

**STUDY  
OF POTENTIAL  
WATER EFFICIENCY IMPROVEMENTS  
IN COMMERCIAL BUSINESSES**

**Final Report**

**U.S. Environmental Protection Agency  
Grant Number CX 823643-01-0  
with the State of California  
Department of Water Resources**

**April 1997**

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**Study Objectives**

The purpose of the study is to identify which types of commercial water users have the highest potential to improve water-use efficiency.

The study objectives are to:

1. Quantify the water consumption of commercial water users in at least ten metropolitan areas in the United States.

2. Quantify the potential cost-effective water savings achievable by different categories of commercial water users.
3. Estimate the volume of water potentially saved for each of the commercial categories for each of the selected metropolitan areas.

### **Definition of Commercial Water Users**

This study focuses on commercial customers of water utilities. The California Urban Water Conservation Council adopted the following definition of commercial water users:

Commercial customers include customers that provide or distribute a product or service, such as hotels, restaurants, office buildings, commercial business, and other places of commerce. Also included are establishments dedicated to public service, including schools, courts, churches, hospitals, and government facilities. All facilities serving these functions are included regardless of ownership.

Excluded from the study are the following types of customers: single or multifamily residences, agricultural users, or customers that are primarily manufacturers or processors of materials as defined by the Standard Industrial Classifications Code numbers 2000 through 3999.

Commercial businesses were grouped into 22 categories of commercial water users (see Table 1 "Commercial Business Categories Defined"). The category depended upon the type of water use, or combination of water uses common for those types of business. The common types of water uses considered were: toilet use for employees and customers, laundries, kitchens, process water, cooling towers, and public toilet facilities.

Table 1

<b>COMMERCIAL BUSINESS CATEGORIES DEFINED</b>		
	<b>SIC CODES INCLUDED</b>	<b>CATEGORIES DEFINED AND BUSINESS TYPES INCLUDED</b>
<b>Car Washes</b> self-serve car washes	7542-7549	car washes, but not self-serve
<b>Church/Sanctuary</b>	8661	includes other religious buildings
<b>Communications &amp; Research</b>		high air conditioning load, some process uses
	7812-7819, 4812-4899, 9661	radio/tv studio, motion picture production, electronic communications, space research & technology laboratories
<b>Correctional Facility</b>	922	
<b>Education</b> schools	8211	elementary/secondary, schools with large landscapes but without dormitories
museums & libraries	8231, 8412, 8243-8249	vocational, libraries, museums, without large landscapes nor dormitories
colleges/other schools	8221-8222, 8299	includes other educational group residences
social services	832-839	job training, child care, family services
<b>Golf Courses</b>	7992	
<b>Health Care</b> health services	8071-8099	doctors offices, day clinics, medical labs
hospitals & nursing homes	8062-8069, 8051-8059	overnight medical care
<b>Hospitality</b> restaurant/bar	5812-5813	eating & drinking places including fast food
overnight accommodations	7011, 7041, 7032-7033	hotels with food, hotels and motels without food, camps and recreational vehicle parks
other group shelter	7021, 7041	rooming houses, organization hotels
<b>Landscape, Agriculture &amp; Animal Services</b>	0781-0783, 0711, 0721-0724, 0741-0742, 0751-0752, 0211-0291, 0971	landscape horticultural services, agriculture, soil preparation, crop services, veterinary, equestrian, livestock, poultry, game propagation
<b>Landscape &amp; Irrigation</b>	8422, 4971	parks, gardens: trees, botanical, zoological: pool/fountain, cemeteries, open land
<b>Laundries</b>	7211-7219	laundromat, cleaning & dyeing fabrics, industrial laundries

Table 1 (continued)

Meeting and Recreation	SIC CODES INCLUDED	CATEGORIES DEFINED AND BUSINESS TYPES INCLUDED
convention center		includes meeting halls, auditoriums
recreation & theaters	7911-7991, 7832-7833	bowling, theaters, movies, dance studios, etc. generally without a kitchen or large landscapes
amusement parks		water used as major feature, i.e., rides, visual effects
<b>Military</b>	9711	
<b>Misc. Commercial</b>		
warehousing	4221-4226	public warehousing & storage
warehouse-cold storage		
boat dock		
<b>Nonprofit Service &amp; Organizations</b>	8611-8699 except 8661	professional, labor, civic, political social organizations except churches
<b>Offices</b>	6011-6799, 9111-9211, 9311-9651	finance, insurance, real estate, government
<b>Passenger Terminals</b>	4173, 4231, 4481, 4580	airports, bus stations, passenger docks
<b>Sales - Retail &amp; Wholesale</b>		
grocery stores	5411-5499	supermarkets, prepare foods and have freezers
convenience stores		little seating or kitchens, but have ice and beverages
dry goods	5611-5736, 5912-5963	wholesale and retail, clothiers, furniture, electronics, liquor, used goods, drug stores
<b>Services - Personal &amp; Business</b>		
misc. repair services	7621-7699,	
crematories, funeral homes	7261	
laboratories		
printing	2711-2796	
<b>Transportation &amp; Fuels</b>	5983-5989, 4212-4215, 4311, 4783-4789, 4011-4013, 4111-4151, 4412-4499, 4512-4581	fuel dealers, couriers, postal services, railroads, local & suburban transport, water transportation, scheduled air transportation, air courier, pipelines, miscellaneous services to transportation - but not passenger terminals.

Table 1 (continued)

Utilities & Infrastructure	SIC CODES INCLUDED	CATEGORIES DEFINED AND BUSINESS TYPES INCLUDED
police & fire station	9221-9229	
public works/utility	4911, 4931-4939	
electric steam, natural gas	4931-4939, 4961	
gas production & distribution	4922-4925	
sanitary collection & disposal	4953	
construction	1521-1799	
fumigating		
septic tank cleaning	7699	
<b>Vehicle Dealers &amp; Services</b>	5511-5591, 7521, 7532-7539	auto, motorcycle, recreation vehicle (including boats) dealers new and used, parking garages, service stations, repair shops - but not car washes

## **Quantify Commercial Water Use at U.S. Water Utilities**

The American Water Works Association generously provided a list of water utilities with 50,000 or more connections and metered commercial customers. DWR used the list and contacts with members of AWWA's Water Conservation Committee to find study participants. Several factors hindered the effort: few utilities can identify commercial water customers by the types of business and can download the data in a usable form; DWR tried to include utilities from different parts of the country to provide geographical balance to the survey.

Participating utilities were requested to provide 12 months of water-use data for commercial customers. DWR sought 1994 or 1995 total water-use data in the defined commercial water user categories (such as hotels), but not data about individual customers. Definitions of the water-use categories were required if Standard Industrial Classifications codes were not used.

The following utilities provided commercial water-use data for the study:

- City of Austin, Texas
- City of Burbank, California
- East Bay Municipal Utility District, California
- Erie County Water Authority, Buffalo, New York
- City of Fresno, California
- City of Glendale, California
- Miami Dade Water & Sewer Authority, Miami, Florida
- Orlando Utilities Commission, Orlando, Florida
- City of Portland, Oregon
- City of San Diego, California
- City of Santa Monica, California
- City of Santa Rosa, California
- City of St. Paul, Minnesota

Data was provided in different formats. Some agencies presorted and summarized their data on paper. Several California utilities provided data (thousands of commercial customer records) on computer spreadsheets which DWR used to develop commercial water-use summaries. DWR helped the City of Fresno to organize its data. The results are shown as "Commercial Water Use of Participating Utilities" on Table 2, and detailed in Appendix 2.

