their science projects they created as part of their study of water. The caravan also visited City Park Golf Course and the Zoo, all locations where the recycled water will be used for irrigation.



Recycled Water System Fall 2004 Newsletter Volume 1

At the end of each irrigation season, Denver Water will send a newsletter to recycled water customers and other interested parties. The Recycling Plant and distribution system have been on line since April 1, 2004. From the start-up through the irrigation season, approximately 1,344 MG (million gallons) or 1,344,000,000 gallons of recycled water have been delivered to recycled water customers. We appreciate your cooperation during this initial year of service. We realize you may have been inconvenienced as various Denver Water staff and consultants visited customers numerous times during the irrigation season.

The majority of this newsletter focuses on irrigation customers; however, information useful to industrial customers is included as well. Denver Water realizes that industrial customers will have unique questions and issues regarding use of recycled water. Denver Water is committed to gather and provide data needed by customers to determine the suitability of recycled water for their operations. If after reading this newsletter you still have unanswered questions, please contact community relations and we will get the answers for you.



Don't Drink From the Sprinklers!
We use nonpotable recycled water for irrigation.

¡No tome de los rociadores!
Utilizamos agua no potable reciclada para irrigación.



DENVER WATER



**DENVER WATER
RECYCLED WATER SYSTEM**



Phosphorus Reduction Tips at a Glance



Prevention First. Here are some quick tips for selecting phosphorus reduction strategies for business users—commercial, industrial and institutional operations, your wastewater treatment facility (WWTF), residential or domestic sources and the drinking water treatment plant that prevent or minimize phosphorus releases.

Phosphorus contributors

All business users— commercial, industrial and institutional

Including agricultural co-ops, car/truck washing facilities, dairies, food processing plants, meat packing and locker plants, metal finishing facilities, municipal water treatment plants that add phosphorus to drinking water, nursing homes, restaurants, schools and other businesses or institutions with phosphorus sources.

Tips to reduce phosphorus

Cleaning & sanitizing

- Establish purchasing criteria for cleaning products
- Use low or non-phosphorus cleaners and detergents
- Use proper concentrations of cleaners and detergents
- Use cleaners and detergents as directed by manufacturer
- Do not accept sample cleaners from vendors

MnTAP fact sheet: Phosphorus: Reducing Releases from Industrial Cleaning and Sanitizing Operations #11

Industrial / metal finisher

Metal preparation, finishing & painting

- Evaluate low- and non-phosphorus systems
- Reuse water where it will enhance cleaning
- Maintain proper levels of phosphate in the bath
- Keep process solutions in their tanks by reducing carryover
- Use deionized reverse osmosis water for process baths and rinses
- Ensure all process controls are properly set, calibrated and maintained
- Keep spray nozzles cleaned and maintained

MnTAP fact sheet: Metal Phosphatizing Operations #64

Industrial / food processor

Including dairies, meat packing and locker plants.

Food processing

- Keep food by-products off the floor and out of drains
- Use dry cleanup practices prior to wet cleaning
- Reduce spills, leaks and tank overflows
- Use an automatic clean-in-place (CIP) system
- Reuse food by-products for animal feed, composting or landspreading

MnTAP fact sheets: Phosphorus: Reducing Releases from Dairy Operations #116

Phosphorus: Reducing Releases from Meat Packing Operations #118

Phosphorus: Reducing Releases from Poultry Processing Plants #71

Phosphorus contributors

Tips to reduce phosphorus

Your WWTF

- Improve phosphorus removal using biological or chemical treatment methods.

Domestic

- Institute environmentally preferable purchasing in your household. Find sources for low- or non-phosphorus dishwashing liquids and soaps.
- Use laundry detergent purchased in Minnesota or other states in which only low- and non-phosphorus detergent is sold.

Prevent phosphorus from entering storm sewers

- Wash the car on the lawn to prevent phosphorus-laden rinse water from running into stormwater sewers.
- Collect organic material (leaves, grass clippings, etc.) from street drains and gutters. Check fall leaf pick up dates to take advantage of composting services.
- Use phosphorus-free lawn fertilizer.
- Restore natural shoreland or streambank habitat to prevent phosphorus-laden runoff from entering surface water.
- Use lawn mowers that chop up grass clippings and leave them on the lawn. These mulching mowers reduce the need for fertilizers.

Drinking water treatment plant

- Optimize the addition of phosphorus to the drinking water supply. This prevents pipe corrosion.

Water conservation

Reducing effluent flows from businesses may reveal hidden phosphorus concentrations.

Businesses

- Monitor water use to establish a baseline
- Continue monitoring to raise employee awareness about conserving water
- Implement a training program to show employees how to use water efficiently
- Use pressure gauges and control valves on any mist spray rinse
- Use adjustable/low pressure nozzles
- Use smaller size nozzles
- Angle and space nozzles to maximize the contact of the water's spray
- Use solenoid valves to stop the flow of water when production stops
- Implement programs to stop water flow during non-production times

- Repair leaks in hoses and nozzles
- Implement a preventive maintenance plan
- Use flow meters to identify causes of high water use
- Modify drain zones to return more solution to previous stages
- If your company has different operating divisions, consider charging water use back to each division, this can create financial responsibility and will maximize water use and efficiency

MnTAP fact sheet: Water Use Tips #119

Domestic

- Install low flow showerheads and flush toilets
- Redirect groundwater sump pump discharge from laundry sinks to lawns or the storm sewer



Phosphorus: Reducing Releases from Industrial Cleaning and Sanitizing Operations

Minnesota Technical Assistance Program ■ FACT SHEET

Minnesota's waters must be clean and healthy in order to sustain aquatic life and provide recreational use. Although phosphorus is a nutrient for plant growth, excess phosphorus can speed up the aging process of lakes and streams by stimulating algae growth. This creates high biochemical oxygen demand (BOD) as algae decomposes and uses up available oxygen supplies, sometimes threatening the survival of fish and other aquatic organisms.

The Minnesota Pollution Control Agency (MPCA) is working to establish effluent phosphorus limits and phosphorus monitoring requirements for municipal wastewater treatment facilities. These treatment facilities are asking their industrial users to reduce phosphorus in discharges to the treatment plant.

Housekeeping, janitorial operations, and process cleaning or sanitizing can be sources of significant amounts of phosphorus released to wastewater treatment plants. Many traditional cleaning chemicals use phosphorus components, like phosphoric acid or trisodium phosphate, as active ingredients for effective cleaning. Alternative low- and non-phosphorus cleaners are effective and available.

Alternative Cleaners

Compared to traditional phosphorus cleaners low- and non-phosphorus cleaners are as effective and are comparable in cost. Alternative cleaners are available to meet a wide variety of industrial cleaning needs. Ask your chemical supplier for more information about changing cleaning chemicals. A sample list of low-phosphorus cleaning chemical suppliers is included at the end of this fact sheet.

Gain control over what chemicals are purchased and used at your facility by establishing purchasing criteria for cleaning chemicals. For example, look for products that are biodegradable and non-toxic to both humans and aquatic life. Choose products with a phosphate concentration of 0.5 percent by weight or less.

Coordinating purchases between departments or process areas can help avoid duplication and excess inventory. Reducing the overall number of chemicals at your facility generally cuts the amount of chemicals containing phosphorus. To help minimize the number of different products in your inventory, purchase low- or non-phosphorus cleaners and cleaners that can be used for a variety of cleaning applications.

Another easy way to control your inventory is by not accepting sample cleaners from suppliers. Samples can present disposal problems because they may contain components that you do not want to discharge in your wastewater, like phosphorus.

Federal-Mogul Corporation

Federal-Mogul in Lake City, Minnesota, manufactures diesel and compressor pistons and cylinder sleeves. MnTAP funded a student intern at the company to identify sources of phosphorus in its manufacturing plant and to develop a strategy for reducing the quantity ending up in the wastewater. The two sources of phosphorus were a phosphate coating process and plant maintenance cleaning chemicals.

Sources of phosphorus were found in cleaners used throughout the plant in diverse areas. Office and janitorial cleaners, including floor cleaners used plant-wide, contained phosphate. Non-phosphate replacements were available in all areas to eliminate the phosphate releases to the sanitary sewer. The intern worked with existing vendors to move to non-phosphate cleaners.

During the student's time at the company, all cleaning chemicals were switched to non-phosphorus containing materials. The substitutes performed as well as, or better than, the conventional phosphorus containing materials.

With these changes, Federal Mogul reduced cleaner use by two 55-gallon barrels per year and saved \$1,000.

Clean-in-Place Systems

A clean-in-place (CIP) system eliminates the need to dismantle equipment for cleaning and can help you carefully control water and chemical use at your facility. Many production facilities manually run CIP systems, but fully automated CIPs are more consistent than manual operations and are typically more effective. Using final CIP rinses as the pre-rinse for the next cleaning cycle can cut the amount of wastewater generated.

Bongards Creameries

Bongards Creameries, a producer of dairy products in Norwood, Minnesota, began looking for ways to reduce phosphorus in 1992. The primary source of phosphorus at Bongards was the whey evaporator. Housekeeping and transfer and cleaning operations were additional sources.

Phosphorus was reduced by implementing dry cleanup before wet spray cleanup. Spills were reduced to minimize phosphorus from cleaning solutions. CIP recovery systems that automatically reused rinses were installed. Level sensors were installed to keep tanks from overflowing. Extra dairy product was recovered during vat cleanup.

Bongards reduced the total phosphorus loading to its treatment ponds by 40 percent—from 150 pounds per day in 1991 to 90 pounds per day in 1999.

Low-phosphorus Cleaning Chemical Suppliers

MnTAP maintains the following list of low-phosphorus cleaning chemical suppliers solely as a service to Minnesota companies. This is not a complete list of suppliers and does not represent an endorsement by MnTAP. MnTAP, by providing this list, does not guarantee that products or services do or do not comply with environmental and safety laws in any specific application.

