

THE PORTLAND WATER ABUNDANCE PLAN

A Proposal to Use Managed Competition to Conserve and Extend
the Portland Metropolitan Region's Water Supplies



Jerry Yudelson, P.E., M.B.A.

EXECUTIVE SUMMARY

The 1992 drought made it clear that regional growth had overtaken the capacity of the water supply system to function reliably in drought years. In response, a new regional water supply plan was adopted by the City of Portland, the METRO regional government and local water supply agencies, but there have been few other effective short-term solutions. Pressing tasks still remain from the 1992 drought, including major investments in supply proposed by Portland water officials since that time. Because these improvements come with high price tags, it is important to examine all options, using practical economic thinking and lessons from the development of competitive energy markets over the past 20 years.

The basic premise of this report is that water should be procured and provided in a similar fashion as other vital commodities such as natural gas, electricity and food. The public does not worry about shortages of these commodities or carry the burden of investing in new supplies, nor should they with water. This plan suggests that water users and ratepayers would be better served if the municipal monopolies now providing water supply in the Portland area were required to submit to managed competition.

The deregulation of energy markets demonstrates that under conditions of economic uncertainty, managed competition can provide long-term price stability, plus better environmental performance and more abundant supplies than regulated monopolies. This alternative includes competition in regional water supply, distribution, billing, treatment and maintenance, and water conservation programs. The report analyzes the benefits of a more critical look at our regional water system, and proposes immediate concrete actions.

ABOUT THE AUTHOR

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INTRODUCTION

The City of Portland enjoys the blessings of a wet Pacific Northwest climate and two mighty rivers flowing past and through it, the Columbia and the Willamette. With these natural advantages water supply should not be a problem. Moreover, since 1892, by decree of President Benjamin Harrison and subsequent legislative actions, the city has enjoyed exclusive and free access to the Bull Run River watershed, located about 35 miles east of Portland in the Mount Hood National Forest. This watershed has provided an abundant supply of pure water for the growth of the city and the surrounding area;¹ Portland sells roughly 40% of its water to other cities in the region.²

Why, then, should water supply be an issue for public debate? Though partially a matter of public concern over the impacts of El Niño events, and global climatic change, the most proximate reason is the 1992 drought. A traumatic time for many in Portland, 1992 rationing turned many residents into neighborhood “water police” and exposed the lack of city mechanisms for addressing shortages. It was inconceivable to many long-time residents that a city in such a water-rich region should run short of water! Although the drought ended in about five months and has not been followed by similar events in the past six years, the episode forced local officials to explore new supply alternatives.

In late 1996, the city and regional water suppliers completed a plan to provide adequate water supplies through the year 2050.³ In their plan, Portland officials propose investing \$120 to \$150 million or more to build another dam and reservoir in the Bull Run watershed, in order to provide post-2017 water supply. Other cities in the region are considering spending \$80 million or more to use the Willamette River, in the event they cannot obtain Bull Run water from Portland.⁴

This Regional Water Supply Plan may turn out to be less realistic and more expensive than many now expect, because it is based on outmoded assumptions about water use, pricing, and the impact of population and economic growth on demand. Abundant and relatively cheap supply is extremely important to the region’s economic growth, as witnessed by the local siting of many water-intensive semiconductor plants in this decade. Further, the current moratorium on new water connections in Wilsonville due to a projected shortage of supply, displays our profound dependence on an adequate supply.

This said, it should be noted water is essentially an economic good, no more important than electricity, gas or food for the region’s population and economic growth; it is unclear why water supply should automatically be considered

a government function. Other equally essential services such as energy supply and telecommunications have long been conceded to the private sector as regulated monopolies and are now rapidly being opened to competition. Why shouldn’t water supply also be opened to competition?

Public water supply planners and engineers have long treated water as a commodity that exists outside of economics, in spite of research over the past 30 years that indicates water demand does depend on pricing. Studies show a price elasticity of demand, or a percentage reduction in water use caused by a certain percentage increase in water price, that is real and cross-cultural. Price manipulation can therefore be used as a tool to manage water demand.

The Portland area has seen a long-term trend toward increased water use per capita, presumably as the population gets older, larger, richer and more suburban. Though this has been countered by a recent trend toward reduced per capita use due to a variety of factors, regional population growth, projected at 45% over the next 20 years,⁵ will significantly stress water supplies. See Table 1.

Table 1. Regional Metropolitan Region (Four-County) Population Growth History and Forecast⁶

1990	1995	1997	2017
1,412,344	1,596,100	1,658,500	2,271,000

An examination of the current water situation indicates the City of Portland, and its regional water supply partners, would be well served by a change in the institutional arrangements for water supply, distribution and delivery. We cannot readily create more water, but we can provide it at a lower cost by using principles of managed competition.

LESSONS FROM THE 1992 DROUGHT

The spring and summer of 1992 brought drought conditions and record high temperatures to Portland. Lacking a good backup well system or a reserve water treatment plant for Willamette or Columbia River water, the city was forced to resort to that old standby of poor planning: rationing. From the 1991-92 fiscal year to the 1992-93 fiscal year, overall water use dropped by 12%,⁷ and during the drought months, by 36%,⁸ mostly through citizen cooperation and partially through the enforcement of water rationing rules. The system survived: when the rains came again in October of that year, the rationing was lifted.

The water rationing plans, however, were unpopular and not very effective. In the middle of the drought, *The Oregonian* editorialized:

Why in the world is Portland relying on water cops and stringent rules to cut water use when it would be more effective to impose a surcharge on every water user who exceeds a certain level? The answer to that question...lies in an antiquated billing system the City Council has been much too slow to modernize. ...Conservation pricing would encourage prudent use of an increasingly strained resource.... *It also makes good sense to let the marketplace be the water cop, instead of midnight patrollers....* Portland and its regional customers of the Bull Run water system should speed up the water-use and billing changes that have been on tap too long already.⁹ [Italics added]

As City Commissioner Mike Lindberg (then in charge of the Portland Water Bureau) explained, “People wanted equity but they didn’t like the Big Brother approach that turned neighbor against neighbor. This hit us so fast, and frankly we’d never faced anything like it before, so I think mistakes may have been made.”¹⁰

For the 1994-95 fiscal year, three block rates for residential and commercial water users were adopted for the first time by the city council, with the highest block paying 50% more than the lowest of the three blocks. Today, a resident pays a set amount for the first block of 1,200 cubic feet of water used each month, a higher rate for the next 800 cubic feet and the highest rate for the third block or tier of water used, above 2,000 cubic feet per month.¹¹ The theory is that the higher prices for increased monthly use will cause residential users to reduce their heavy seasonal water use, such as outdoor watering, to avoid higher charges.