**Table 2**  
**Commercial Water Use of Participating Utilities**

Category	AUSTIN TEXAS 1992	BUFFALO NEW YORK 1995	BURBANK CALIF. 1995	EBMUD CALIF. 1994	GLENDALE CALIF. 1995	MIAMI FLORIDA 1995	ORLANDO FLORIDA 1995	PORTLAND OREGON 1995	SAN DIEGO CALIF. 1995	SANTA MONICA CALIF. 1995	ST. PAUL MINNISOTA 10/94-9/95	SANTA ROSA CALIF. 1994
	Water Use in Hundreds of Cubic Feet per Year											
	Percent of All Reported Commercial Use											
Car Washes		67,535 2%	12,240 1%	98,781 0%	7,767 0%		22,206 0%		58,848 1%	22,044 3%	29,046 1%	8,084 1%
Church	187,219 1%	9,888 0%	7,008 1%		51,794 3%	258,528 1%	77,980 1%	122,741 0%	91,164 1%	1,824 0%	34,857 1%	18,368 3%
Communications & Research	14,597 0%	2,000 0%	290,292 28%	39,965 0%	149,153 8%		115,119 1%		227,760 3%	12,396 1%	84 0%	1,726 0%
Correctional Facility	90,875 1%						17,228 0%					
Education	1,459,362 11%	30,549 1%	106,272 10%	2,167,958 8%	137,373 7%	1,590,888 7%	171,570 2%	78,477 0%	875,676 11%	103,644 12%	200,585 9%	72,731 11%
Health Care	763,544 6%	376,395 12%	174,398 17%	1,487,408 6%	349,605 18%	2,494,689 11%	831,874 5%	1,028,767 4%	839,676 11%	177,000 20%	403,142 17%	107,578 16%
Hospitality	1,737,024 13%	658,794 21%	122,496 12%	2,075,412 8%	258,265 13%	3,804,931 18%	3,862,083 35%	1,600,716 5%	2,631,084 34%	334,032 39%	374,122 16%	184,953 28%
Irrigation	285,815 2%	161,825 5%		8,733,586 22%	98,218 5%		89,074 1%	482,448 2%	326,908 4%	89,376 10%	73,130 3%	1,983 0%
Landscape, Agriculture & Animal Services	5,972 0%	71,063 2%	10,500 1%	109,808 0%			16,507 0%	479,187 2%				1,945 0%
Laundries			36,732 4%	680,800 3%		628,061 3%	235,928 2%	323,873 1%		33,918 4%		36,883 5%
Meeting and Recreation	125,882 1%	107,246 3%	25,812 2%	556,598 2%	184,084 10%	56,513 0%	58,455 1%	2,096 0%	166,176 2%	27,240 3%	116,764 5%	2,869 0%
Military	318,728 2%						1,984 0%					2,183 0%
Misc. Commercial						6,736,551 31%	49,914 0%		4,946 0%		10,760 0%	
Nonprofit Service & Orgs		44,774 1%		611,818 2%	11,325 1%		84,623 1%		15,228 0%		18,259 1%	3,263 0%
Offices	1,829,299 14%	497,413 16%	118,524 11%	1,852,697 7%	245,340 13%	2,666,588 12%	1,074,104 10%	1,672,894 6%	582,840 8%		305,756 13%	101,261 15%
Passenger Terminals	58,881 0%	36,707 1%	24,060 2%		1,000 0%		1,127 0%	87,445 0%	17,148 0%	2,844 0%	3,806 0%	
Sales	893,041 7%	571,091 18%	97,560 9%	1,022,589 4%	67,906 4%	1,797,959 8%	256,773 2%	877,507 3%	555,168 7%	57,132 7%	280,762 12%	49,612 8%
Services	738,595 6%	6,941 0%	6,132 1%	681,272 3%	95,430 5%		49,702 0%	220,230 1%	1,003,260 13%		4,884 0%	2,833 0%
Transportation & Fuels		36,238 1%		365,697 1%	11,058 1%		82,029 1%	593 0%			14,202 1%	7,350 1%
Utilities & Infrastructure	4,235,180 32%	20,983 1%	8,016 1%	491,222 2%	162,833 8%		619,718 3%	21,461,833 73%	74,898 1%		1,381 0%	18,798 3%
Vehicle Dealers & Services	118,227 1%	106,674 3%	2,496 0%	152,872 1%	80,043 4%	207,131 1%	233,356 2%	146,263 0%	202,068 3%	4,956 1%	79,089 3%	31,759 5%
Warehousing	234,856 2%	340,822 11%		8,038,751 31%	8,619 0%	1,460,386 7%	3,427,453 31%	817,348 3%	2,508 0%		395,868 17%	1,648 0%
TOTAL REPORTED COMMERCIAL USE	13,094,795	3,146,634	1,042,536	26,127,234	1,919,904	21,699,183	11,078,483	29,382,518	7,674,446	866,404	2,346,277	657,624

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The data has several anomalies. Some utilities called categories by different names; for instance, some put churches under nonprofit organizations. Miami combined many commercial customers into "Misc. Commercial." "Correctional Facility" and "Military" are absent from most utility reports. In San Diego, the Navy has a huge presence but was excluded from the water audit program which was the source of the data. Burbank, San Diego, and Santa Monica excluded customers with less than 200 HCF of annual water use. Burbank reports large water use for its motion picture industry (communications), although the data includes Universal Studios with its very large amusement park. Portland includes wholesale transfers of water to other utilities in the "Utilities" category. A dearth of sales to "Golf Courses" leads one to suspect that many golf courses have alternate water supplies. To use the data fully, local utilities need to understand what the data actually represents.

### **Estimating Potential Water Savings for Commercial User Categories**

The Metropolitan Water District of Southern California data base of commercial water audit results was extremely valuable in quantifying potential water savings percentages. The City of Tucson, Arizona and the Massachusetts Water Resources Authority (through its consultant - ERI Services) provided additional site data. The initial data included 194 site audits which were later expanded to 744 audits.

The purpose of the water audits was to recommend cost-effective measures to improve water-use efficiency. Generally, cost included capitol costs and any increase in labor while benefits included decreased costs for labor, natural gas, electricity, water, and wastewater. The term "cost effective" means that the measure would have a simple payback usually acceptable to the type of business where the audit was conducted. For a restaurant, the payback might be two years; for an elementary school, the payback might be five years. Since water and wastewater rates vary from one utility to another, businesses served by different utilities may have widely different payback periods.

Table 3 presents water savings potential for various types of businesses. Not all categories were equally or adequately represented by water-use data. Some categories, such as churches, nonprofit, golf courses, and landscape irrigation had few sites where water audits had been conducted. Churches were combined with nonprofit. Correctional facilities, military, utility, and passenger terminals had only six audited sites. No sites identified as warehouses were audited although a number of transportation facilities were audited and participating utilities reported substantial water use for warehouses. Other categories had no reported water use. The original 22 categories were reduced to 18 (see Table 3 "Potential Water Savings From On-Site Water Audits").

To acknowledge the variation of potential savings from site to site, a range of potential savings was developed. Figure 1 "Potential Water Savings From On-site Water Audits" displays the range of savings for 18 categories of commercial water users.