Anderson Chemical Company
Litchfield, MN
Marlene Williams
320/693-2477
andersonchemco.com

Chaska Chemical Company
Savage, MN
Sean Teske
952/890-1820

Ecolab
St. Paul, MN
Jim Paul (food and beverages)
800/392-3392
Allen Feyen (institutional)
800/352-5326
www.ecolab.com

Troy Chemical
St. Paul, MN
James Henningsen
651/787-0717
www.troychemical.com

Unilever
Faribault, MN
Rick Orban
507/383-5749

West Agro, Industrial Group
Kansas City, MO
Curt Thomas
816/891-1600
www.westagro.com

For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution and reduce costs. Our information resources are available online at <mntap.umn.edu>. Or, call MnTAP at 612/624-1300 or 800/247-0015 from greater Minnesota for personal assistance.

Reducing Phosphorus Discharge and Water Use

Minnesota's waters must be clean and healthy in order to sustain aquatic life and provide recreational use. Although phosphorus is a nutrient for plant growth, excess phosphorus can speed up the aging process of lakes and streams by stimulating algae growth. This creates high biochemical oxygen demand (BOD) as algae decomposes and uses up available oxygen supplies, sometimes threatening the survival of fish and other aquatic organisms.

The Minnesota Pollution Control Agency (MPCA) is working to establish effluent phosphorus limits and phosphorus monitoring requirements for municipal wastewater treatment facilities. These facilities are asking their industrial users to reduce phosphorus in discharges to the treatment plant.

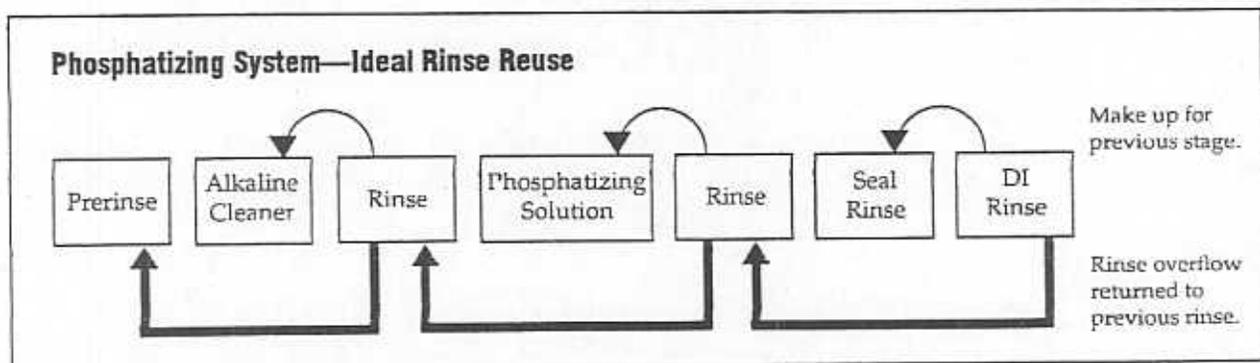
Metal phosphatizing operations are a large industrial source of phosphorus in wastewater. When companies minimize phosphorus discharge from these operations they save by reducing chemical and water use.

Phosphatizing helps prevent corrosion and prepares the metal surface for improved paint adhesion. Less

commonly, phosphatizing is used to improve the lubrication, or slipperiness, of part surfaces. The phosphatizing process can vary widely. For larger, low-volume products that do not require a high degree of corrosion resistance or adhesion a one-stage cleaner/phosphatizer, applied with a spray wand, is commonly used. Large, automated seven-stage conveyorized systems are used for high volume component manufacturing and to meet the highest surface property specifications. Three, five and six-stage systems are also common. A typical five-stage phosphatizing system starts with alkaline cleaning then goes through a rinse, phosphatizing solution, another rinse and finally a seal rinse.

Ideal Rinse Reuse

Many phosphatizing operations were built when water and wastewater disposal costs were low. But, costs have risen and now an ideal system maximizes rinse reuse to minimize chemical and water loss (see diagram below). Overflow from the rinses can be used as make up for evaporation and for dragout losses from the previous static chemical bath, and as a cascade rinse for the previous rinse stage. For a medium-sized five-stage phosphatizing system, a five gallon per minute (gpm) rinse flow—600,000 gallons per year for one shift—is typical. A greater flow rate may indicate an opportunity to decrease water use.



Modify an existing system. The following changes may have the greatest benefits:

1. Reuse water where it will enhance the quality of cleaning. Reuse deionized (DI) water first to maximize the benefit of its purity and because of its cost (see Rochester Powder Coating, page 3). DI effluent from a single stage rinse will generally be cleaner (less dissolved solids) than fresh city water.
2. Cascade the rinses where the overflow volumes are greatest (i.e., greater than five gpm). Cascading the phosphatizing rinse back to the cleaning rinse can cut the rinse flow in half. And, the acidic phosphate chemical that is returned with the rinse neutralizes the alkaline cleaning carryover that would otherwise degrade the phosphate chemistry. No new contaminants are introduced.
3. Use overflow from the subsequent stage as make up for heated tanks because heated tanks lose the most volume to evaporation.
4. Add a prerinse before the cleaner stage to loosen and remove soils. This keeps a significant amount of soils out of the system, making the cleaning stage more effective. Reuse water by cascading overflow from the cleaning rinse to the prerinse.

Water and Chemical Use Reduction Tips

Phosphorus alternatives. Research on substitutes for phosphatizing compounds is ongoing. A few options are currently available. A number of phosphatizing chemistry vendors have developed sophisticated seal rinses (microprimers) that eliminate the iron phosphatizing step while providing equal corrosion protection and adhesion. Phosphoric acid in the phosphatizing step also maintains a specific pH. This function can be accomplished by other acids to lower the phosphorus concentration of this stage. Talk to your supplier about these possibilities. If improved paint adhesion to aluminum substrates is the goal, Sol-Gel processes¹ and abrasive blasting procedures² are available.

Also, a one-stage, no-rinse process for small to medium scale operations is possible. It incorporates residual surface oils into the coating so excess solution can be captured and reused creating zero-effluent from the process³.

Bath concentrations. Maintain phosphate bath concentrations and chemical metering of wand applicators within the correct operating range, using the chemical supplier's recommendation. If a range

is given, try operating at the low end. This may require greater care by the operators. Lower operating concentrations reduce loading to the rinses, which can lead to reduced flow rates and phosphate losses to effluent.

Reduce carryover. Keep chemistries in their tanks by reducing carryover. Design drain holes in parts where possible and avoid blind holes and recesses. Rack parts for good drainage. Angle them so solutions drain off one point—not an edge—of the part back into the bath.

Design the system with adequate drip time. For dip tank operations, hold parts above the tank to allow the solution to drain back into the tank. Holding parts above the tank for 15 to 30 seconds returns 40 to 50 percent of the dragout into the tank.

Modify drain boards between stages to drain back to the previous stage. Multistage spray systems should have drain zones between stages that provide for similar drain times—15 to 30 seconds minimum. Consider a fine, low-volume mist arc or spray rinse between stages to remove additional carryover.

Use clean water. Consider using DI or reverse osmosis (RO) water for making up chemical baths and possibly for rinses. DI water greatly decreases the dissolved solids present. This lengthens bath life and reduces the volume of chemicals used and discharged. It also cuts scaling in heated tanks and the volume of sludge generated by treatment of wastewaters.

Automated systems. Ensure all process controls are properly set (i.e., speed, chemical additions) and that they are periodically calibrated and maintained. Conductivity controls are particularly sensitive—consider using inductive conductivity sensors to reduce maintenance requirements. Quality parts are not an indicator of good system control. Poorly maintained control systems can create quality products by overusing water and chemicals. Frequency of bath turnover may be a better indicator.

Water flow. Measure and control water flow. Flow meters give a quick indicator of water overuse and malfunctions that can lead to overuse. Metering valves can be used with flow meters to control flow rates. In the absence of flow meters, use flow restrictors to control flow. Avoid using ball valves in water lines unless a wide open flow is desired. Small

changes in ball valve position can result in large changes in the water flow rate. Although cheap, they are only appropriate as on/off valves.

Filter baths. Filter baths remove solids that could build up in the tank or clog nozzles. Skim oil off the alkaline cleaning tank to lengthen the bath life.

Spray nozzles. Clean spray nozzles. Plugged nozzles can cause areas of the parts to be poorly cleaned or coated. A common response to quality failures is to increase the flow and frequency of bath changes when merely cleaning the nozzle could ensure that the solution cleans the parts. Properly position nozzles for an ideal spray pattern to ensure the solution cleans the parts.

Procedures. Train employees on proper operation of the phosphatizing system. Conduct daily inspections to look for tank leaks, valve leaks, evidence of controller malfunctions and plugged nozzles.

Rochester Powder Coating

Reducing Phosphorus Discharge

Rochester Powder Coating (RPC) in Rochester is a job shop that paints sheet metal parts using powder coating. Prior to painting, the sheet metal goes through a phosphatizing line. By embracing pollution prevention practices, RPC reduced its phosphorus discharge by 98 percent over two years.

In October 1995, discharge from the RPC phosphatizing system was 410 milligrams per liter (mg/L) going into the City of Rochester's sewer system. With impending phosphorus limits, RPC and the City of Rochester began to look for ways to reduce this phosphorus discharge. RPC implemented an aggressive approach to maximize the use of

phosphate instead of discharging it. First, RPC began to monitor solution content every two hours. This ensured that the concentration was within the proper operating range. They also added more-efficient spray nozzles to the phosphating risers to improve solution contact with parts.