This block structure has been maintained since 1994, with average residential rates climbing 12.4% over four years, from \$0.845 per 100 cubic feet in 1994-95 to \$0.95 in 1998-99.¹² To date, however, monthly residential billing, a key component of increasing the effectiveness of block rate pricing to reduce water use, has not been adopted in Portland (this billing option is available, but consumers rarely request it).

Water Use Since 1992. There had been a long-term trend (through 1990) toward higher water use per capita in the population as a whole, caused by suburbanization and higher incomes.¹³ Recent reductions in use appear to challenge this trend, indicating that Portland residents have embraced the 1992 conservation message.

Average per capita consumption in Portland was down 12%, from 151 gallons per day in the pre-drought 1991-92 fiscal year, to 133 gallons per day in the post-drought 1993-94 fiscal year.¹⁴ Total system water use was at pre-drought levels, in spite of a 5% increase in the served population (see Table 2).

In a summer 1998 pamphlet mailed to water customers the Portland Water Bureau claimed, “Last year the Water Bureau served 93,000 more people than in 1991 and used less water. Water use per person has dropped 15% in recent years.”¹⁵ In fact, overall water usage (including residential and commercial use) in the City of Portland has dropped from 159 gallons per person per day prior to the 1992-93 fiscal year to 137 gallons per person per day for the 1997-98 fiscal year, a drop of 14%. Over the same period, small meter residential customers in the City of Portland have reduced their average per person use from 85 to 75 gallons a day, a reduction of 12%.¹⁶ However, as Table 2 shows, system-wide per capita use, that is, residential and commercial use for the City of Portland *and surrounding region*, has not decreased.

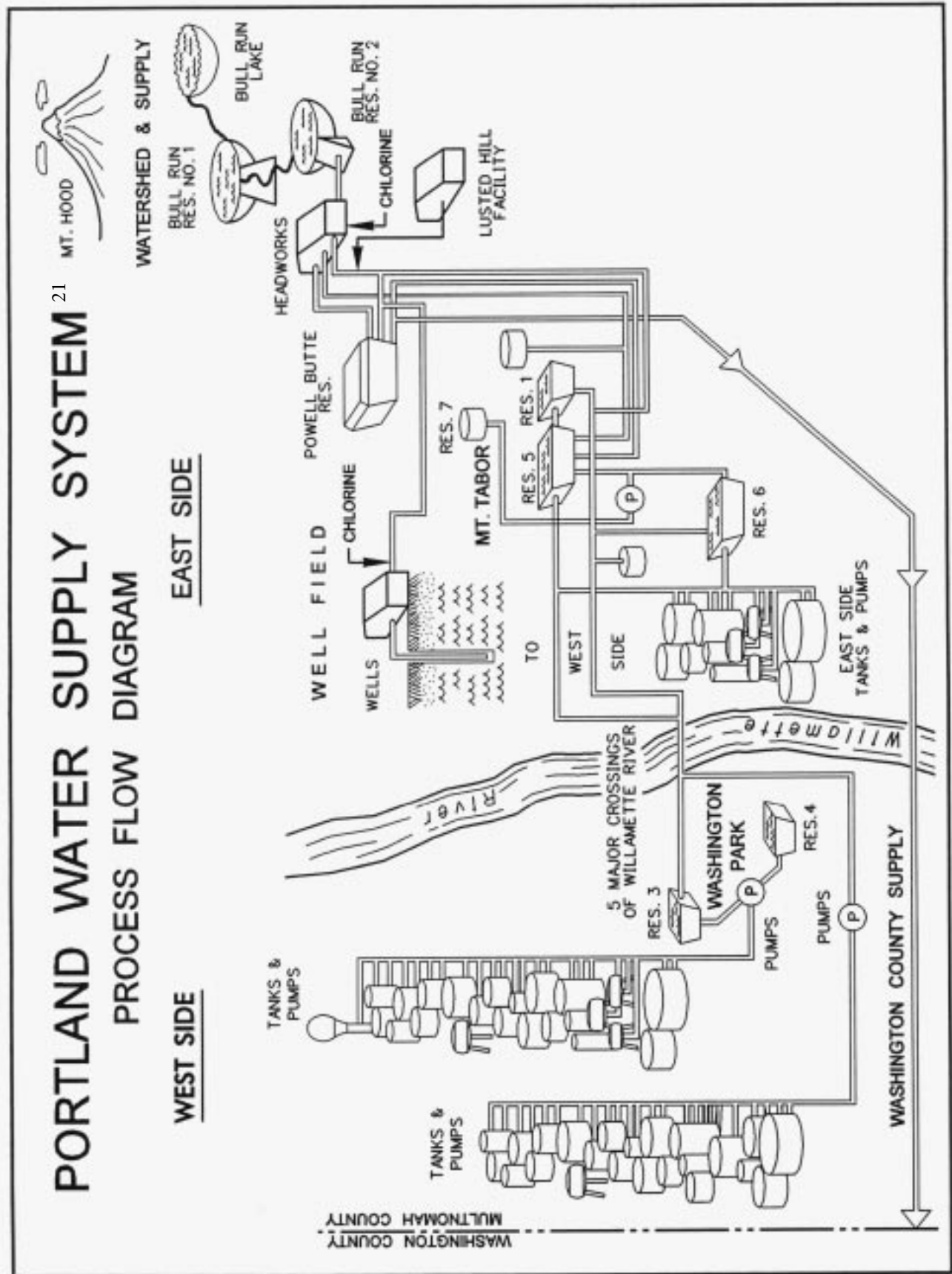
This history shows the flexibility of *short-term* residential water demand, at least in the 1% to 15% order of magnitude, with few economic incentives other than a slight change in the rate structure. Demand reductions could also be linked to current trends toward “reurbanization,” and higher density housing. Multi-family building permits in the Tri-County region went from 25% of total permits in 1992 to 49% in 1997,¹⁷ which may have contributed to the declining water consumption. A planning process which emphasizes such densification may continue to moderate future increases in demand.¹⁸ Other causes of the reduced usage include an increased awareness of the finiteness of the earth’s resources, a lifestyle trend toward resource conservation, and public mandates for more efficient water use equipment in new buildings.¹⁹

How much more flexibility would there be in water demand if the city were to fully embrace economics as a demand regulator? Without new supply sources, if Portland were to have another drought as severe as that of 1992, the city would need to curb water use by more than 25% to account for the increased demands of the regional economic and population growth.