Table 3

<b>POTENTIAL WATER SAVINGS FROM ON-SITE WATER AUDITS</b>					
<b>Type of Business</b>	<b>Number of Site Audits</b>	<b>Average minus 1 std. dev.</b>	<b>Average</b>	<b>Average Plus 1 Std. Dev.</b>	<b>Standard Deviation</b>
car wash	12	3%	27%	51%	24%
church - nonprofit	19	14%	31%	48%	17%
communications & research	10	0%	18%	40%	22%
corrections	2	8%	14%	20%	6%
eating & drinking	102	14%	27%	41%	14%
education	168	4%	20%	36%	16%
healthcare	90	11%	25%	40%	14%
hospitality*	222	8%	22%	35%	13%
hotel & accommodations	120	6%	17%	28%	11%
landscape irrigation	6	7%	26%	44%	19%
laundries	22	0%	15%	32%	17%
meeting/recreation	20	7%	27%	48%	21%
military	1		9%		
offices	19	11%	28%	45%	17%
sales	56	12%	27%	42%	15%
services	58	13%	30%	47%	17%
transportation & fuels	24	11%	31%	50%	20%
vehicle dealers & services	12	6%	17%	27%	10%
<b>Total Sites</b>	<b>741</b>				
* Hospitality includes "eating & drinking" and "hotels & accommodations"					

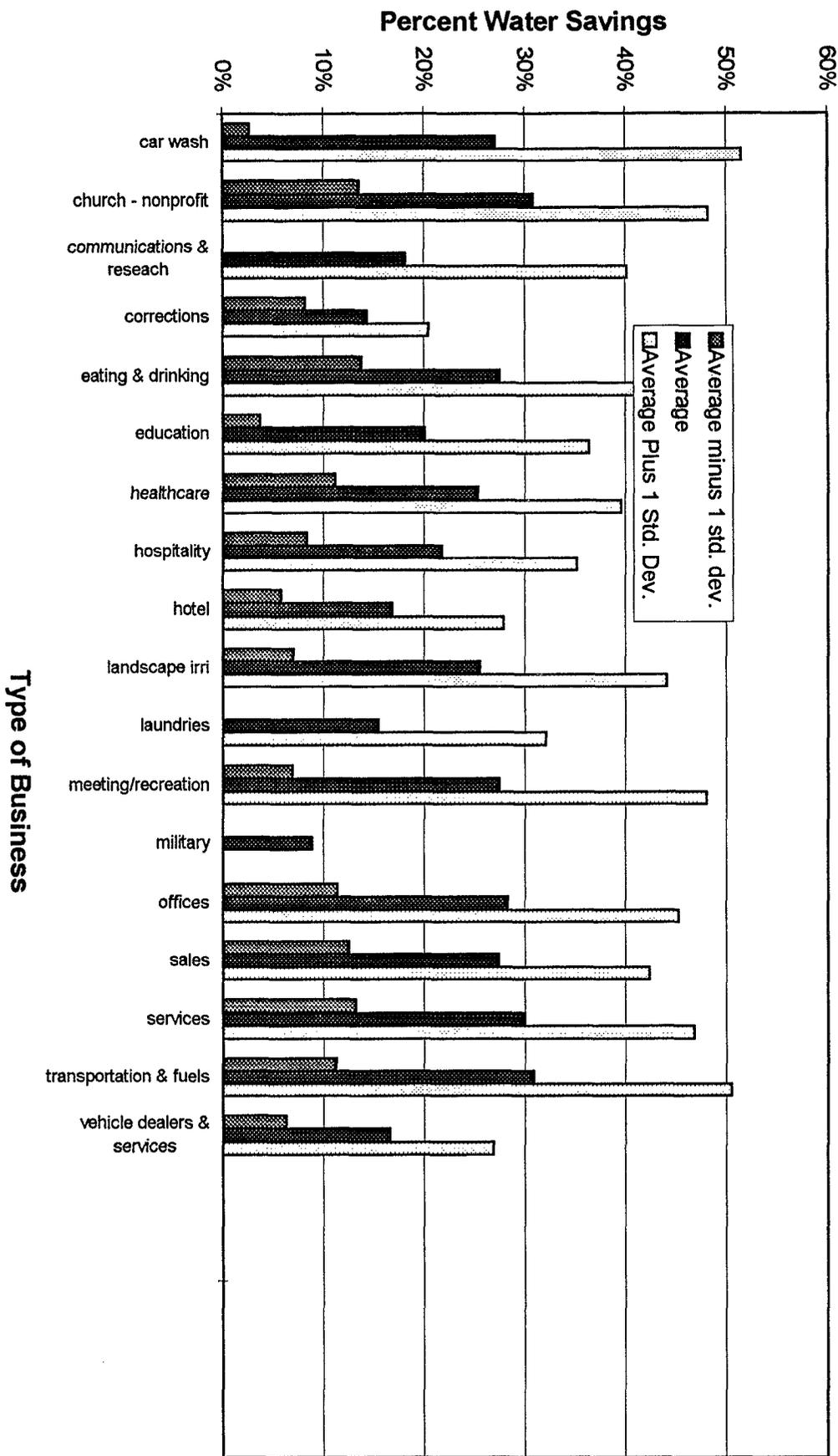


Figure 1  
Potential Water Savings from On-site Water Audits

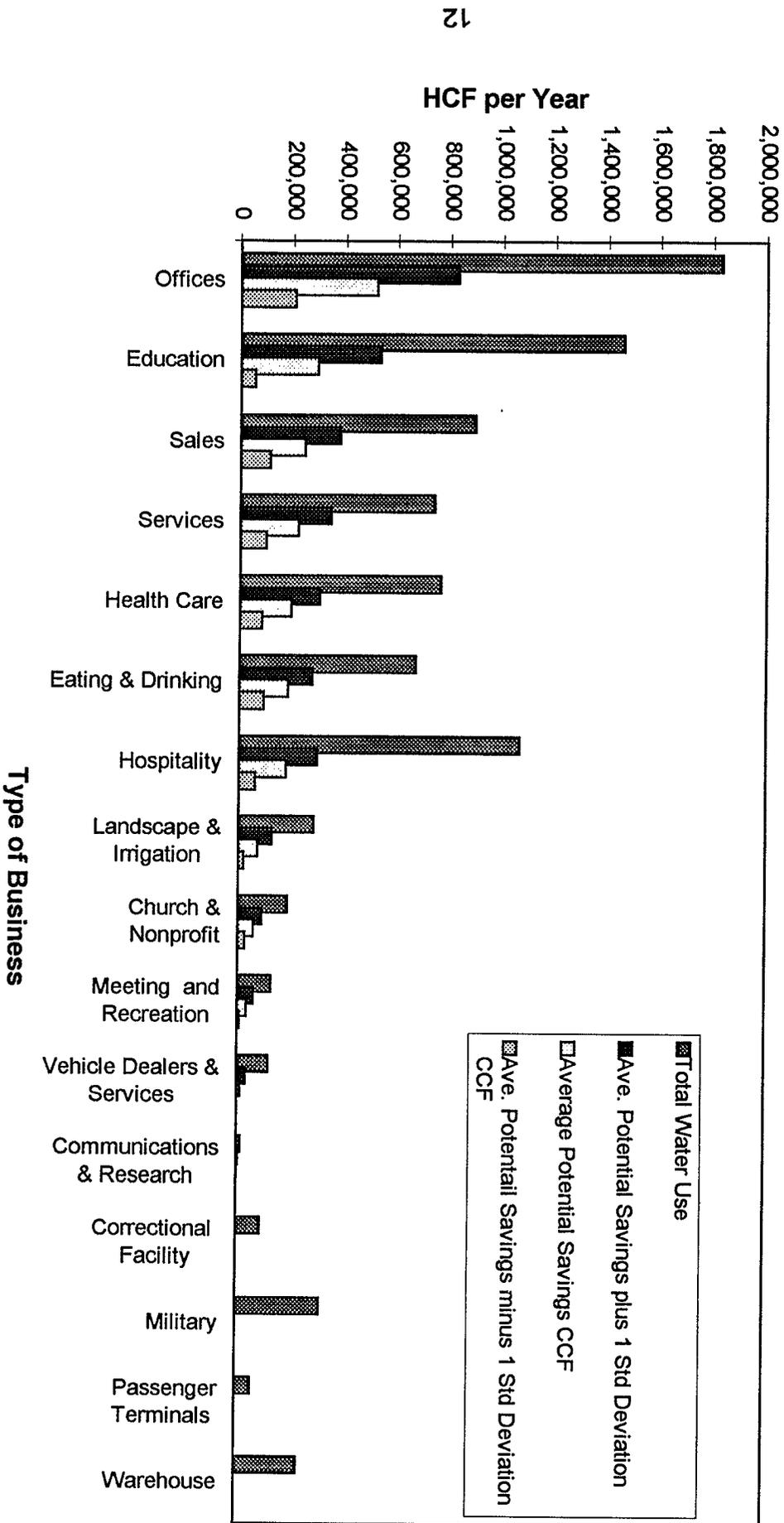
## **Estimating Potential Water Savings Volumes for Each Utility**

The third objective was to estimate the volume of water potentially saved for each commercial category in each of the participating utilities. DWR made the estimates by multiplying the volume of water use (Table 2) by the potential water savings percentage (Table 3) for each category. The ranges of potential savings and the total water use are displayed for each utility on 13 bar charts titled "Potential Water Savings by Commercial Users" (Figures 2-14).