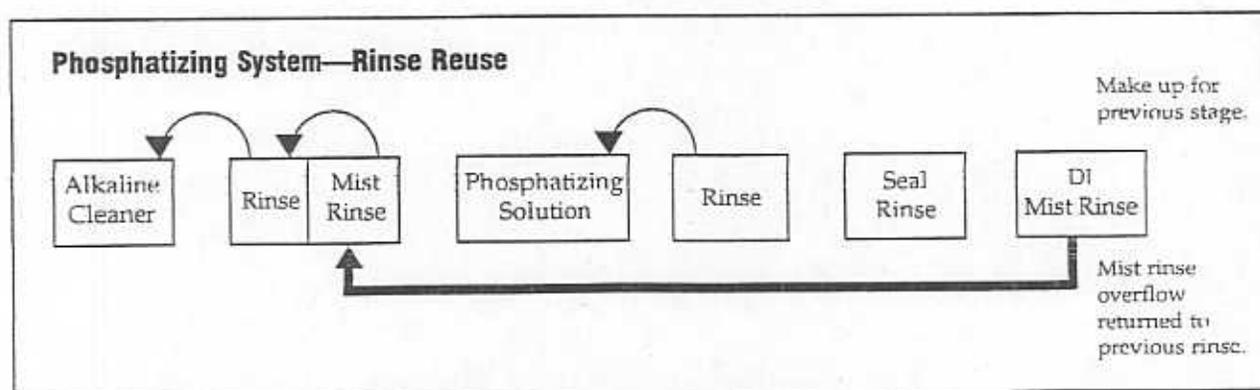
In 1995, RPC installed a five-stage cleaning/ phosphatizing system. The system had a partial rinse return to the phosphating bath to prevent loss of phosphorus. Along with installing this system, RPC instituted rigorous monitoring, maintenance and worker training. In 1997, a sixth stage, DI rinse was added to enhance corrosion resistance and recycle phosphate rinse solution for reuse in the mist rinse just prior to phosphatizing. This provided cleaner parts going into phosphatizing. Although RPC increased its production and increased discharge by 30 percent, phosphorus discharge concentrations were lowered to eight mg/L.

Federal-Mogul Corporation

Identifying Phosphorus Sources

MnTAP funded a student intern at Federal Mogul, Lake City, a manufacturer of diesel and compressor pistons and cylinder sleeves, to identify the sources of phosphorus in its manufacturing plant and to determine a strategy for reducing the quantity ending up in the wastewater. The two main sources of phosphorus were a phosphate coating process (96 percent) and plant maintenance cleaning chemicals (four percent).

During the student's time at the company, all of the cleaning chemicals were switched over to non-phosphorus containing materials. The substitutes performed as well as or better than the conventional phosphorus containing materials.



System layout used by Rochester Powder Coating in 1999.

Changes to the phosphatizing line were suggested. They included typical actions like dragout reduction, fog-like rinsing and counter current flow in tanks. Procedures also were recommended for more routine and careful maintenance of the baths to minimize chemical use and disposal, and to ensure that the proper coating quality was achieved. Approximately 50 percent of the total phosphorus from the process could be reduced with the above changes.

Hoffman Engineering Company

Reducing Water Use

Hoffman Engineering Company, a manufacturer of metal and composite enclosures in Anoka, reduced water use in a painting pretreatment process with the help of a MnTAP intern. Three of the four stages in the pretreatment washer were modified to conserve water. These changes resulted in an estimated savings of \$32,000 and 3.5 million gallons of water annually. Savings from decreased chemical use were not calculated.

Installing flow meters, automated conductivity meters and control valves, Hoffman gained better control of bath concentrations and rinses. These changes helped identify leaks and malfunctions as well as decreased the loss of bath chemicals. Drain zones also were modified to return more solution to each respective preceding stage.

Treating Phosphorus Discharges

Once phosphorus reduction efforts are put in place, facilities may still need to lower phosphorous concentration in their wastewater. They can be lowered by precipitating phosphorous with ferric chloride, lime or alum. Ferric chloride is generally the most efficient precipitant. The amount of precipitant needed will vary with local water chemistry and the phosphatizing chemicals used. But, adding 20 mg/L of ferric chloride and a 40 minute residence time in the settling tank are reasonable starting points in trying to reach a phosphorous concentration of less than two mg/L.

Regulations

Categorical discharge permits. Facilities that perform metal phosphatizing are subject to the U.S. Environmental Protection Agency's metal finishing standard that limits the concentration of seven metals, cyanide and total toxic organics (TTO) in waters that are sewered. For more information contact the MPCA's Water Quality Pretreatment Division at 651/296-6300 or 800/657-3864. Large municipal wastewater treatment facilities also deal with this regulation for industrial facilities in their areas.

Hazardous waste sludge. If wastewaters from aluminum phosphatizing operations are treated and a sludge is produced, that sludge is a listed hazardous waste [F019] and must be managed as one.

For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution and reduce costs. Our information resources are available online at <mntap.umn.edu>. Or, call MnTAP at 612/624-1300 or 800/247-0015 from greater Minnesota for personal assistance.

References

1. Zheng, Haixing. "An Alternative to Anodization: Sol-Gel Solutions for Metal Finishing." *Metal Finishing*, December 1998, 35.
2. Ault, Peter J. and Mike Starks. "Abrasive Blasting as an Alternative to Chromate Conversion Coating on 5086 Series Aluminum." *Metal Finishing*, July 1999, 30-33.
3. Carpenter, Scott. "One-Step, Zero-Effluent Organic Phosphating." *Metal Finishing*, September 1999, 56-60.

*Dishwasher
SOP*

RESOLUTION 23-05

PHOSPHORUS FREE DISHWASHER DETERGENT

Whereas; the Liberty Lake Sewer and Water District operates a wastewater treatment plant that discharges to the Spokane River; and

Whereas; it is known that phosphorus is a leading cause of nutrient loading to rivers, streams and lakes leading to decrease dissolved oxygen in water bodies; and

Whereas; there is an ongoing study of the Spokane River to reduce phosphorus in the river; and

Whereas; the District is upgrading its wastewater treatment plant to further reduce phosphorus discharges to the Spokane River; and

Whereas; research Nationally has shown that phosphorus in dishwasher detergent is a major source of phosphorus to wastewater treatment plants.

Whereas; the Liberty Lake Sewer and Water District pass resolution 40-89 in 1989 which prohibited the discharge of laundry detergent containing phosphorus resulting in a reduction of phosphorus to the wastewater treatment plant.

Now Therefore, be it Resolved: that the Liberty Lake Sewer and Water District requests that all it's customers discontinue use of dishwasher detergent containing phosphorus.

Dated this 20 day of July, 2005

Liberty Lake Sewer and Water District

Tom Agnew, President

Harley Halverson, Secretary

Frank L. Boyle, Commissioner

SEAL

Lee Mellish, Manager

ORDINANCE NO. _____

AN ORDINANCE PROHIBITING THE USE, DISTRIBUTION FOR SALE AND SALE OF DISHWASHING DETERGENTS CONTAINING MORE THAN TRACE AMOUNTS OF PHOSPHORUS IN THE CITY OF SPOKANE, AMENDING SPOKANE MUNICIPAL CODE TITLE 13, CHAPTER 3.

PURPOSE: The Spokane City Council finds that the Spokane River is a natural asset that enhances the environmental, recreational, cultural and economic resources of the area and contributes to the general health and welfare of the public. The Council further finds that regulating the amount of nutrients and pollutants, including phosphorus contained in dishwashing detergents, entering the Spokane River will improve water quality and reduce wastewater treatment costs.

WHEREAS, the City of Spokane operates a wastewater treatment plant that discharges to the Spokane River; and

WHEREAS, portions of the Spokane River and Lake Spokane are currently listed as critically impaired under the Clean Water Act for dissolved oxygen (DO). Adequate concentrations of DO are critical for supporting fish, invertebrates and other aquatic life; and

WHEREAS, wastewater discharges carry pollutants such as phosphorus into the river that lower DO; and

WHEREAS, the Department of Ecology is developing a clean-up plan to reduce phosphorus loading to the Spokane River and Lake Spokane; and

WHEREAS, the increased phosphorus and decreased dissolved oxygen in the Spokane River and Lake Spokane impact the City's ability to meet state and federal water quality standards; and

WHEREAS, phosphorus comes from commercial fertilizers and a variety of other sources including dishwashing detergents; and

WHEREAS, removing this phosphorus from the treatment plant's influent decreases the costs of treating municipal wastewater; and

WHEREAS, reducing phosphorus loading in the Spokane River will improve the water quality by increasing dissolved oxygen levels; and

WHEREAS, the 1989 regional ban prohibiting the discharge of laundry detergent containing phosphorus resulted in a 21-32% reduction of phosphorus effluent concentrations from the municipal wastewater dischargers in the Spokane River; and

WHEREAS, research Nationally has shown that phosphorus in dishwasher detergent is a major source of phosphorus to wastewater treatment plants; and

WHEREAS, prohibiting phosphorus-containing dishwashing detergent eliminates one source of phosphorus in the Spokane River and Lake Spokane; and

WHEREAS, Article XI, Section 11 of the State Constitution authorizes the City to exercise its police power to protect the public health and safety by restricting the sale and use of dishwashing detergents containing phosphorus.

NOW THEREFORE, THE CITY OF SPOKANE DOES ORDINANCE:

Section 1. That the following sections are added to SMC Chapter 13.03, Article I, Definitions. All other definitions in the section remain unchanged.

13.03.0231 - "Dishwashing detergent" means a cleaning agent sold, used, or manufactured for the purpose of cleaning dishes, whether by hand or by household machine. (RCW 70.95L.010).

Section 2. That the following sections are added to SMC Chapter 13.03, Article III, General Requirements.