Total System Consumption (Billions of Gallons/Year)			
Year	Total System Consumption		Water Use Per
	(billions of gallons/year)	Population	Capita Per Day (gallons)
1991-92	36.5	720,000	139
1992-93	34.5	735,000	129
1993-94	36.5	754,000	133
1994-95	38.4	790,000	133
1996-97	41.8	813,000	141

THE FORECASTED WATER SUPPLY SITUATION

The Portland water supply system, shown schematically in Figure 1, currently meets the needs of about 800,000 people in the region, roughly 60% of the Portland metro area population.



Over time, the Bull Run River system can be expanded to meet increased water demand by such means as a new dam, raising existing dams and storing water in underground aquifers during the winter to meet peak summer demands.²¹

According to the Regional Water Supply Plan (RWSP), adopted in 1997 by all of the area water supply agencies and METRO, water demand in the region is expected to grow steadily through the year 2050 at a rate of between 0.7% and 2.1% annually.²² Peak season demand is expected to grow from 0.8% to 2.3% annually,²³ the higher estimate being equivalent to a doubling time of 31 years. This forecast is based on regional population and employment growth figures from METRO and on reductions in water demand due to “naturally occurring conservation” through building codes, appliance standards, programmed and expected technological advances, and “the competitive marketplace.”²⁴

On the supply side, the RWSP indicates “committed” water supply resource additions will add about 20% to regional water supplies over the next 2 to 10 years.²⁵ This will provide temporary relief against the demands of increased population and economic growth, but may not be enough to offset the impact of a string of abnormally dry years. The RWSP concludes that “given existing and committed resources, the region will not need major new supply increments until close to the year 2020.”²⁶ The main future options under consideration are a third dam in the Bull Run Watershed and/or a water treatment plant on the Willamette or Columbia Rivers.²⁷

According to local officials, through an equal split of “naturally occurring conservation” and new conservation programs, 11% (27 million gallons per day) could be shaved from average peak season water demand by the year 2020.²⁸ The RWSP asserts, “This projected savings (from conservation) provides substantially more ‘supply capacity’ than any other single resource option identified in the final resources strategy.”²⁹ In other words, the RWSP relies more on conservation than any other alternative as the most cost-effective way to meet future water demand.

Some of the recommended conservation program concepts include:³⁰

- Conservation education (primarily in outdoor water use) and outdoor water audits.
- Incentives and regulations to install water-efficient irrigation and landscapes.
- Conservation pricing structures.

A recent review of Portland’s conservation program suggests there are many benefits to such approaches.³² They:

- Help to stretch existing supplies, deferring the capital costs of expanding supply.
- Make regulatory permits for expansion easier to acquire.
- Reduce supply-related operating costs for power and chemicals.
- Extend the lives of wastewater treatment facilities before they have to be expanded.

The main focus of Portland’s conservation efforts is on peak-season (summer) demand, a time when water use increases (for outdoor landscape maintenance and irrigation) and supplies are the lowest.³³ However, there is also a strong economic argument for reducing overall water use, even during the non-peak months, in order to decrease water and sewer treatment plant operating and maintenance costs and extend the lives of existing plants. None of these benefits have thus far been factored into the evaluation of the cost-effectiveness of conservation programs.

There are many economical conservation alternatives;³⁴ the first focus should be on reducing residential water use, attending to leak repairs, adhering to more efficient outdoor watering methods, and utilizing low-flow toilets, showerheads, and faucet aerators. System-wide conservation options include pressure reduction and leak detection/repair. The industrial sector should target water reuse, as should large landscaping water users. Commercial water users have an even larger number of conservation measures available through process changes and technology retrofits.

The Regional Water Supply Plan assumes, however, planning and conservation programs will remain the sole domain of public water supply agencies. A recent Oregon Environmental Council survey of regional conservation efforts shows them to be woefully underfunded;³⁵ it is clear public agencies have not yet invested sufficiently to make the RWSP’s conservation projections come true. There is also a concern at the Portland Water Bureau that conservation investments are not being taken seriously enough.³⁶ It is time for a more aggressive program of public incentives, implemented by private operators, to make conservation projections a reality.

WATER DEMAND AND PRICING: LESSONS FROM BASIC ECONOMICS

Economics should play a larger role in future water supply decisions than it has in the past to obtain more efficient resource allocations, save the public money and reach better long-term solutions. A fundamental tenet of economics is that the more something costs, the fewer units of it are likely to be demanded. This is the basic law of supply and demand taught in every beginning economics class. From the standpoint of water supply, this law means there is no such thing as an absolute demand for water; rather, there is an economic level of demand at various prices. Therefore, water demand can, within wide ranges, be controlled through the simple mechanism of raising prices to the largest or most inefficient users, and effectively communicating that increase.

Increased costs will lead to changes in the behavior of consumers, such as reductions in consumption-related activities and investments in water conserving technology. Decreases in water use per capita will depend heavily upon the relative cost of water, the available alternatives for changing consumption patterns and the perceived benefits, both economic and social, of reducing usage.

European and North American water consumption research point to the influence of price on water use. These studies show an elasticity of demand for water, that is, the percentage reduction in use caused by a certain percentage increase in price, of -0.10 to -0.35.³⁷ That means a 10% increase in water prices (in real terms) will decrease water use by 1.0% to 3.5%. (A 100% price increase will reduce water use by 10% to 35% per capita). Local studies verify these findings; a 1992 analysis of the history of Portland area water demand found the long-term price influence to be a 34% decrease in per capita use for each 100% increase in water prices.³⁸

Two interesting questions remain in considering the impact of water rates on demand. First, why don't other utilities have increasing block rate pricing structures? Second, how would water be priced during drought or seasonal peak demand periods, and what would be done with the excess funds generated?

An answer to the first question is fairly simple: other utilities have individual mechanisms for addressing demand and present different situations. Electricity, for example, has traditionally been priced according to both power demand and energy use, i.e., one pays a charge per kilowatt (power) and for each kilowatt-hour used (energy). The charge per kilowatt directly relates to the capacity of the system to serve peak demand, the increasing cost of adding new power sources and the high cost of buying additional power at peak times. In addition, electricity can easily be produced at the time of demand and is nearly impossible to store, whereas water is easily stored but cannot be produced at the time of demand

(except from wells, which are limited resources). Therefore, one would expect different pricing structures.

As for the second question, this plan proposes to increase the peak-season water costs (see *Water and Sewer Rates in Portland* below) in order to induce further investments in conservation, changes in landscaping and irrigation use and changes in industrial processes that consume considerable water. Initially, these increases would likely generate excess income for the Portland Water Bureau. Those funds should be used to finance a public/private partnership in water conservation investments through a program of managed competition. In this way, water use will gradually decline on a per capita basis, reducing long-term water service revenues so as to eliminate the excess funds.