For each utility, the chart displays the percent overall potential savings. DWR calculated this value by totaling the volume of average savings for all commercial categories, then dividing by the total volume of commercial water use. The potential water savings for commercial water users ranges from 20 percent to 25.6 percent, with an average of 22.2 percent.

Figure 2

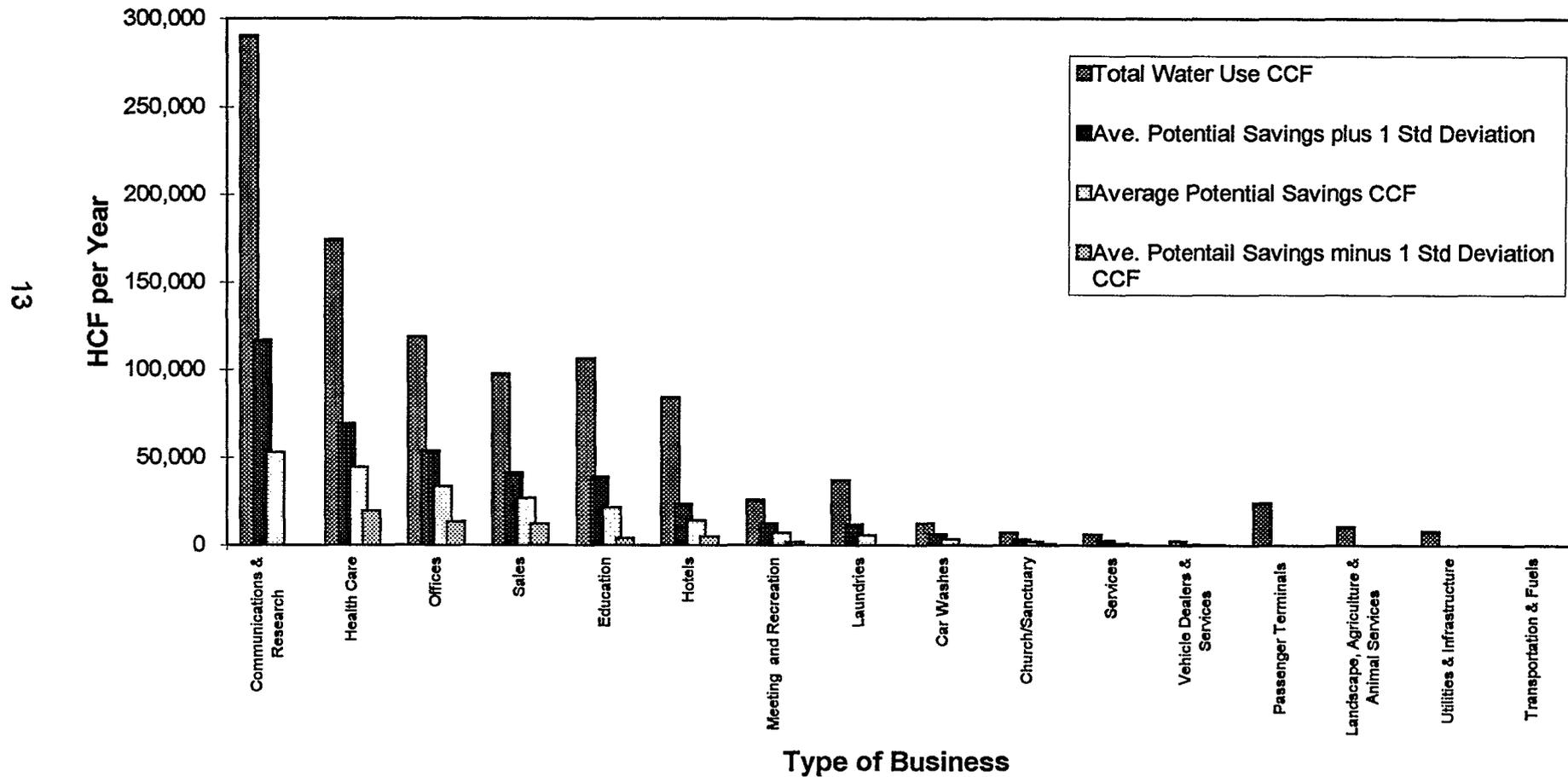
## Austin, TX Potential Water Savings by Commercial Users 1992 data



Total Reported Commercial Use: 8,853,643 HCF (20325 AF)  
 Total Average Potential Savings: 2,013,649 HCF (4623 AF)  
 Overall Potential Savings: 23%

Figure 3

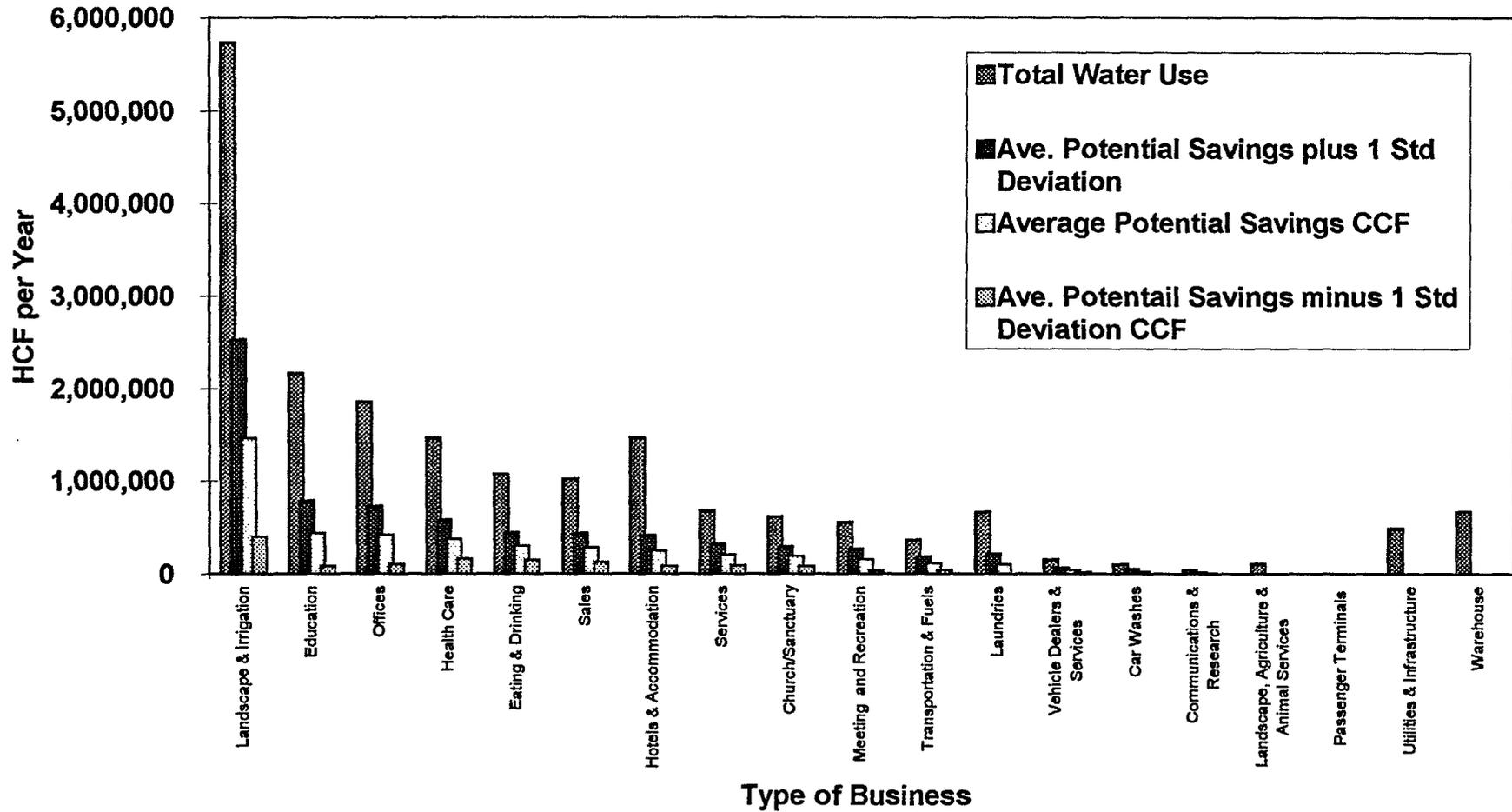
### Burbank, CA Potential Water Savings by Commercial Water Users 1995 data