Article III – General Requirements

13.03.0334 *Restrictions on the Sale, Distribution for Sale, and Use of Phosphorus Containing Dishwasher Detergent.*

- A. Effective _____, it shall be unlawful for any person within the City to sell, distribute for sale, or use a dishwashing detergent that contains more than a trace of phosphorus or any other compound containing phosphorus such as phosphates.
- B. Effective _____, no person shall sell, offer or expose for sale, give or furnish any dishwashing detergent in the City unless the container, wrapper or other packaging thereof shall be clearly labeled with respect to its phosphorus ingredient content clearly and legibly set forth thereon in terms of percentage of phosphorus by weight, expressed as elemental phosphorus per container, wrapper or other packaging thereof, as well as grams of phosphorus, expressed as elemental phosphorus per recommended use level.
- C. Any person found guilty of violating this provision, except when otherwise specifically provided, shall be fined not more than three hundred dollars (\$300.00) for the first offense, and not more than five hundred dollars (\$500.00) for the second and each subsequent offense, in any 180-day period. A separate and distinct offense shall be regarded as committed each day on which such person shall continue or permit any such violation is permitted to exist after notification thereof.
- D. Violations of this ordinance will be enforced pursuant to Chapter 01.05, SMC.
- E. Severability clause. If any section, provision or portion of this ordinance is ruled invalid by a court, the remainder of the ordinance shall not for that reason be rendered ineffective or invalid.

PASSED by the Council this _____ day of _____, 2005.

Council President

APPROVED by me this _____ day of _____, 2005.

Mayor

Attest:

Finance Director

Approved as to form:

Office of the City Attorney

Published: _____

ORDINANCE NO. _____

AN ORDINANCE PROHIBITING THE USE, DISTRIBUTION FOR SALE AND SALE OF ANY CLEANING AGENT CONTAINING MORE THAN TRACE AMOUNTS OF PHOSPHORUS IN THE CITY OF SPOKANE, AMENDING SPOKANE MUNICIPAL CODE TITLE 13, CHAPTER 3.

PURPOSE: The Spokane City Council finds that the Spokane River is a natural asset that enhances the environmental, recreational, cultural, and economic resources of the area and contributes to the general health and welfare of the public. The Council further finds that regulating the amount of nutrients and pollutants, including phosphorus contained in dishwashing detergents, entering the Spokane River will improve water quality and reduce wastewater treatment costs.

WHEREAS, the City of Spokane operates a wastewater treatment plant that discharges to the Spokane River; and

WHEREAS, portions of the Spokane River and Lake Spokane are currently listed as critically impaired under the Clean Water Act for dissolved oxygen (DO). Adequate concentrations of DO are critical for supporting fish, invertebrates, and other aquatic life; and

WHEREAS, wastewater discharges carry pollutants such as phosphorus into the river that lower DO; and

WHEREAS, the Department of Ecology is developing a clean-up plan to reduce phosphorus loading to the Spokane River and Lake Spokane ; and

WHEREAS, the increased phosphorus and decreased dissolved oxygen in the Spokane River and Lake Spokane impact the City's ability to meet state and tribal water quality standards; and

WHEREAS, phosphorus comes from a variety of sources including cleaning agents; and

WHEREAS, many of these other sources are otherwise regulated by federal, state, or local law; and

WHEREAS, removing this phosphorus from the treatment plant's influent decreases the costs of treating municipal wastewater; and

WHEREAS, reducing phosphorus loading in the Spokane River will improve the water quality by increasing dissolved oxygen levels; and

WHEREAS, the 1989 regional ban prohibiting the discharge of laundry detergent containing phosphorus resulted in a 21-32% reduction of phosphorus effluent concentrations from the municipal wastewater dischargers in the Spokane River; and

WHEREAS, research nationally has shown that phosphorus in cleaning agents is a major source of phosphorus to wastewater treatment plants; and

WHEREAS, prohibiting phosphorus-containing cleaning agents eliminates one source of phosphorus in the Spokane River and Lake Spokane; and

WHEREAS, Article XI, Section 11 of the State Constitution authorizes the City to exercise its police power to protect the public health and safety by restricting the use of fertilizers containing phosphorus to the Spokane River.

NOW THEREFORE, THE CITY OF SPOKANE DOES ORDINANCE:

Section 1. That the following section is added to SMC Chapter 13.03, Article I, Definitions. All other definitions in the section remain unchanged.

13.03.0233 - "Cleaning agent" means a laundry detergent, dishwashing compound, household cleaner, metal cleaner or polish, industrial cleaner, or other substance that is used or intended for use for cleaning purposes.

Section 2. That the following sections are added to SMC Chapter 13.03, Article III, General Requirements.

13.03.0336 *Restrictions on the Sale, Distribution for Sale, and Use of Phosphorus Free Cleaning Agents*

- A. Effective _____, it shall be unlawful for any person within the City to sell, distribute for sale or use a cleaning agent that contains more than a trace of phosphorus or any other compound containing phosphorus such as phosphates.
- B. This section shall not apply to cleaning agents which are used:
 - 1. In agricultural or dairy production;
 - 2. To clean commercial food or beverage processing equipment or containers;
 - 3. As industrial sanitizers, metal brighteners, or acid cleaners, including those containing phosphoric acid or trisodium phosphate;
 - 4. In industrial processes for metal, fabric, or fiber cleaning and conditioning;
 - 5. In hospitals, clinics, nursing homes, other health care facilities, or veterinary hospitals or clinics;
 - 6. By a commercial laundry or textile rental service company or any other commercial entity: (i) to provide laundry service to hospitals, clinics, nursing homes, other health care facilities, or veterinary hospitals or clinics; (ii) to clean textile products supplied to industrial or commercial users of the products on a rental basis; or (iii) to clean professional, industrial, or commercial work uniforms;

7. In the manufacture of health care or veterinary supplies;
8. In any medical, biological, chemical, engineering, or other such laboratory, including those associated with any academic or research facility;
9. As water softeners, antiscaling agents, or corrosion inhibitors, where such use is in a closed system such as a boiler, air conditioner, cooling tower, or hot water heating system;
10. To clean hard surfaces including windows, sinks, counters, floors, ovens, food preparation surfaces, and plumbing fixtures.

C. This section shall not apply to cleaning agents which:

1. Contain phosphorus in an amount not exceeding five-tenths of one percent (0.5%) by weight which is incidental to manufacturing;
2. Are manufactured, stored, sold, or distributed for use solely outside the State.

D. Effective _____, any person who sells or distributes for sale any cleaning agent in violation of this section shall be guilty of a Class 3 misdemeanor punishable only by a fine not to exceed fifty dollars (\$50.00).

E. Effective _____, any person who uses any cleaning agent in violation of the provisions of this section shall be responsible for an infraction for which the sanction is a penalty of not more than ten dollars (\$10.00).

F. Violations of this ordinance will be enforced pursuant to SMC Chapter 01.05.

G. Severability clause. If any section, provision or portion of this ordinance is ruled invalid by a court, the remainder of the ordinance shall not for that reason be rendered ineffective or invalid.

PASSED by the Council this _____ day of _____, 2005.

Council President

APPROVED by me this _____ day of _____, 2005.

Mayor

Attest:

Finance Director

Approved as to form:

Office of the City Attorney

Published: _____

ORDINANCE NO. _____

AN ORDINANCE RESTRICTING THE USE, SALE AND APPLICATION OF PHOSPHORUS FERTILIZERS IN THE CITY OF SPOKANE, AMENDING SPOKANE MUNICIPAL CODE TITLE 13, CHAPTER 3.

PURPOSE: The Spokane City Council finds that the Spokane River is a natural asset that enhances the environmental, recreational, cultural, and economic resources of the area and contributes to the general health and welfare of the public. The Council further finds that regulating the amount of nutrients and pollutants, including phosphorus contained in fertilizer, entering the Spokane River will improve water quality and reduce wastewater treatment costs.

WHEREAS, the City of Spokane operates a wastewater treatment plant that discharges to the Spokane River; and

WHEREAS, portions of the Spokane River and Lake Spokane are currently listed as critically impaired under the Clean Water Act for dissolved oxygen (DO). Adequate concentrations of DO are critical for supporting fish, invertebrates and other aquatic life; and

WHEREAS, wastewater discharges and stormwater run-off carry pollutants such as phosphorus into the river that lower DO; and

WHEREAS, the Department of Ecology is developing a clean-up plan to reduce phosphorus loading to the Spokane River and Lake Spokane; and

WHEREAS, the increased phosphorus and decreased dissolved oxygen in the Spokane River and Lake Spokane impact the City's ability to meet state and tribal water quality standards; and

WHEREAS, phosphorus comes from commercial fertilizers and from a variety of other sources including animal waste, malfunctioning septic systems, detergents used for car and boat washing, exposed soil, and industrial uses; and

WHEREAS, many of these sources are otherwise regulated through federal, state and local laws; and

WHEREAS, reducing phosphorus loading in the Spokane River will improve the water quality by increasing dissolved oxygen levels; and

WHEREAS, reducing phosphorus to the treatment plant influent will reduce wastewater treatment costs; and

WHEREAS, the 1989 regional ban prohibiting the discharge of laundry detergent containing phosphorus resulted in a 21-32% reduction of phosphorus effluent concentrations from the municipal wastewater dischargers in the Spokane River; and

WHEREAS, studies from other municipalities have shown a 23 percent reduction in the amount of phosphorus reaching area lakes associated with a ban of fertilizer phosphorus; and

WHEREAS, prohibiting commercial phosphorus-containing fertilizers eliminates one source of phosphorus in the Spokane River and Lake Spokane; and

WHEREAS, Article XI, Section 11 of the State Constitution authorizes the City to exercise its police power to protect the public health and safety by restricting the sale and use of fertilizers containing phosphorus.