During a drought period, dramatically increasing rates to promote short-term conservation will probably not increase water revenues substantially, because water use, and total water sales, will decline considerably. If there are excess revenues during a drought emergency, they can be rebated when the crisis is over in the form of a one-time rate reduction.

WATER AND SEWER RATES IN PORTLAND

Water Rates in Portland. The Portland Water Bureau and the Portland City Council responded to the 1992 drought by instituting increasing block rate pricing for residential and commercial water users, in which water use costs more *per unit consumed* the more total units of water consumed. Table 3 shows summer 1998 water and sewer rates in Portland.

These rate changes are both positive moves and run counter to the still widespread "cost of service" mentality that says it is cheaper to distribute water to a larger water user, per unit (because fixed costs of local distribution are spread over more water sales); therefore, water should get cheaper the more of it you use. In an era of increasing water scarcity and increasing cost per unit of new investment, the cost of service notion is a relic that should be resolutely discarded.

Though the rate changes are a step in the right direction, they do not go far enough in providing an effective economic incentive to conserve water. The Portland Water Bureau needs to take action to increase the differential between rate classes for residences from the current 50% (\$1.38 per 100 cubic feet vs. \$0.92) to 100%. In addition, the price signals need to be sent more frequently, in the form of a monthly bill. Such a move will allow homeowners and renters to compare monthly use on a year-to-year basis, providing a financial incentive for reduced consumption. The current quarterly billing standard is both a burden on homeowners in the form of a large lump-sum payment and an ineffective price signal; by the time consumers get billed for summer water use, for

example, they cannot take immediate steps that will pay off in reducing their bills for another year.

Sewer Rates in Portland. The current sewer rate charge in the City of Portland is \$3.01 monthly per 100 cubic feet for residences and \$3.12 for commercial and industrial users, reflecting the costs primarily of sewer system and treatment plant maintenance, debt service and presumably some of the costs of the Combined Sewer Overflow program.

However, sewer rates are based on *winter consumption*, reflecting indoor water use, and thus the amount of water that actually goes into the sewers. Therefore, to cut one's water bill, it is far more expedient to reduce winter water use than summer peak use (by a factor of more than 2 to 1). Cutting winter usage will in fact reduce overall per capita consumption, but will do little to address the issue of cutting peak demand during summer drought periods, which is at the core of Portland's water supply problem. While winter surpluses could be stored for summer use, this would not go far enough to meet the region's demand.

The high sewer rates, at more than three times the lowest tier water rate, create a problem for using price signals to control water use because they are fixed and do not depend on summer usage. Even if the city raises the rate differential for the highest tier to 100% more than the lowest tier, the effective increase in monthly bills for excessive water use, combining both water and sewer charges, and neglecting the \$4.01 per month service charge for a moment, is only 24% (from \$3.93 to \$4.85).

Therefore, the city should consider tying sewer rates to the same increasing block rate structure as water rates. A major increase in water use (for example, from below 1,200 cubic feet per month to more than 2,000 cubic feet per month, a 67% increase) would then lead to a 100% increase in water bills. (At current 1998-99 rates, a 67% increase in water use would only increase total water and sewer bills by 11.7%, not a strong incentive to cut water use). If price signals are received on a timely basis, such a rate schedule would prompt residential water consumers to take strong action to cut summer water use.

Storm Water Rates. Portland water users are also charged a quarterly storm water rate of \$23.46, assessed to cover storm sewer maintenance and debt service on revenue bonds.³⁹

Effectiveness of the Block Rate Structure. Figure 2 shows a typical summer 1998 water bill for a 2,800 square foot home occupied by two people, on a 15,000 square foot lot with a small garden and modest-sized lawn. This quarterly bill of \$168.89 consists of:

- Water Service Charge \$16.49

- Block 1 Water Charge \$32.36
(up to 1,200 cu. ft./month)
- Block 2 Water Charge \$ 8.60
(between 1,201 and 2,000 cu. ft./month)
- Sewer Service Charge \$11.94
- Sewer Volume Charge \$77.63
(Based on winter average use of 900 cu. ft./month)
- Stormwater Management \$21.93

In the above example, of the \$8.60 charged in Block 2 for "excess water use," less than \$1.50, or less than 1% of the total bill is due to the increasing rate structure. At a cost increase of less than 1% of the water bill, where is the incentive to conserve water? In addition, the sewer volume charge is based on winter water use, a distant memory by the summer and impossible to change in the short-run.

Commercial Water Users. Commercial and industrial users are responsible for 44% of Portland's overall water consumption.⁴⁰ One may assume such entities have an even higher price elasticity of demand than residential users because of the following factors:

- Their bill is higher in absolute amounts (therefore, it will get more management attention).
- They have more technological options for water conservation investment.
- They have greater access to financing for technology upgrades.
- There is a competitive advantage in cutting operating costs.
- They typically have trained operations and maintenance personnel on hand.

Currently, commercial water users pay the same rates per 100 cubic feet of water as residential users. Their block rate structures are also progressive, with the third tier paying 50% more than the first tier. They pay a sewer rate of \$3.12 per 100 cubic feet, about the same as residential users, with the sewer volume charge also based on winter water use.

However, there is no incentive for water conservation built into the commercial structure except on a seasonal basis. Increasing block rates for commercial users are based on exceeding 40% of the average of the past 12 months' consumption. This is presumably to discourage excessive summertime water use, but under these block rates,



Bureau of Water Works
 Bureau of Environmental Services
 1120 SW Fifth Avenue, Room 601
 Portland, Oregon 97204-1974
 (503) 823-7770

City of Portland

ABC COMPANY

DATE DUE	AMOUNT DUE
12/04/98	\$342.17

ADDRESS SERVED

ACCOUNT NUMBER

Return this portion with your payment • Make checks payable to Bureau of Water Works • Write account number on check • Do Not Send Cash

CUSTOMER INFORMATION

ADDRESS SERVED

ACCOUNT NUMBER

SERVICE PERIOD
10/06/98 TO 11/05/98

SERVICE UNITS
1

WATER VOLUME AVERAGE: 32 CCF

WATER CHARGES	AMOUNT	SEWER CHARGES	AMOUNT
SERVICE CHARGE	22.64	SERVICE CHARGE	10.81
METER READINGS & USAGE (100'S CUBIC FT) (100 CUBIC FT (CCF) = 748 GALLONS)			
PRIOR CURRENT CCF			
3945 4003 58			
WATER VOLUME CHARGES			
45 CCF @ .920	41.40		
13 CCF @ 1.100	14.30		
0 CCF @ .000	0.00		
		SANITARY SEWER VOLUME CHARGE (ACTUAL VOLUME OF 58 CCF)	181.02
		STORMWATER MANAGEMENT	72.00
TOTAL WATER CHARGES	78.34	TOTAL SEWER CHARGES	263.83