Total Reported Commercial Use: 1,042,536 HCF (2393.3 AF)  
 Total Potential Savings: 212,380 HCF (487 AF)  
 Overall Potential Savings: 20 %

Figure 4

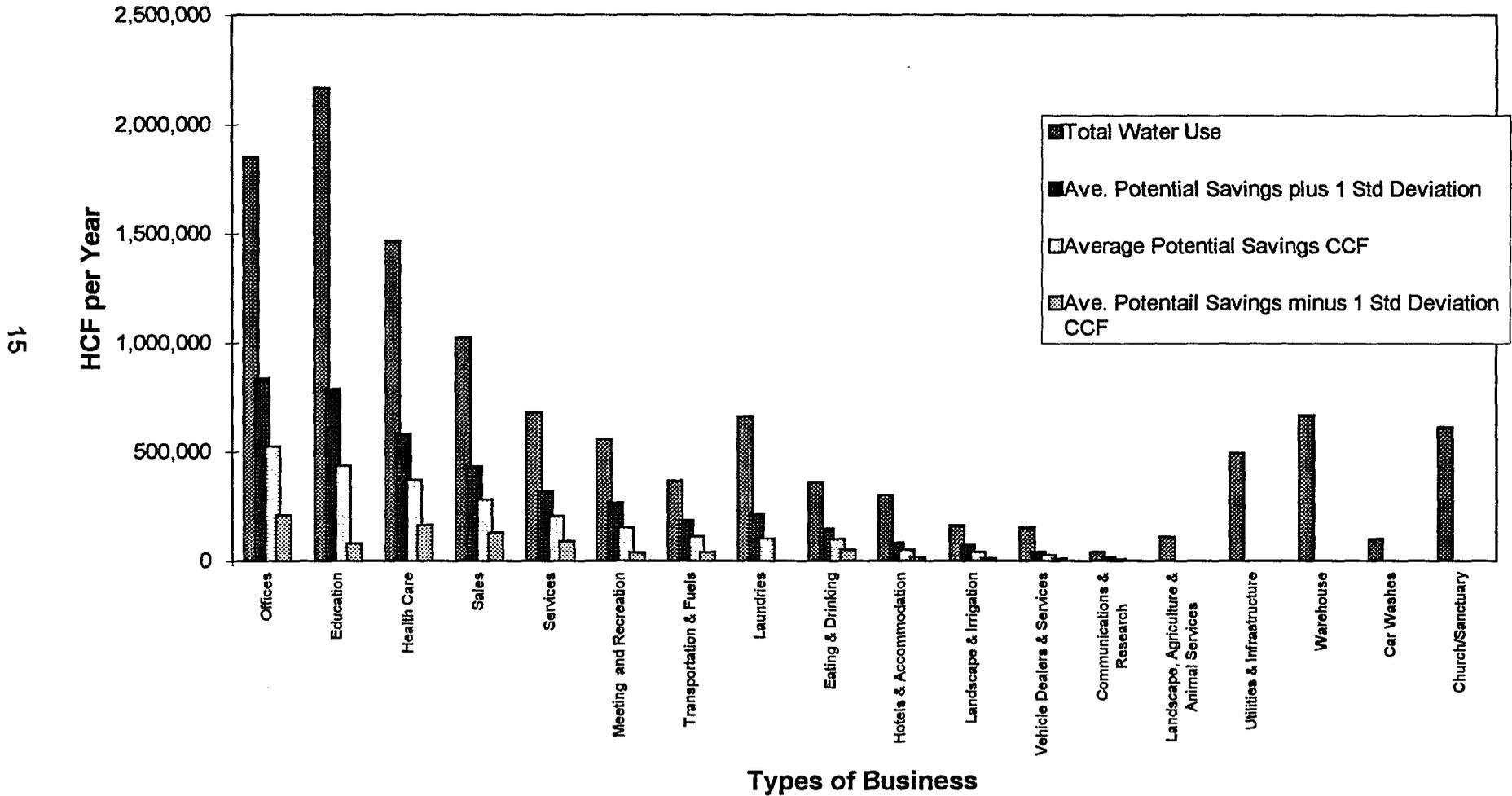
**East Bay Municipal Utility District, CA  
Potential Water Savings by Commercial Users  
1995 data**



Total Reported Commercial Use: 19,220,417 HCF (4412.0 AF)  
 Total Potential Savings: 4,344,089 HCF (9972.6 AF)  
 Overall Potential Savings: 23%