NOW THEREFORE, THE CITY OF SPOKANE DOES ORDINANCE:

Section 1. That the following sections are added to SMC Chapter 13.03, Article I, Definitions. All other definitions in the section remain unchanged.

13.03.0217 - "Fertilizer" A substance containing one or more recognized plant nutrients and that is used for its plant nutrient content or that is designated for use or claimed to have value in promoting plant growth, and shall include limes, gypsum, and manipulated animal and vegetable manures. It does not include un-manipulated animal and vegetable manures, organic waste-derived material, and other products exempted by the Washington State Department of Agriculture.

13.03.0219 - "Manipulated" Processed or treated in any manner, including drying to a moisture content less than thirty percent.

13.03.0221 - "Lawn Fertilizer" means any fertilizer, whether distributed by property owner, renter or commercial entity, distributed for nonagricultural use, such as for lawns, golf courses, parks and cemeteries. Lawn fertilizer does not include fertilizer products intended primarily for garden and indoor plant application.

13.03.0225 - "Trace" means less than 0.5% by weight.

13.03.0227 - "Turf" means noncrop land planted in closely mowed, managed grasses including , but not limited to, residential and commercial property, private golf courses, and property owned by federal, state or local units of government, including parks, recreation areas, and public golf courses. Turf does not mean pasture, hay land, hay, turf grown on turf farms, or any other form of agricultural production.

13.03.0229 - "Turf fertilizer" has the same meaning as lawn fertilizer and is interchangeable for the intent and purposes of this chapter.

Section 2. That the following sections are added to SMC Chapter 13.03, Article III, General Requirements.

13.03.0332 Restrictions on the Sale, Application and Use of Fertilizers:

A. Prohibitions, effective _____:

1. It shall be unlawful for any person to apply within the City any lawn and turf fertilizer, liquid or granular, that contains more than a trace of phosphorus or other compound containing phosphorus, such as phosphate.
2. It shall be unlawful for any person to apply or deposit any fertilizer on an impervious surface. If such application occurs, the fertilizer must be immediately contained and either legally applied to turf or any other lawful site, or returned to the original or other appropriate container.
3. It shall be unlawful for a person to apply lawn and turf fertilizer when the ground is frozen or when conditions exist which promote or create runoff.
4. It shall be unlawful for any person to sell or offer for sale any lawn or turf fertilizer within the City that is labeled as containing more than 0% phosphorus, or other compound containing phosphorus, such as phosphate, except such fertilizer may be sold for use as provided in subsection B.
5. It shall be unlawful for any person to display lawn or turf fertilizer containing phosphorus. Signs may be posted advising customers that lawn fertilizer containing phosphorus is available upon request for uses permitted by subsection B.

B. Exemptions. The prohibition against the use of fertilizer under sections A and B above shall not apply to:

1. Newly established turf or lawn areas during their first growing season.
2. Turf or lawn areas that soil tests, performed within the past three years by a state-certified soil testing laboratory, confirm are below phosphorus levels established by the University of Washington Extension Service. The lawn or turf fertilizer application shall not contain an amount of phosphorus exceeding the amount and rate of application recommended in the soil test evaluation.
3. Agricultural uses, vegetable and flower gardens, or application to trees or shrubs.
4. Yard waste compost, biosolids, or other similar materials that are primarily organic in nature and are applied to improve the physical condition of the soil.

C. Requirements. A sign containing the regulations set forth in this ordinance and the effects of phosphorus on the City of Spokane's waters must be prominently displayed where lawn and turf fertilizers are sold.

D. Enforcement and Penalties. Violations of this ordinance will be enforced pursuant to SMC Chapter 01.05.

1. Any person who violates any provisions of this ordinance shall be guilty of a civil offense and may be fined a sum not to exceed \$1000 for each offense. After a notice of violation has been given, each day of site work in conjunction with the notice of violation shall constitute a separate offense.
2. The penalty provided in subsection (a) shall be assessed and may be imposed by a notice in writing either by certified mail with return receipt or by personal service to the person incurring the same. The notice shall include the amount of the penalty imposed and shall describe the violation with reasonable particularity. In appropriate cases, corrective action shall be taken within a specific and reasonable time.
3. Within 20 calendar days after notice is received, the person incurring the penalty may apply in writing to the City for remission or mitigation of such penalty. Upon receipt of the application, the City may remit or mitigate the penalty upon whatever terms the City in its discretion deems proper. The City's final decision on mitigation or revision shall be reviewed by the hearing examiner if the aggrieved party files a written appeal therewith of said decision within 10 calendar days of its issuance.
4. The prosecuting attorney may enforce compliance with this chapter by such injunctive, declaratory or other actions as deemed necessary to ensure that violations are prevented, ceased or abated.

E. Severability clause. If any section, provision or portion of this ordinance is ruled invalid by a court, the remainder of the ordinance shall not for that reason be rendered ineffective or invalid.

PASSED by the Council this _____ day of _____, 2005.

Council President

APPROVED by me this _____ day of _____, 2005.

Mayor

Attest:

Finance Director

Approved as to form:

Office of the City Attorney

Published: _____

Memorandum

To: Ryan Orth, Ross & Associates

From: Len Bramble, Technology Work Group Co-Chair
Lars Hendron, Technology Work Group Co-Chair

Subject: Amended Submittal of Preliminary Information
Spokane River TMDL Collaboration
Technology Work Group

Date: October 21, 2005

The purpose of this memorandum is to modify and amend the memorandum of September 14, 2005 in order to better reflect the various Technology Work Group member's perspectives and inferences that can be drawn from the Technology Work Group's efforts to date, including prior suggestions that the Full Group consider utilizing 50 micrograms per liter for average monthly effluent phosphorus at this time until additional study and investigation is completed.

The Spokane River TMDL Collaboration Steering Work Group and Full Group have requested each Work Group (Wastewater Flows & Loading, Technology, Re-use & Conservation, and Non-Point Source) provide its findings, recommendations, etc as of September 14, 2005. Consistent with that request, within this communication you will find the statistical summary of plant performance data gathered by the Technology Work Group, along with certain specific conditions pertaining to the utilization of this data. Graphics supporting this summary and made a part of this report by reference are attached as well.

The Spokane Collaboration Technology Work Group (TWG) has accumulated a variety of information and data for more than 115 wastewater treatment plants (WWTP) within the US and abroad. Of these 115+ WWTP's, we have thus far been fairly successful at accumulating average monthly total phosphorus effluent data from 43 WWTP's. The TWG stresses that this data accumulation and evaluation effort is an on-going effort, and points out that among needed future work relating to WWTP technology and phosphorus reduction efforts is the need to undertake a much more detailed and exhaustive effort at the WWTP's or WWTP technologies of most interest, including but not limited to, analyses of daily effluent phosphorus data as opposed to average monthly effluent phosphorus data, taking into consideration the actual permit limits WWTP's were working to achieve, and the seasonality aspects of permit limits and WWTP operations.

This data collected from around the country represents a wide range of performance. The data is presented here without bias but it is important to note that various TWG

members' opinions about what constitutes a reasonable performance expectation ranged from about 30 to about 70 ug/L (micro grams per liter) as an effluent concentration for total phosphorus possibly attainable by municipal wastewater treatment plants on an average monthly basis, conditioned upon the data limitations and need for additional work listed below because the attached graphs show performance within the proposed TMDL range, but also well above it. Likewise, any discussion of a permit limit should take into account these limitations and consider the recommendations for additional work.

1. **LIMITATIONS OF THE DATA:**

- a. The data and information accumulated thus far for 43 of the 115+ WWTP's under study indicates that there are 11 WWTP's in the hydraulic operating range of 0.23-2.14 MGD and 3-4 WWTP's in the range of 28.4-42.8 MGD that are achieving, or are close to achieving, an average monthly final effluent concentration of total phosphorus of 50 ug/L or lower (see graphics).
- b. Our data show that there are treatment plants performing phosphorus removal at levels significantly better than is currently achieved on the Spokane River. These levels approach, but do not reliably achieve on a sustained basis, the P removal levels necessary for the Spokane River (i.e., 10 micrograms per liter).
- c. There is a difference between minimum performance levels used in writing NPDES permits and the environmentally better average performance operators like to achieve to assure they meet their permit's minimum performance level. It is these better, average performance numbers that result in the actual pounds of phosphorus removed and discharged.
- d. Almost all data is based upon monthly averages of total phosphorus effluent from a limited data set. Without more detailed data, the ability to accurately understand and gauge a WWTP's efficiency of phosphorus removal is most difficult.
- e. This data is based upon year-around (January through December) data, and not seasonal (April through October) data; thus seasonal aspects relating to a wastewater treatment plant's hydraulic performance are "averaged" out.
- f. The 50 ug/L value is simply a reasonably predictable concentration and "place holder" for TMDL evaluation at this time.
- g. The testing frequency of the data was highly variable, especially for the smaller plants that don't test every day and don't provide daily monitoring reports (DMR's) to the EPA. These variations may skew the data and make comparisons difficult.
- h. The data considered thus far is generally geared to respective applicable in-place permit limits. If these permit limits are relatively high, there is no incentive to operate the WWTP to achieve a lower limit or to test at lower detection levels. Thus, some of the WWTP's currently showing total phosphorus concentrations higher than 50 ug/L

might be capable of achieving lower concentrations if required to do so, therefore merit further study. For example, Frisco Sanitation WWTP in Frisco, Colorado (our ID#5) has a permit limit for total phosphorus of 500 ug/L but is actually achieving 80 ug/L; one has to wonder what they might be able to achieve with a different and lower goal.