PREVIOUS BALANCE	OTHER CHARGES	PAYMENTS	CURRENT CHARGES	AMOUNT DUE
290.28	0.00	290.28CR	342.17	342.17

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Table 3. Portland Water and Sewer Rates (Monthly)⁴¹
 (\$/100 cubic feet or 750 gallons)

Customer Class	Residential	Commercial and Multi-Family
Water: Fixed Charge	\$5.69	varies depending on size
First Tier (up to 1,200 cu. ft./mo.)	\$0.92	\$0.92 (up to 40% above past 12 months' average)
Second Tier (1201-2000 cu. ft./mo.)	\$1.10	\$1.10 (1.4 - 2.0 times average)
Third Tier (over 2000 cu. ft./mo.)	\$1.38	\$1.38 (above 2.0 times average)
Sewer: Fixed Charge	\$4.01	\$10.96
Volume Charge (based on winter water usage)	\$3.01	\$3.12
Stormwater Rate	\$7.82 (fixed)	variable

cost will not be proportionate to increases in water use, but much less. Conversely, unless an increasing block rate schedule is applied to sewer rates, decreases in water use will not be rewarded proportionately either; a decrease back to the first block of water use will not proportionately decrease water bills because of the high fixed-rate sewer charge based on winter water use.

In summary, today's Portland water and sewer rates do not provide an effective economic incentive to conserve water for residential users and scarcely provide one for most commercial users (except for the high sewer charges based on volume). The Portland Water Bureau should change the water and sewer rates to reduce high summer use among homeowners and to encourage year-round conservation on the part of businesses. Though these rate changes will likely reduce overall use per capita, however, there will still be a need for investments in both water conservation technology and

commercial water users can actually increase average monthly use up to 40% per year and still pay the same cheap rate as the most water-conserving homeowner! The only commercial user that is penalized is the one whose water use fluctuates widely, i.e. more than 40% above the average monthly use. Though this rate does address summer water use, it does little to cut the long-term growth in commercial and industrial water demand and therefore little to cut future summer peak use. Wouldn't it be more effective to switch the residential user to the commercial plan, to penalize summer water use, and the commercial user to the residential plan to force a reduction in overall use during the year?

The city should also move to a more conservation-oriented rate schedule for commercial users. For example, the rate structure could penalize businesses which do not reduce their current consumption per employee or per unit shipped, year after year. Alternatively, businesses could be tasked with reducing water consumption to 75% of current levels, then given the same increasing block rates as residential water users above that base level.

In addition, sewer rates should also be charged on an increasing block rate schedule; otherwise, the increases in water

new supply in order to meet increasing regional water demands due to population growth.

LESSONS FROM 20 YEARS OF ENERGY INDUSTRY PRIVATIZATION

The 1973 energy crisis, which resulted from a sudden reduction in imported oil supplies and a rapid increase in oil prices, was essentially solved in 1981 when President Reagan decontrolled oil and gas prices. By 1986, oil prices had sunk to nearly half their 1981 levels, supplies were more abundant, and the threat of political blackmail from Middle Eastern oil producers had evaporated. Today, the real price of oil (in the form of gasoline) is lower than at any time in the past 40 years.

Other than the decontrolling of prices, there were major institutional changes in energy production and distribution that took place during that same period. The 1978 Public Utility Regulatory Policies Act (PURPA), which required electric utilities to purchase power from independent power producers, unexpectedly gave rise to a dramatic increase in renewable energy power production (primarily wind and geothermal

power) and in energy-conserving cogeneration. The country's bent toward expensive nuclear power in the early 1970s was entirely replaced by more economic investments in both conventional and alternative sources of energy. In the 1990s, the development of trading markets in pollution credits has helped clean the air of sulfur dioxide and other power plant emissions. As we approach the next decade of the deregulation of energy markets, nationwide competition in energy supply is growing rapidly and fortuitously. At the same time, energy prices in the nation's largest energy markets, for example, New York and California, have stabilized in real terms and in some areas are lower than prices 10 and 20 years ago.

What lessons does the deregulation of energy markets over the past 20 years have for water supply planning in the Portland area? Several come to mind:

1. **Conservation investments are almost always cost-effective and much more readily available than anyone believed.** Even with low prices, many private companies have continued to find ways to reduce their energy use per employee and per unit of goods produced, while decreasing their air and water emissions. Regulation has played a role, but good old-fashioned economics has led the way.

Lesson: We need to begin deploying major water conservation investments before we begin to make expensive, and perhaps unneeded, investments in regional water supply.

2. **Private markets and private companies can respond quicker to a crisis in supply than any combination of government agencies and regulated monopolies.** We have cheap, reliable and abundant energy supplies today because government actions created incentives for private capital, ingenuity and initiative to solve the problem. For example, wind power development was stalled in the early 1980s, with hundreds of millions of federal dollars producing almost no usable electric power. When tax incentives were created for private companies, wind power generation grew in just five years, supplying nearly 5% of California's electricity by 1986. Today, electricity consumers all over California are requesting that their power come from "green" sources such as the wind.

Lesson: Water supply planners should take good notes and open up the region to a full-scale program of managed competition, including inviting such multi-billion-dollar enterprises as Enron and U.S. Filter to take part, along with large engineering and construction firms such as Bechtel and Fluor Daniel.

3. **The nation's energy crisis of 20 years ago was solved through a combination of deregulation, new institutional arrangements and offering attractive incentives for private capital to invest in new technologies for energy supply.** Local experience concurs. When the Portland region faced a solid waste disposal crisis in the mid-1980s with the closure of the St. Johns Landfill, an EPA Superfund site, it turned to a private company, Waste Management, to build a regional landfill with private funds to serve the city's needs. Two other private companies also built regional landfills east of the Cascades with their own funds. As a result, instead of a waste disposal crisis, the Pacific Northwest now has 40 years of guaranteed solid waste disposal capacity at regional landfills, at no cost to the taxpayers, and with far fewer environmental impacts than the publicly operated landfills they replaced.⁴²

Lesson: There are better uses for public investment money than spending hundreds of millions of dollars on water supplies when private capital is ready and willing to take on the task. We should think instead about *selling* our public water systems to private companies and creating an endowment with the money to help meet some of the city's unmet needs, such as funding for police, fire, and water bureau pensions.

4. **Improvements in energy conservation technology and management happened because there were economic incentives to do so.** Renewable energy and conservation technologies were fundamentally non-existent in 1975. Today, the United States and Western Europe, which faced similar crises, are exporting these technologies throughout the world.