Figure 5

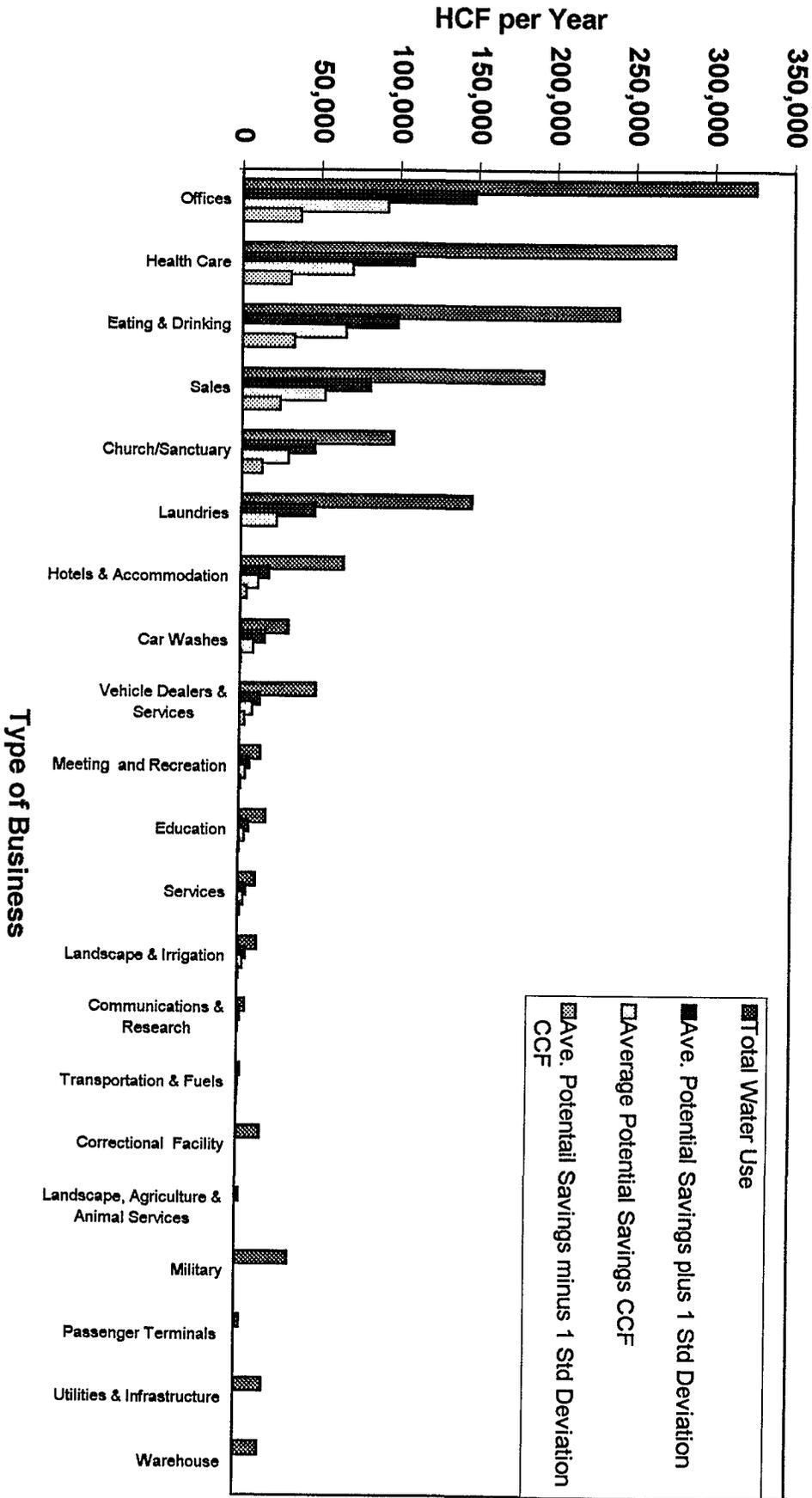
### Erie County Water Authority, NY Potential Water Savings by Commercial Users 1995 data



Total Reported Commercial Use: 11,765,305 HCF ( 27009.4 AF)  
 Total Potential Savings: 2,405,044 HCF (5521 AF)  
 Overall Potential Savings: 20%

Figure 6

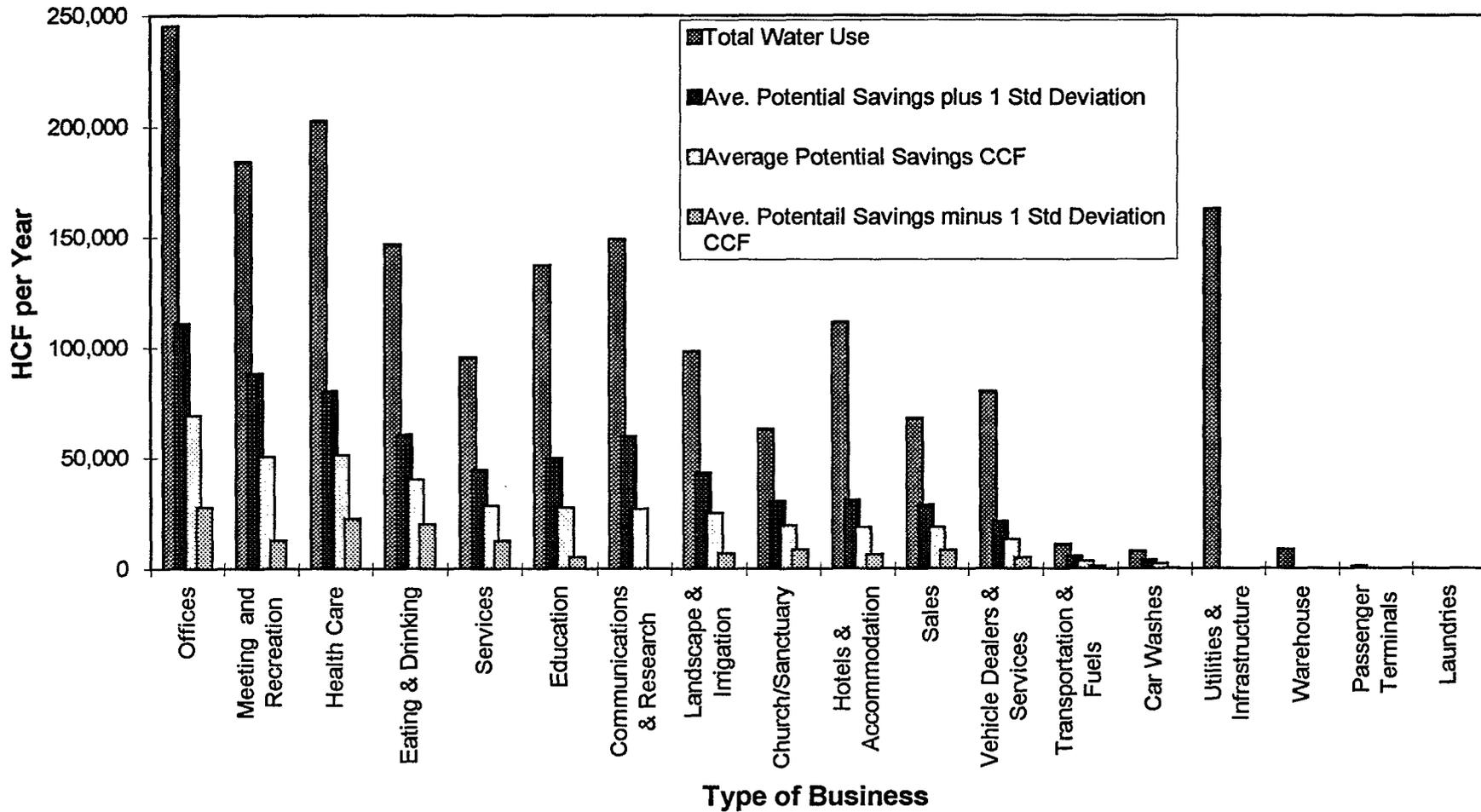
**Fresno, CA**  
**Potential Water Savings by Commercial Users**  
**1995 data\***