- i. Some WWTP's were not required to test for phosphorus, but were testing it anyway and getting low numbers and good results. These merit more study.
- j. Many of the smaller plants appear to be getting much lower numbers but we lack information as to scalability.
- k. It is important to point out that, given the data limitations, the information gathered, though useful, does not show what is attainable but merely what is being attained at various locations under specific conditions. More information, more pilot studies, and more investigations are needed before conclusions can be drawn or recommendations made as to the appropriate phosphorus concentration for dischargers to this river.
- l. This data and suggestion should be utilized to preliminarily estimate phosphorus loading (pounds) only, and not to establish permit limits. Permit limits for effluent total phosphorus should be based established only after completion of much more detailed and substantive study of applicable data and other considerations, including pilot testing.

2. **ADDITIONAL EVALUATION OF THE DATA:**

- a. Issues pertaining to uncertainty and reliability of analytical results, variability, methods, and procedures need to be addressed. Lab analysis at low phosphorus levels is highly variable. In order to have confidence in the data, one needs information as to lab capabilities.
- b. Additional study is needed to determine if local facilities with widely varying flow rates and other design and operational characteristics could expect to achieve similar or different phosphorous removal rates with respect to those included within this study.
- c. Additional consideration should be conducted to determine if some of the wastewater treatment facilities with data reflecting a concentration of effluent total phosphorus higher than 50 ug/L should not be eliminated from consideration and may be worthy of additional investigation, particularly on a seasonal (April through October) basis.
- d. "Sizing" of facilities to respective flow treatment needs should also be included as a factor that needs to be considered.
- e. Additional pilot studies will be needed prior to more precisely determining final achievable total phosphorus concentrations and deciding upon applicable permit limits. The Technology Work Group is eagerly awaiting the pilot results for the testing that was recently concluded at Inland Empire Paper and has recently commenced at the City of Spokane WWTP. By the time these results are available we hope to be able to suggest effluent phosphorus concentrations that will

more accurately and fully help reasonably estimate the total phosphorus discharged to the Spokane River from point sources.

- f. Future studies and technology improvements will likely result in changes in predictable phosphorus removal.
- g. How well a plant is operated and maintained can have a significant impact upon achieving phosphorus reduction, but this aspect is not included in our considerations.

Attachments (4 pdf files named):

- 1 Eff P by Flow Name 0-100.pdf
- 2 Eff P by Flow Name 0-300.pdf
- 3 Eff P by Flow 0-100.pdf
- 4 Eff P by Flow 0-300.pdf

RRF

Memorandum

Date: September 27, 2005
To: Spokane TMDL Collaboration Full Group
From: Bonne Beavers, member of the Technology Work Group (TWG), on behalf of the Sierra Club
RE: Matrix and Narrative

During the TWG meeting on 9/22/05, it was agreed that the September 14, 2005 Submittal of Preliminary Information from the TWG co-chairs did not accurately reflect the group's consensus, largely because the original submittal recommended 50 ug/l as an average monthly effluent concentration for total phosphorus for municipal wastewater treatment plants. Instead, the TWG agreed that data limitations made a hard recommendation impossible and thus a new submittal was to be drafted. In particular, it appears that certain treatment technologies may be capable of achieving phosphorus effluent concentrations significantly lower than 50 ug/l. Further analysis is necessary to assess whether these technologies may be transferable to and appropriate for Spokane River dischargers.

Because an amended memo was not circulated in time for the 9/28/05 Full Group meeting, Sierra Club offers this submittal which it believes reflects the group's recommendations and concerns.

From June through September, the TWG gathered data from over 115 wastewater treatment plants within the US and abroad in an attempt to determine the levels of phosphorus reduction being achieved by these plants. The information collected by the workgroup identified some technologies with full scale WWTP applications that have demonstrated promise for meeting TMDL targets. However, due to significant data gaps, the TWG decided that the information was insufficient to support a hard recommendation about what is achievable. It is important to note that the information gathered, though useful, does not show what is attainable but merely what is being attained at various locations under specific conditions. More information, pilot studies, and investigations are needed before conclusions can be drawn or recommendations made as to the appropriate phosphorus concentration for dischargers to the river.

Nevertheless, the data gathered is useful as the foundation for the next step of evaluation. Although the raw data is posted on the TMDL collaboration website, the group agreed to submit to the Full Group some graphs showing WWTP monthly phosphorus reductions sorted by flow accompanied by a list outlining some of the data limitations and information needed for a more exhaustive evaluation.

Data limitations:

1. Almost all data gathered was based upon monthly averages of total phosphorus effluent from a very limited data set. Without more detailed data, the ability to accurately understand and gauge the facilities' efficiency of phosphorus removal is difficult.
2. How well a plant is operated and maintained can have a significant impact upon achieving phosphorus reductions, but we lack this information.
3. We were unable to obtain DMRs for all facilities and thus have a very limited data set, especially for the smaller plants, many of which do not test every day. Frequency of testing is highly variable and skews comparisons.
4. Much of the data is based on monthly averages. Without the daily DMRs, one does not know the range of phosphorus reductions for the facility during that month.
5. Most plants test according to permit limits. Thus, if permit limits are relatively high or if phosphorus is not a pollutant of concern, there is no incentive to operate at a lower limit or to test for lower detection levels. Nevertheless, the technology could be capable of achieving lower levels. For example, the Frisco Sanitation WWTP, (Our ID #5), in Frisco, Colorado, has a permit limit for total phosphorus of 500 ug/l but is actually achieving 80 ug/l. One might want to explore what the plant could achieve if its goal were greater phosphorus reductions.
6. Analytical uncertainty makes comparisons difficult. In general, lab analysis at low levels of concentration is highly variable. One needs access to the very best labs and even then, split samples may vary considerably. We have no information as to the particular labs used by these facilities or their capabilities.
7. We have no information on scalability. Many of the smaller plants appear to be getting much lower numbers but we have no information yet to determine whether these would be appropriate for larger plants. It would be counterproductive, however, to rule out these technologies because they could very well be appropriate for the smaller plants who could afford to do a pilot project and move forward with what is not yet accepted industry wide.
8. The data results were based on year-round (January through December) data, not seasonal (April through October). Thus seasonal aspects relating to a plant's hydraulic performance may be "averaged out."
9. Some WWTPs were not required to test for phosphorus, but were testing it anyway and getting low numbers. These merit more study.

MEMO

TO: TECHNOLOGY WORKGROUP
FROM: THE SIERRA CLUB/BONNE BEAVERS
RE: EVALUATION CRITERIA
DATE: 6/22/05

The Advanced Wastewater Treatment Technology Evaluation Workshop identified five evaluation criteria for wastewater technology, but did not specify the subcriteria evaluated for O&M. Before embarking on further technology evaluations, it would seem prudent to specify these subcriteria to ensure apt comparisons.

The following are suggested subcriteria for O&M resources:

1. Ease of operation and maintenance
2. Operator training time
3. Number of people it takes to operate and maintain
4. Technical expertise necessary to operate and maintain
5. Backwash
6. Ability to handle peak loading
7. Frequency of breakdown
8. Frequency of part replacement
9. Flexibility for add-ons or expansion
10. Need for outside technical assistance
11. Ease of integration with existing technology
12. Turnkey operation
13. Footprint
14. Odor control - biofiltration
15. Quality of discharge - suitability for reuse/protection against waterborne diseases
16. Chemical use - ease of disposal/secondary or offsite environmental effects
17. Energy efficiency
18. Reduced emission of greenhouse gases
19. Use of bi-products such as methane
20. Applicability to municipal and industrial uses

Bonne Beavers

From: Ragsdale, Dave [RAGS461@ECY.WA.GOV]
Sent: Wednesday, May 18, 2005 5:22 PM
To: Bramble, Lenox; 'Ryan Orth'; Bonne Beavers; 'Bruce Rawls (brawls@spokanecounty.org)'; 'Dale Arnold (darnold@spokanecity.org)'; 'Doug Krapas (doug_krapas@iepc.com)'; '(MASSMANN@COMCAST.NET)'; Cupps, Katharine; 'Lars Hendron (lhendron@spokanecity.org)'; 'Mike Petersen'; 'Pat Blau (Pat.Blau@kaisertwd.com)'; 'Rick Fink (rick_fink@iepc.com)'; 'Sid Fredrickson'; 'Terry Werner (T Werner@postfallsidaho.org)'; Merrill, Kenneth R.
Subject: RE: Upcoming Meetings of Spokane River Collaboration Technology Workgroup

Attached for distribution to the Technology Workgroup is a summary of DMR data for the Walton WWTP.

As some of you already know, this facility is in New York and utilizes D2 filter technology. I was provided this information last January by staff of the New York State Dept. of Environmental Conservation which regulates this discharger. I asked for data from this plant because it appears to be the largest D2 application for municipal wastewater treatment (about 4.5 mgd treatment capacity). Effluent samples were analyzed by a state certified laboratory and submitted to the NY DEC as required by the NPDES permit. Even without applying any statistical twists to measurements reported as less than values, the average monthly total P concentration is about 10 ug/l. The concentration is approximately the concentration identified in the draft TMDL. We cannot know with certainty how much lower the actual total P concentrations actual are w/o using analytical methods that obtain lower quantification levels. I was told the Ecology/EPA Region 10 Manchester laboratory can achieve a quantification level of about 3 ug/l. Delaware Engineering stated in their recent presentation in Spokane that operation of the treatment processes in the NYC watershed are optimized to achieve low turbidity, not the lowest total P possible. So, performance for phosphorus removal might be improved to even lower concentrations.