Lesson: The City of Portland and the regional water supply agencies should get out of the water conservation business and instead create the incentives to allow conservation investments to be made for economic reasons. Because commercial and industrial users represent large percentages of water use in most cities of the region, and respond most clearly to economic reasoning, they should be the first targets.

5. **A new kind of business, called an Energy Service Company (ESCO) grew up in the wake of deregulation to fund and install energy conservation investments, sharing the savings with the equipment and facility owners.** Energy Service Companies are private sector responses to new economic opportunities; government didn't have to create or regulate them. They made their own deals

with private businesses who would benefit from reducing energy costs and were willing to share the savings with private entities.

Lesson: We can anticipate that Water Service Companies (WASCO's) will grow up in the wake of water supply and price deregulation. If the Portland Water Bureau were to establish a price it would pay for water conservation investments, at less than the cost of new supply investments, it would be able to buy conservation the same way it would buy new supply. Businesses would receive financial incentives to invest in conservation, perhaps as rebates on their water bills, perhaps as low interest loans. It's safe to predict that myriad businesses would find a way to make such savings pay for commercial and industrial water users (as well as homeowners) and to make a profit for themselves. This program would save the city's taxpayers and ratepayers tens of millions of dollars and would again serve to make Portland a model for progressive civic action in this arena.

THE PORTLAND WATER ABUNDANCE PLAN

The Portland Water Abundance Plan relies on three levels of public awareness and change in current water supply planning, procurement, distribution and sale. It requires a fundamental willingness on the part of the public water supply authorities to let go of the reins and give the promise of managed competition an opportunity to take root in the Portland area.

Managed Competition. Managed competition has successfully reduced the costs of sewage treatment plant operations, the sewage and stormwater collection system and one of the city's dams in Indianapolis,⁴³ and is now being introduced in Atlanta.⁴⁴ In Indianapolis, according to Mayor Stephen Goldsmith, the costs of sewer service were reduced by 20% (\$23 million in the first two years) and effluent violations fell by 50%, in a city that had been considered a model for efficient wastewater treatment plant operations.⁴⁵

Describing the Indianapolis experience, Mayor Goldsmith comments:

We consistently showed that free-market competition could do something critical to solve the fiscal crisis facing state and local governments: it could increase service while cutting costs, thereby changing the basic equation that describes government failure everywhere today. Competition could stop the spiral of higher taxes paying for worse services.⁴⁶

Managed competition does *not* require existing public employees to lose their jobs, current incomes or other benefits. In fact, it offers them the promise of greater freedom to do a better job than they are allowed to do today, and greater rewards for so doing. It may be the case, in such operational areas as running a monthly meter reading and billing system, that today's Portland Water Bureau employees would emerge the winners in a managed competition program. These are tasks that can easily be made more efficient by front-line employees and middle managers who know intimately the inefficiencies in the current system. However, even if a private operator submits a lower bid for the same work, many of the city's employees could be transferred to that company and might still be represented by the same union.

In other areas, such as running conservation investment programs, it is likely that private businesses, community and environmental groups would offer superior programs to government agency-run efforts. It may be that private engineering/construction companies would be willing to provide new water supply and distribution investments and to operate the current systems at a cost the public agencies would have trouble meeting. However, the purpose of managed competition is to allow all entities to compete fairly in public services, to the public's benefit.

Three Levels of Change. Specific measures proposed under this program are grouped under the following three levels, representing possibly increased difficulty in implementation (mostly for political reasons) and increased payoff in supply and economic benefit. The levels and programs are summarized in Table 4.

Level 1 - Improving on Business as Usual

1. **Implement proposals dating from the 1992 drought to provide monthly billing of water and sewer charges.** A conservation-oriented water pricing structure will not work if the city cannot send timely signals to consumers and businesses to reduce water use. Monthly billing is eminently feasible, and the city water bureau is just dragging its feet in implementing this change. Though more expensive, its benefits outweigh the cost, and the higher expense could make water officials more amenable to contracting out alternatives.
2. Provide timely notice (required under current wholesale water distribution contracts), to regional water customers over the next three years that future contracts with the City of Portland for wholesale water supplies (up for renewal beginning in 2004) will require adoption of conservation-oriented rate structures, monthly billing and aggressive investments in water conservation.

3. **Create a Portland Water Conservation Investment Fund**, using surplus revenues from a conservation-oriented increase in water rates, to begin a city-sponsored but privately run program of aggressive investments in water conservation technology in single-family residences, businesses and multi-family housing. (A recent report on conservation rate structures showed that Portland had made progress in setting up rate structures and programs to promote conservation, but still had a way to go, and that most other water agencies in the region lagged far behind.⁴⁷ Therefore, relying on the effectiveness of public agency-run conservation programs seems like a bad bet.)

The Portland Water Conservation Fund would be put under private-sector or institutional-sector management to see which companies or institutions (such as community organizations, environmental groups, or “water trusts”) can use technology and management incentives to create the highest amount of water conservation from a fixed level of investment. To address legitimate concerns of water agencies as to whether conservation investments will pay off, all such investments would be required to be: a) real, b) surplus, c) permanent and d) measurable.

Fund investments would come from more conservation-oriented rate structures that yield revenues above and beyond current needs for maintenance, debt service and general fund contributions. Assuming a first-year increase in revenues of 10%, an initial funding level of \$5.5 million per year is well within reach (this amount is about 10% of projected water sales in fiscal year 1998-99). Such funding would increase current city water conservation investments of about \$1 million per year, five-fold.⁴⁸

4. **Expand the economic incentives in the city’s increasing block rate water pricing program** by raising the current 50% rate differential between the lowest and highest rate blocks to 100% over a period of three years, and by applying the block rate pricing to sewer volume charges. These changes will promote effective conservation during future droughts by reducing both overall water use increases and peak summertime use. At the same time, the city needs to ensure that the poor will not face increases in their water bills by continuing its current program of subsidizing bills for lower-income ratepayers. For commercial users, the target must be to reduce water use year after year, or pay higher rates, adjusted by either gross sales or total

employees.