\* Fresno data incomplete to to changing data system

Figure 7

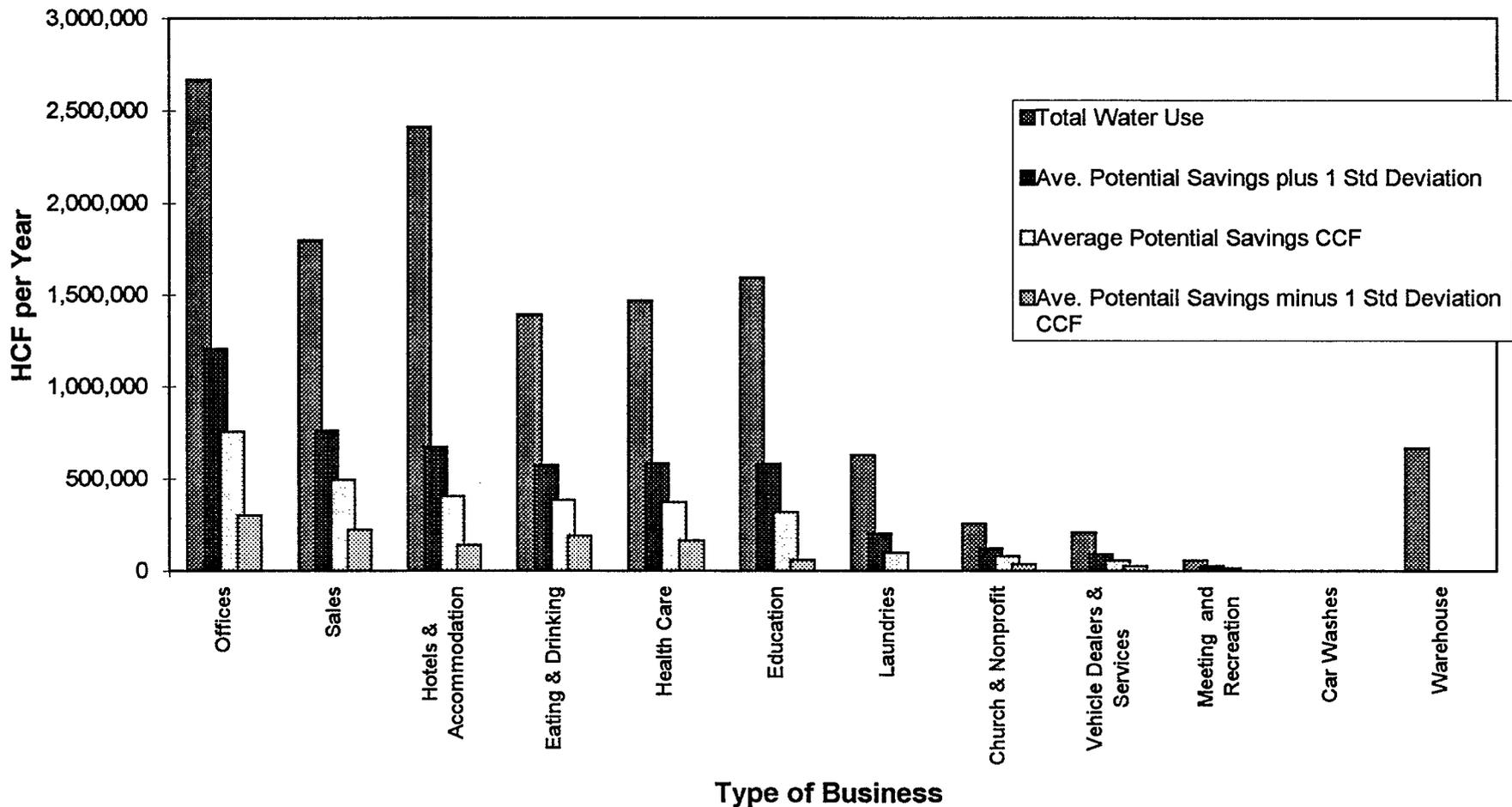
### Glendale, CA Potential Water Savings by Commercial Water Users 1995 data



Total Reported Commercial Use: 1,773,016 HCF (4070 AF)  
 Total Potential Savings: 395,467 HCF (908 AF)  
 Overall Potential Savings: 22 %

Figure 8

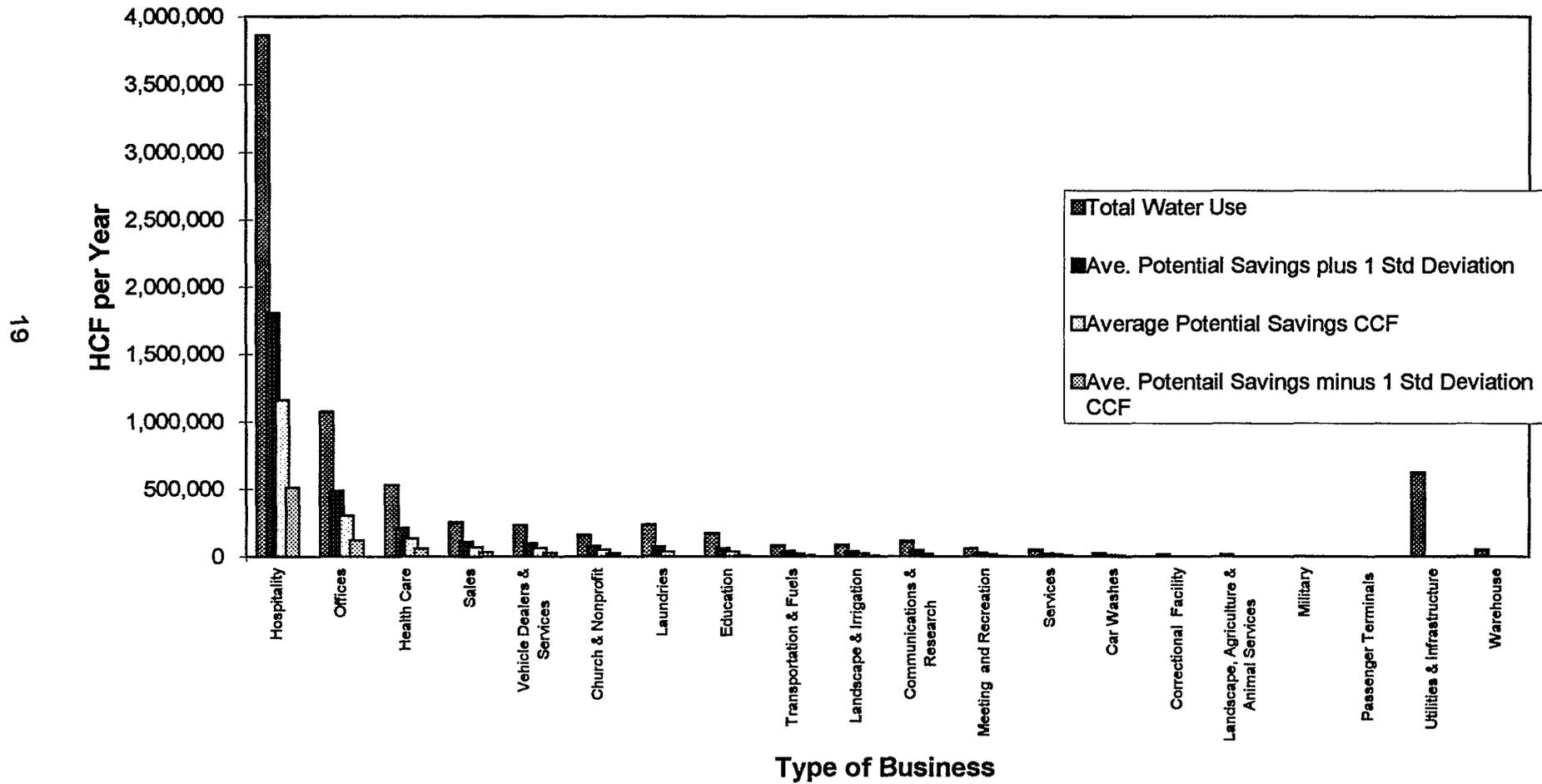
**Miami, FL**  
**Potential Water Savings by Commercial Users**  
**1995 data**



Total Reported Commercial use: 13,140,506 HCF (30166 AF)  
 Total Potential Savings: 2,973,270 HCF (6826 AF)  
 Overall Potential Savings: 22 %