David Ragsdale
EPA - Office of Water & Watersheds
(360) 407-6589

<<DMR data summary for Walton WWTP from NY DEC.doc>>

-----Original Message-----

From: Bramble, Lenox
Sent: Wednesday, May 18, 2005 12:17 PM
To: Ryan Orth; Bonne Beavers; Bruce Rawls (brawls@spokanecounty.org); Dale Arnold (darnold@spokanecity.org); Ragsdale, Dave; Doug Krapas (doug_krapas@iepc.com); (MASSMANN@COMCAST.NET); Cupps, Katharine; Lars Hendron (lhendron@spokanecity.org); Bramble, Lenox; Mike Petersen; Pat Blau (Pat.Blau@kaisertwd.com); Rick Fink (rick_fink@iepc.com); Sid Fredrickson; Terry Werner (T Werner@postfallsidaho.org)
Subject: Upcoming Meetings of Spokane River Collaboration Technology Workgroup
Importance: High

A reminder to Technology Workgroup members, the following future meetings of the workgroup were picked at our last (first) meeting on May 13, 2005.

- ❖ May 26, 2005 from 1:30 P.M. to 4:00 P.M. at Spokane Wastewater Management Department, 909 E. Sprague, Spokane
- ❖ June 9, 2005 from 3:00 P.M. to 5:00 P.M. at Spokane Wastewater Management Department, 909 E. Sprague, Spokane
- ❖ June 22, 2005 from 1:30 P.M. to 4:00 P.M. at Spokane Wastewater Management Department, 909 E. Sprague, Spokane

ATTACHMENT K

10/21/2005

DMR data from NY DEC
Walton - V WWTP
NPDES No. NY0027154
Reporting period 2/28/2003 to 10/31/2004
Effluent limitation for Total P = 0.2 mg/l (effective February 2003)
Secondary treatment w/nitrification and D2 filtration

Total P

Monthly
Average

Concentration

Date

<0.013	2/28/2003
<0.012	
<0.0068	
<0.007	
<0.012	
<0.009	
<0.007	
<0.007	
<0.006	
<0.006	
<0.023	
<0.006	
<0.011	
<0.006	
<0.008	
<0.02	
0.025	
<0.01	
<0.007	
0.009	
<0.007	10/31/2004

<0.010 = average of monthly averages
0.25 = highest reported total P monthly average
<0.006 = lowest reported total P monthly average

Note: Most of the results are reported as < values because more sensitive analytical methods are not necessary to demonstrate compliance with the 0.2 mg/l effluent limitation for total P. Analyses for total P are conducted twice weekly.

Bonne Beavers

From: Ragsdale, Dave [RAGS461@ECY.WA.GOV]
Sent: Tuesday, September 27, 2005 1:45 PM
To: Bonne Beavers
Subject: FW: Spokane River TMDL Collaboration: September 28 Full Group Meeting Materials

Bonne. Attachments per your request.

This performance data is from the Walton and Stamford WWTP in NY which are using D2. Also, testing of the D2 pilot at Spokane WWTP last week showed it achieved 10 and 13 ug/l using alum.. Impressive! However, the NY plants are using a different coagulant (PACL) and achieving even better results than with just alum. It would be a shame if the pilot(s) leave town without some experimentation with coagulants. I would have pushed to specify this had we been afforded an opportunity to review and comment on protocols. I have no information about how the Trident pilot is doing.

I will not be attending the Full Group meeting tomorrow but Eaton, Christine Psyk (my supervisor) and Adrienne Allen (attorney) will be there for EPA.

Dave.

-----Original Message-----

From: Ragsdale, Dave
Sent: Tuesday, September 27, 2005 9:18 AM
To: 'Ryan Orth'
Cc: 'Psyk.Christine@epamail.epa.gov'; 'Eaton.Thomas@epamail.epa.gov'; Peeler, Dave; Bramble, Lenox; Cupps, Katharine; Merrill, Kenneth R.; 'Allen.Adrienne@epamail.epa.gov'
Subject: RE: Spokane River TMDL Collaboration: September 28 Full Group Meeting Materials

Ryan. I am the EPA Office of Water and Watershed staff assigned by my agency to development and completion of the Spokane River Dissolved Oxygen TMDL. As part of that work assignment I have participated as an "observer" on the Technology Workgroup and the Reuse and Conservation Workgroup.

I note that at our most recent meeting on September 22 the consensus of the Technology Workgroup was to NOT recommend any specific concentration as representative of what can be achieved by current technology. The information collected by the workgroup identified some technologies with full scale WWTP applications that have demonstrated promise for meeting TMDL targets. However, it was agreed that this information is insufficient to support a recommendation about the ability of treatment technology. The next step of evaluation needs to occur before such a determination can be made.

The paper you distributed included a previous draft recommendation of 50 ug/l as "an average monthly effluent concentration for total phosphorus possibly attainable by municipal wastewater treatment plants on an average monthly basis". In response to comments from workgroup member about the draft recommendation, it was agreed to drop this number from the final report to the Full Group.

FYI, I have attached discharge monitoring information from WWTPs which are achieving monthly averages of approximately 10 ug/l. These technologies have been installed with capacities necessary to treat wastewater from any of the Spokane discharge facilities. There are also other technologies which have consistently achieved much lower than 50 ug/l total P in their effluent.

I trust that distributing the previous draft recommendation will be clarified during workgroup presentations to the Full Group tomorrow. Please feel free to call me if you have questions about this message.

Thanks,
David Ragsdale

10/21/2005

Walton Apr-Oct monthly average effluent total phosphorus

year	Month	reported avg	sensored data 1/2 <values
2003	APR	<0.0068	0.0034
	MAY	<0.007	0.0035
	JUN	<0.012	0.0060
	JUL	<0.009	0.0045
	AUG	<0.007	0.0035
	SEP	<0.007	0.0035
	OCT	<0.005	0.0030
2004	APR	<0.008	0.0040
	MAY	0.02	0.0200
	JUN	0.025	0.0250
	JUL	<0.01	0.0050
	AUG	<0.065	0.0330
	SEP	0.001	0.0010
	OCT	<0.007	0.0035
2005	APR	<0.007	0.0035
	MAY	<0.007	0.0035
last report	JUN	<0.011	0.0055

Stamford Apr-Oct monthly average effluent total phosphorus

Year	Month	Avg month TP	sensor data 1/2 c-value
2004	APR	<0.009	0.0045
	MAY	<0.012	0.0060
	JUN	0.011	0.011
	JUL	0.022	0.022
	AUG	0.013	0.011
	SEP	0.013	0.013
	OCT	0.006	0.006
2005	APR	<0.006	0.003
	MAY	0.009	0.009
	JUN	0.008	0.008
last report	JUL	0.030	0.030

Total P Date	Parkson Corporation	US Filter Trident	Zenon
	Result, mg/L PO4-P	Result, mg/L PO4-P	Result, mg/L PO4-P
8/18/2005		0.018	
8/19/2005		0.052 outlier?	
9/1/2005	0.019		
9/2/2005	0.015		
9/6/2005	0.018		
9/7/2005	0.013	0.010	
9/8/2005	0.020	0.018	
9/9/2005	0.036 outlier?	0.010	
9/10/2005	0.011	0.009	
9/11/2005	0.011	0.010	
9/12/2005	0.016	0.014	
9/13/2005	0.014	0.011	
9/14/2005		0.011	
9/15/2005	0.017	0.017	
9/16/2005	0.010	0.012	
9/17/2005	0.015		
9/18/2005	0.010		
9/19/2005	0.010		
9/20/2005	0.010		
9/21/2005	0.013		
9/22/2005	0.015		
9/23/2005	0.012		
9/24/2005			
9/25/2005			
9/26/2005	0.016		0.009
9/27/2005		0.013	0.011
9/28/2005		0.026	0.031
9/29/2005		0.023	0.023
9/30/2005		0.016	
10/1/2005			
10/2/2005			
10/3/2005		0.009	
10/4/2005		0.010	
10/5/2005			

Mean	0.015	0.016	0.019
Min	0.010	0.009	0.009
Max	0.036	0.052	0.031
StDev	0.005826	0.010218	0.010376
RSD	38.7	63.6	56.1



PARKSON CORPORATION

DynaSand[®] Continuous Backwash Upflow Sand Filter

Partial Reference List (> 5 MGD)

<u>Customer</u>	<u>City</u>	<u>ST</u>	<u>Flow (MGD)</u>	<u>#Modules</u>
Boca Raton RWPF	Boca Raton	FL	6	24
Brevard County So. Reg WWTP	Melbourne	FL	5.5	16
Brevard County No. Reg WWTP	Pompano Beach	FL	10	40
Inland Empire Utilities Agency	Chino	CA	12.5	72
Marysville WWTP	Marysville	WA	10	48
South Regional WWTP	Hollywood	FL	8	32
Northwest Orange County	Orlando	FL	14	56
New Smyrna Beach WWTP	New Smyrna Beach	FL	10	36
City of Canton WWTP	Canton	GA	7.2	24
Yuma WWTP	Yuma	CA	11.5	32
Nanhai Shell Co.	Shenzhen	China	23	96

ATTACHMENT M

STREET ADDRESS :
2727 N.W. 62ND STREET
FORT LAUDERDALE, FL 33309-1771

MAILING ADDRESS :
PO BOX 408399
FORT LAUDERDALE, FL 33340-8399

WWW.PARKSON.COM
TEL 954/974-6610
FAX 954/974-6182

AN
AXEL JOHNSON INC.
COMPANY

Bonne Beavers

From: Bramble, Lenox [LBRA461@ECY.WA.GOV]
Sent: Tuesday, April 12, 2005 11:46 AM
To: Peeler, Dave; Bellatty, James
Cc: Ragsdale, Dave; Koch, Richard A.; Cupps, Katharine; Merrill, Kenneth R.; Frye, Richard J.; Dunn, David
Subject: Parkson Corporation presentation of April 6, 2005 at Ecology ERO
Importance: High

The subject presentation by Parkson Corporation and their Northwest USA supplier of the Parkson DynaSand D2 Advanced Filtration System (D2) occurred this morning and lasted from 9:00 A.M. until noon. By my count 42 attended the presentation, including the presenters (Parkson Corporation and WH Reilly), representative from local governments (City of Spokane, Spokane County, Liberty Lake Sewer & Water District, City of Post Falls, City of Moscow), environmental organizations (Center for Justice, Sierra Club, Lands Council), engineering consultants (HDR, CH2mHill, JUB Engineers, Environmental Planning & Design, Stan Miller), wastewater treatment vendors (Blue Water Technologies), EPA, and Ecology (HQ, CRO, ERO). Over the course of the 3-hour presentation informative technical, operational, and financial information was presented resulting in a good number of questions from among those in attendance. It is worth noting that at the conclusion of the meeting no one in attendance appeared to have any unanswered questions, although I'm certain we will all think of some.