Level 2 - Managed Competition (Limited Scale)

1. **Create a managed competition program for meter reading, billing and collecting water use charges, on a monthly basis.** The city has had six years to create an effective monthly billing program and has not done so. This is an activity that private businesses can probably do better than public agencies. Open the competition to private utilities in the region as well as the city’s water bureau. This will create experience with managed competition that can be extended in the Level 3 program. In a similar competition, the City of Atlanta, Georgia, has chosen an outside operations and maintenance contractor, with a guaranteed savings of \$26 to \$28 million, depending on the length of the contract.⁴⁹
2. **Work closely with regional Bull Run water wholesale customers to negotiate changes in current water supply contracts that will mandate conservation-oriented water rate structures.** The prospect of locking in a long-term supply source could prevent suburban cities from using lower water rates for large industrial users as an incentive to attract water-intensive industries such as electronics manufacturing. To continue receiving high-quality and abundant Bull Run water from Portland, water wholesalers would agree to aggressively fund conservation investments, to adopt the same increasing block-rate structures as Portland and to take other measures to promote water conservation and the efficient use of water.
3. **Create a program of managed competition for water conservation investments** using money from the Portland Water Conservation Investment Fund. Entertain proposals from outside contractors to deliver specific amounts of conservation, selecting those that provide the “biggest bang for the buck,” in terms of real, permanent, verifiable water use reductions. Outside service providers could focus on either the residential or commercial sector and would work primarily on installing water-conserving technology upgrades.

Level 3 - Full-Scale Managed Competition

1. **Phase out city efforts to develop new water supplies as a government monopoly.** Entertain private-sector and city water bureau proposals to provide a mix of investments in conservation and new supplies to meet water needs scheduled through the year 2020. If the city decides to invest in another reservoir in the Bull Run watershed, then let private sector engineering and construction firms bid on the

complete project, including build, operate and transfer programs, in which a private company would build the system, operate for a fixed number of years (usually 15 to 25 years) at agreed upon rates, then transfer ownership to the city at a price set in advance.

2. **Open up the entire Portland Water Bureau operation to managed competition and remove it from management by city commissioners, breaking out the functions of water supply, billing and maintenance.** This bureau can be completely self-supporting and can contribute a negotiated amount each year to the city’s general fund. Whether managed by current water bureau managers or private companies, the water bureau needs to be removed from political control by elected officials. Powers to invoke rationing, in case of failure on the part of private managers during extreme droughts, can be retained by the city council.

As an example of this public/private partnership approach, the City of Evansville, Indiana, recently contracted out both water and sewer line maintenance, water meter billing, operation of the water filtration plant and water distribution management to a private company, while retaining control of customer service, billing, capital project planning and engineering and the monitoring of all contracts. Substantial savings in public costs were

guaranteed under contract by the private company.⁵⁰

Under managed competition, the water bureau could reduce its costs enough to self-fund a major water conservation program without raising overall revenues. In other words, the rate structure could still be made more aggressively pro-conservation without raising the total revenues of the water bureau. Therefore, the most water conserving residential and commercial customers could actually see their water bills drop, even as conservation investments were being aggressively funded.

3. **Keep title to Bull Run Watershed water, but sell the current water distribution and treatment system to a private operator to create a permanent endowment for the city’s unmet needs, such as underfunded police and fire pensions, as well as underfunded water bureau pension plan liabilities (\$142 million as of December 31, 1995).**⁵¹ As of June 30, 1996, the book (accounting) value of the city’s water system was \$200 million.⁵² At a paltry yield of 6%, selling the system at that valuation would yield \$12 million per year in perpetuity for the city’s pensions. At more realistic yields, the investment could yield up to \$20 million for the pensions. If sold to a private company, the city’s water system might well sell at a substantial premium above book value because of the benefit to the acquirer’s stock value. The City of Birmingham, Alabama is currently

Table 4. The Portland Water Abundance Plan

Program Elements	Level 1	Level 2	Level 3
Water Conservation Incentives	Monthly billing; Increase block-rate differentials	Managed competition for Portland water conservation funds	
Regional Water Supply Arrangements	Require conservation in contract renewals	Renegotiate current contracts to promote conservation rates	Managed Competition for regional water supply; Sell the current water treatment and distribution system
Funding Conservation Investments	Create Portland Water Conservation Investment Fund		
Portland Water Bureau Management		Managed competition for meter reading, billing, and collecting	Managed competition for all water bureau operations

considering a similar proposal to sell the water system to private investors, to pay for improvements to the city's schools.⁵³

Just as the City of Portland has tried to create a national model for urban livability over the past 20 years by energizing and incentivizing the private sector to rebuild downtown Portland, now is the time for the city to emulate the efforts of Indianapolis and other cities to become a model for efficient provision of major urban services through effective implementation of managed competition. The Portland Water Bureau is a good place to start.

BARRIERS TO IMPLEMENTATION

The most obvious barriers to implementation are institutional and political. The water bureaucracies will certainly argue they run a tight ship and, except for the 1992 drought, they deserve credit for keeping water supplies adequate for supplying the region's economic growth. There is certainly a measure of truth to this claim. In addition, one may anticipate the potential objection of the unions representing the Portland Water Bureau, although in a sound managed competition program, the water bureau employees could prevail. As Indianapolis showed, even the best run public water agency can reduce its costs when forced to compete.

In the City of Portland, with its antiquated system of political management of city agencies, it will take political courage to make the water bureau the first test case for managed competition. The issue will be for the city council to divest itself of authority over a revenue-producing agency and to tacitly admit that its management has not been the best. Such a divestiture may take public action to change aspects of the city's charter or action in the Oregon Legislature to allow the City of Portland to contract these functions to a private company. These legal requirements have not been investigated as part of this study.

Changes in water rates to promote conservation will be politically palatable if they are coupled with both a low-income rebate rate program (some of which is already in place) and an aggressively run Water Conservation Investment Fund that will help businesses, industries, rental property owners and homeowners make cost-effective conservation investments to reduce their water costs.

The managed competition option should be seriously considered before making any further regional decisions on water supply or conservation funding. In light of the high costs associated with the supply investments currently

proposed by regional water officials, the operational savings of 20% or more potentially available through managed competition should make the Portland Water Abundance Plan the most appealing solution.

CONCLUSIONS AND RECOMMENDATIONS

Long-term population and economic growth appears to be a reality in Portland's future, with population predicted to grow 45% over the next 20 years. The city and the region are ill-prepared to cope with another severe drought on the order of 1992's occurrence and certainly not with more than one drought-year at a time. This is true even as an emerging ethic of water conservation appears to have taken a slight hold in the region. There is a need for a better way to manage the region's water supply and demand in the future.

At a time when investments in the hundreds of millions of dollars for new water supplies are being discussed, the public should ask hard questions:

- Are there better ways to address the water supply situation, using marketplace mechanisms?
- Why shouldn't the water bureaucracies compete for the right to *continue* to enjoy a protected monopoly?
- Wouldn't we save money by having managed competition in water supply?
- Why haven't they come up with more imaginative programs for engaging the enormous entrepreneurial energy of the private sector in water conservation and new supply?
- Why, in light of the slow and to date inadequate response to the 1992 drought, shouldn't the water agencies yield to private enterprise in the management of the water system?

The most sensible alternative is to provide a staged program to introduce managed competition for all of the key water supply tasks: supply development and distribution, system maintenance, meter reading and billing, and conservation investments.