Several significant items certainly worth drawing attention to were:

- Parkson's D2 technology has been pilot tested and installed at a number of wastewater and drinking water treatment plants, the most recent testing in Atlanta demonstrated achieving average phosphorus concentrations of about 10 ug/L.
- Parkson's D2 process appears capable of achieving effluent levels of phosphorus of 10 to 50 ug/L for most wastewater treatment facilities. In some of these instances these results were achieved where phosphorus was not the primary parameter of concern; hence, it may be possible to achieve even better results where phosphorus is the primary parameter of concern and the treatment process is optimized for such accordingly.
- The characteristics of the treated wastewater and the coagulant utilized in the D2 process are most important.
- The Parkson D2 process is considered equivalent to membrane microfiltration for pathogen and turbidity reduction by EPA Region 2 (which includes the state of New York).
- Implementing the D2 process at the City of Spokane's POTW for 60 MGD is estimated to cost approximately \$0.35 to \$0.50 per gallon, whereas smaller installations such as the Liberty Lake Sewer & Water District is estimated to cost approximately \$0.70 to \$1.00 per gallon.
- Parkson indicated that one of their trailer-mounted pilot plant units will be coming available after the end of this month (April), which is likely much to soon for us to make a commitment on a pilot plant. It does serve to reiterate the importance of study these issues and making such decisions in a timely manner. Items of concern for pilot testing include agreement on the scope of the pilot investigation, financial (Parkson indicated a willingness to cost share expenses), location, timing, etc. The rough estimate for a 4-month pilot study are \$100,000 to \$150,000 depending upon such things as the scope and operational support required.
- Parkson seemed very interested in demonstrating their D2 technology in the northwest US, but acknowledged that there are a number of competing requests for their pilot plants at the present time.
- Representatives from the City of Spokane, Liberty Lake Sewer & Water District, and Spokane County were in attendance at the April 6 Parkson D2 presentation and seemed genuinely interested in the technology.
- One of the Parkson presenters, an operator of D2 facilities in New York, was very clear in his description of the facilities as having very few moving parts, straightforward and simple to operate, capable of being equipped with either manual or automatic controls, able to interface with SCADA systems, and able to

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handle and perform well during high peak flow storm events.

Following the presentation, Ecology and EPA staff in attendance at the presentation met to discuss the presentation. This group includes Kathy Cupps, Richard Frye, David Dunn, Richard Koch, Ken Merrill, Dave Ragsdale, and myself (I hope I have not missed anyone). As a result of this discussion, several **recommendations** were fashioned as follows:

- Approach the City of Spokane and the Liberty Lake Sewer & Water District about either of them being agreeable to hosting a Parkson D2 pilot plant at their respective POTW; coupled with this item is the urgent need to investigate methods to finance such a pilot study. As a point of interest, both have preliminarily agreed to consider hosting a pilot plant, but formal discussions have not yet occurred.
- Enter into discussions with the local dischargers specifically about possible site visits to several of the Parkson D2 installations in New York State or other locations at earliest opportunity.
- Obtain more detailed information including operation and maintenance efforts and costs, design considerations, actual performance data and statistical analyses of that data.

Certainly site visits and pilot testing can provide a sound basis for evaluating this technology for possible application in the Spokane area, or other areas. We would like to proceed with these recommendations, and invite your opinions, observations, direction, etc.

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Spokane Reuse Feasibility Study Request

The Sierra Club, Upper Columbia River Group, requests a meeting with Senator Lisa Brown in mid-November, 2005, to discuss water issues in Eastern Washington and to ask for state funding for two Reuse Feasibility Studies, one for the City's wastewater treatment plant and the other for the proposed County/Regional treatment plant. As noted in our previous e-mail, we are available any afternoon, the week of November 14.

Portions of the Spokane River and Lake Spokane are currently listed as critically impaired under the Clean Water Act for dissolved oxygen (DO). Adequate concentrations of DO are critical for supporting fish, invertebrates and other aquatic life. However, wastewater discharges and storm water runoff carry oxygen-demanding substances (pollution) to streams and lakes which decrease DO. These substances can come from both point sources and nonpoint sources. Point sources are end-of-pipe discharges from wastewater treatment plants or storm water collection systems. Nonpoint sources include runoff containing fertilizer and pesticides from lawns and croplands, organic debris from forested land, soil erosion, and faulty septic tanks.

There are seven point sources or wastewater dischargers into the Spokane River – Coeur d'Alene, Post Falls, and the Hayden Sewer District, Liberty Lake Sewer and Water District, Inland Empire Paper Co., Kaiser Aluminum and the City of Spokane's wastewater treatment plant, which also includes 10 of Spokane County discharge. All seven dischargers contribute to the low DO problem. Major contributors of nonpoint pollution are Latah Creek and the Little Spokane River.

For the past four months, the Washington Department of Ecology, the above dischargers, and two local environmental groups, Sierra Club and The Lands Council, have been engaged in collaborative discussions to devise an agreed cleanup plan for DO, called a TMDL (Total Maximum Daily Load), that limits the amount of oxygen depleting pollution that is discharged into the Spokane River by both point and nonpoint sources. Phosphorus reduction is one of the top priorities in the cleanup plan because phosphorus is a main contributor to low dissolved oxygen in this system. At this point in the process, the dischargers and Sierra Club, respectively, are each developing implementation proposals to reduce phosphorus to the river and achieve the TMDL goals.

The Sierra Club believes that a successful plan must include not only wastewater treatment plant upgrades, nonpoint source reduction, and water conservation, but also long-term reuse strategies. Reuse involves reclaiming sewage effluent by treating it to a high level and applying it to industrial, commercial and irrigation uses rather than discharging it to the river.

There are several rationales for a strong reuse program. First, of course, reuse directly removes phosphorus loading to the river. Second, reuse can benefit the quantity and quality of flow in the Spokane River. The Spokane Valley-Rathdrum Prairie Aquifer provides the sole source for drinking water to over 500,000 people in the region. The

aquifer also recharges the Spokane River during critical low flow periods. Pumping from the aquifer reduces flow in the River. As the region's population increases, so too will demand on the aquifer which will further deplete the river, in turn causing increased temperatures and decreased DO. Reclaimed water can substitute for aquifer water, thus leaving colder, clean water available for discharge to the river.

As a part of the TMDL Collaboration, the Reuse Committee identified up to 139 potential reuse sources for irrigation, industrial, wetland construction and other uses. *See Attached Spokane TMDL Collaboration Appendix C.* Nevertheless, when asked to identify concrete proposals, the responses by the City and County were minimal. The City's long-term proposal (twenty years) is to supply 1.3 seasonally to a golf course and cemetery within one mile of the plant. The County, which hopes to build a regional plant with an initial capacity of 10 mgd and future expansions to 20 mgd¹, has no concrete proposals. In support of their conservative approach, the City and County cite cost and cost-effectiveness concerns. By contrast, Liberty Lake Sewer & Water District proposes to irrigate three nearby golf courses and Interstate 90 medians, all within four miles of the plant, for a total of 3 mgd. This would effectively reuse all of the effluent generated at the Liberty Lake treatment into the foreseeable future. *Id.*

To the best of our knowledge, neither the City nor the County has plans to conduct detailed reuse feasibility studies. (As to the County's proposed plant, it would seem particularly timely. The plant as designed does not meet the Draft TMDL's final phosphorus reduction limits. Now is the time to rethink siting and design to take advantage of these reusing opportunities before the plant is built.)

Thus, in order to encourage the City and the County to adopt reuse as an integral part of their TMDL implementation plans and long-term strategies, the Sierra Club requests funding for Reuse Feasibility Studies for both the City of Spokane and the proposed County Plant. These studies would include the following elements:

What potential reclaimed water sites are using water that can be replaced with reclaimed water?

- Of these which have water rights? Which are served by purveyors? Which are operating outside the water right system?

If a new county or regional plant is developed, what site best captures reuse potentials?

What must be done inside the treatment plant to upgrade it to deliver Class A reclaimed water?

- What level of treatment?
- What volume?
- How does this fit with new NPDES permit requirements?

Design a reclaimed water conveyance/distribution system(s):

¹ Spokane County 2004 Wastewater Facilities Plan Amendment

- What is the maximum amount of water that can be delivered along single pipeline to a set of customers?
- How to capture the largest volume possible?
- Then, what is the next pipeline, etc.?
- How to design the distribution system?

What is the cost of the pipeline?

Is there legislative funding to plan, design, and construct a water reclamation distribution system and to implement a concurrent citizen education plan?

What is the cost to the end user? Will it be subsidized? If so, how?

Are there pricing mechanisms that could encourage appropriate use of reclaimed water?

If reclaimed water is provided, how to capture the benefit of reduced pumping?

- Create trust water rights or otherwise protect saved water?

We look forward to discussing these issues with the Senator.

Thank you,

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