Beyond managed competition, the city should investigate selling the water supply treatment and distribution system altogether to a private operator for a one-time capital gain that could be applied to critical capital requirements, such as underfunded police, fire and water bureau pensions. The capital gain could be turned into a permanent endowment to provide protection against future tax increases as these

pension liabilities come due. The city will also be spared the need to go to the bond markets for water system and supply upgrades, preserving bonding capacity for other more essential purposes.

This Portland Water Abundance Plan proposes to introduce marketplace mechanisms into a century-old public bureaucracy as a feasible and cost-effective way to provide for adequate future water supplies to support the region's forecasted economic and population growth.

ENDNOTES

- 1 R. Gregory Nokes, "Little Sandy's future is fluid: Logs or water?" *The Oregonian*, March 10, 1997, p. B1.
- 2 R. Gregory Nokes, "Old idea for Bull Run might provide water solution." *The Oregonian*, February 21, 1998, p. B1.
- 3 Water Providers of the Portland Metropolitan Area, *Regional Water Supply Plan: Final Report*, Portland, October 1996.
- 4 "Old idea for Bull Run might provide water solution." op. cit.
- 5 METRO, *Urban Growth Report, Final Draft*, Portland, December 18, 1997, p.1.
- 6 Ibid, p. 71; METRO, *Urban Growth Report Addendum, Draft*, Portland, August 26, 1998, p. 7.
- 7 City of Portland Bureau of Water Works, *Ten Year Financial Plan*, Portland, July 1997, p. 34.
- 8 City of Portland Bureau of Water Works, *Combined Annual Reports (1992-1993; 1993-1994)*, Portland, 1994, p. 12.
- 9 "Pay for water use: Higher prices for water abuses would be better than midnight water police patrols." *The Oregonian*, July 31, 1992, p. B2.
- 10 Dana Haynes, "Future of water supply considered." *The Oregonian*, November 24, 1992, p. B2.
- 11 City of Portland Bureau of Water Works, *Water Rates/ Sewer Rates (1998-99)*, Portland, July 1998. Note that 100 cubic feet of water equals about 750 gallons.
- 12 City of Portland Bureau of Water Works, *Combined Annual Reports (1993-1994; 1994-1995)*, Portland, 1995; *Water Rates/Sewer Rates (1998-1999)*, op. cit.
- 13 City of Portland Bureau of Water Works, *Water System Demand Study*, Portland, February 1992.
- 14 *Combined Annual Reports (1993-1994; 1994-1995)*, op. cit.
- 15 City of Portland Bureau of Water Works, *Stretch our Summer Supply: It Benefits Everyone*, consumer pamphlet, Portland, 1998.
- 16 Ann Conway, Finance Section, Portland Water Bureau, personal communication.
- 17 *Urban Growth Report Addendum, Draft*, op. cit., p. 15.
- 18 *Urban Growth Report, Final Report*, op. cit.
- 19 *Regional Water Supply Plan: Final Report*, op. cit.
- 20 City of Portland City of Portland Bureau of Water Works of Water Works, data sheet through 6/30/95, July 19, 1995; City of Portland Bureau of Water Works, *1996-1997 Annual Report*, Portland, 1997, p. 6; *Stretch our Summer Supply: It Benefits Everyone*, op. cit.
- 21 *Ten Year Financial Plan*, op. cit., p. 23.
- 22 Erik Sten, "Expanding the Portland Water System," presentation to the Regional Water Providers Consortium, Portland Water Bureau, Portland, September 9, 1998.
- 23 *Regional Water Supply Plan: Final Report*, op. cit., p. 56
- 24 *Ibid*, p. 61
- 25 *Ibid*, p. 44.
- 26 *Ibid*, p. 68.
- 27 *Ibid*, p. 242.
- 28 R. Gregory Nokes, "A framework for growth: Metro's regional plan aims to guide growth and livability." *The Oregonian*, December 11, 1997, p. A21.
- 29 *Regional Water Supply Plan: Final Report*, op. cit., p. 265.
- 30 *Ibid*, p. 264.
- 31 *Ibid*, p. 264.
- 32 Roberta Jortner and Cynthia Dietz, "Regional Water Conservation Presentation," presentation to the Regional Water Providers Consortium, Portland, September 9, 1998.

33 Jortner and Dietz, op. cit.

34 Rocky Mountain Institute, *Water Efficiency: A Resource for Utility Managers, Community Planners, and Other Decisionmakers*, Snowmass, Colorado, 1991.

35 Oregon Environmental Council, *Water Conservation: Is the Price Right?*, Portland, 1998, pp.15-17.

36 Jortner and Dietz, op. cit.

37 Lars G. Hansen, "Water and Energy Price Impacts on Residential Water Demand in Copenhagen," *Land Economics*, February 1996, v. 72, n. 1, pp. 66ff.; Terry L. Anderson and Pamela Snyder, *Water Markets: Priming the Invisible Pump*, Cato Institute, Washington, D.C.

38 *Water System Demand Study*, op. cit.

39 Eric Sten, "Our challenge is to make storm-water rates fairer." *The Oregonian*, East Zone edition, March 12, 1998, p. 2.

40 *1996-1997 Annual Report*, op. cit.

41 *Water Rates/Sewer Rates (1998-1999)*, op. cit.

42 United States Environmental Protection Agency, *Municipal Landfill Regulations Mean Safer Disposal of Solid Waste*, EPA/530-SW-91-066, Washington, D.C., September 1991.

43 Stephen Goldsmith, *The Twenty-First Century City*, Regnery Press, New York, 1997, pp. 33-36, 199-211.

44 "Cities Mull Utility Outsourcing," *Engineering News-Record*, September 7, 1998, p. 16.

45 Goldsmith, op. cit., pp. 207-208.

46 *Ibid*, p. 29.

47 Oregon Environmental Council, op. cit.

48 Jortner and Dietz, op. cit.

49 *Engineering News Record*, op. cit.

50 Jack J. Danks, *Public/Private Partnerships: Breaking New Ground*, Public Works, September 1998, pp. 45-50.

51 *1996-1997 Annual Report*, op. cit.

52 *Ibid*.

53 *Engineering News Report*, op. cit.

ADDITIONAL SOURCES

Neal, Kathy, et al., *Restructuring America's Water Industry: Comparing Investor-Owned and Government-Owned Water Systems*, Reason Foundation, No. 200, Los Angeles, January 1996.

White River Environmental Partnership, *City of Indianapolis Contract Operations of the AWT Facilities and Collection System: 4th Year Summary of Activities*, United Water Services, Harrington Park, New Jersey, 1998.