Figure 9

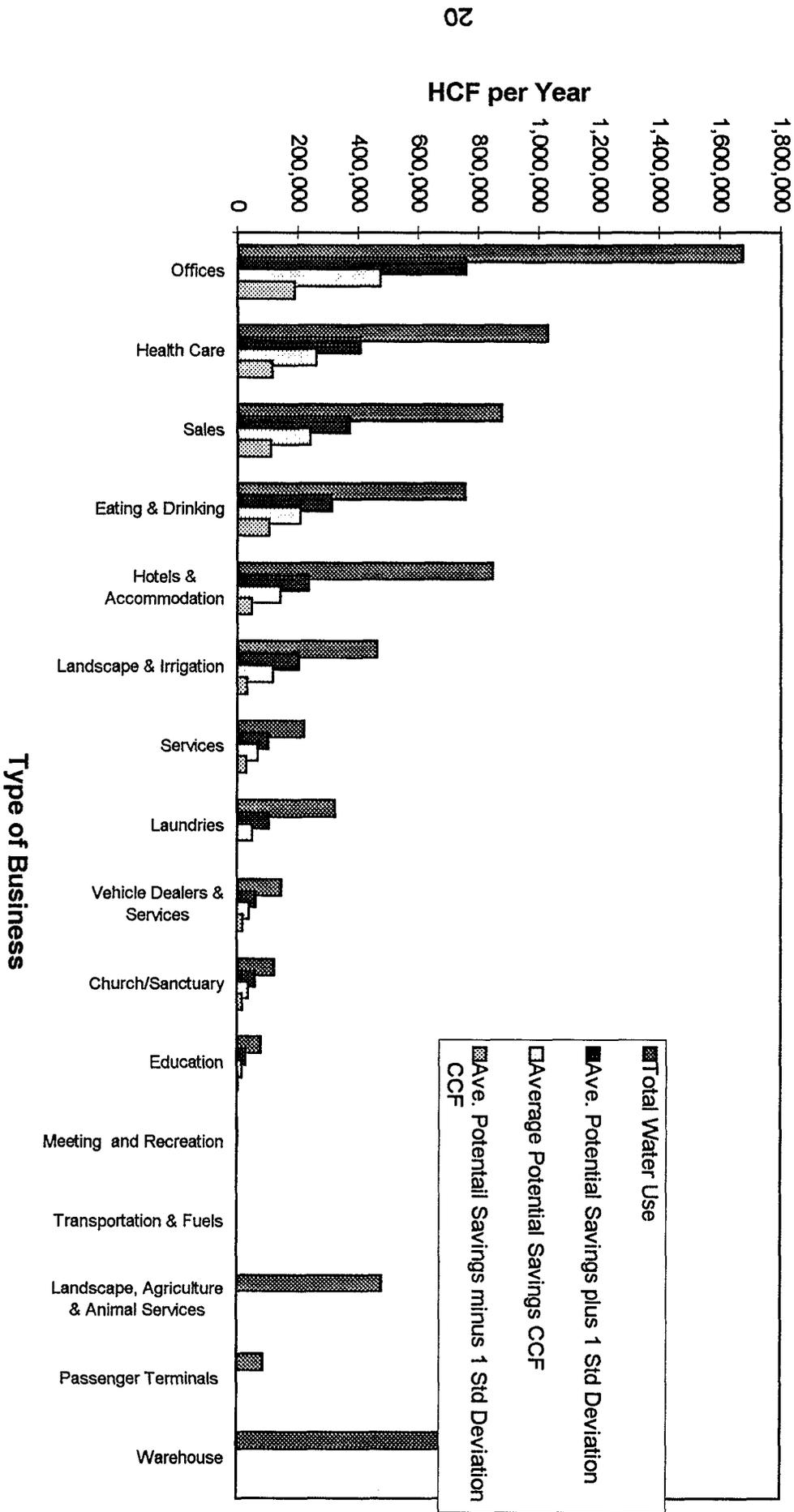
### Orlando, FL Potential Water Savings by Commercial Users 1995 data



Total Reported Commercial Use: 7,649,322 HCF (17560 AF)  
 Total Potential Savings: 1,956,958 HCF (4492 AF)  
 Overall Potential Savings: 25.6 %

Figure 10

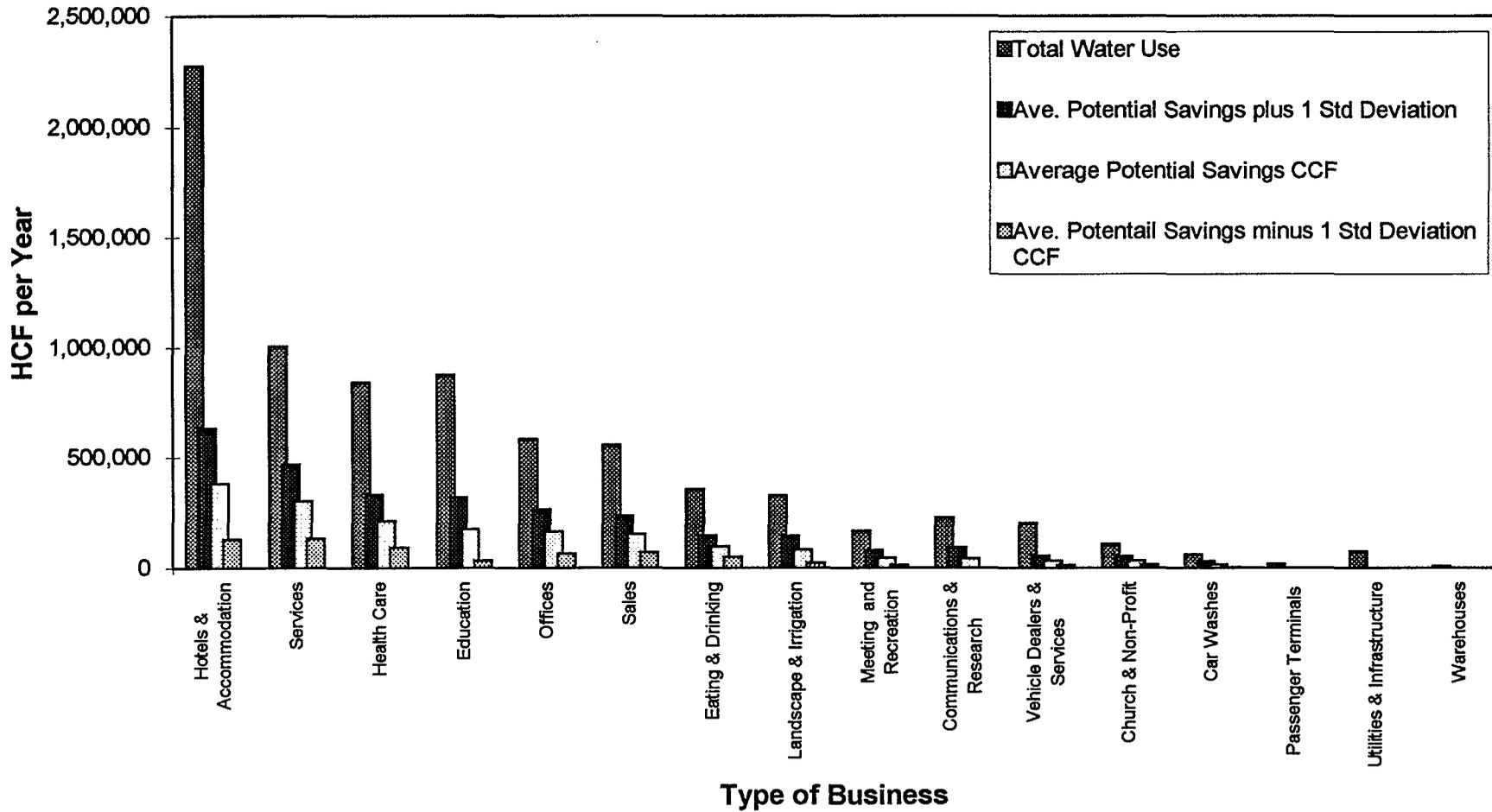
**Portland, OR  
Potential Water Savings by Commercial Users  
1994 data**



Total Reported Commercial Use: 7,920,685 HCF (18183 AF)  
 Total Potential Savings: 1,652,183 HCF (3793 AF)  
 Overall Potential Savings: 21 %

Figure 11

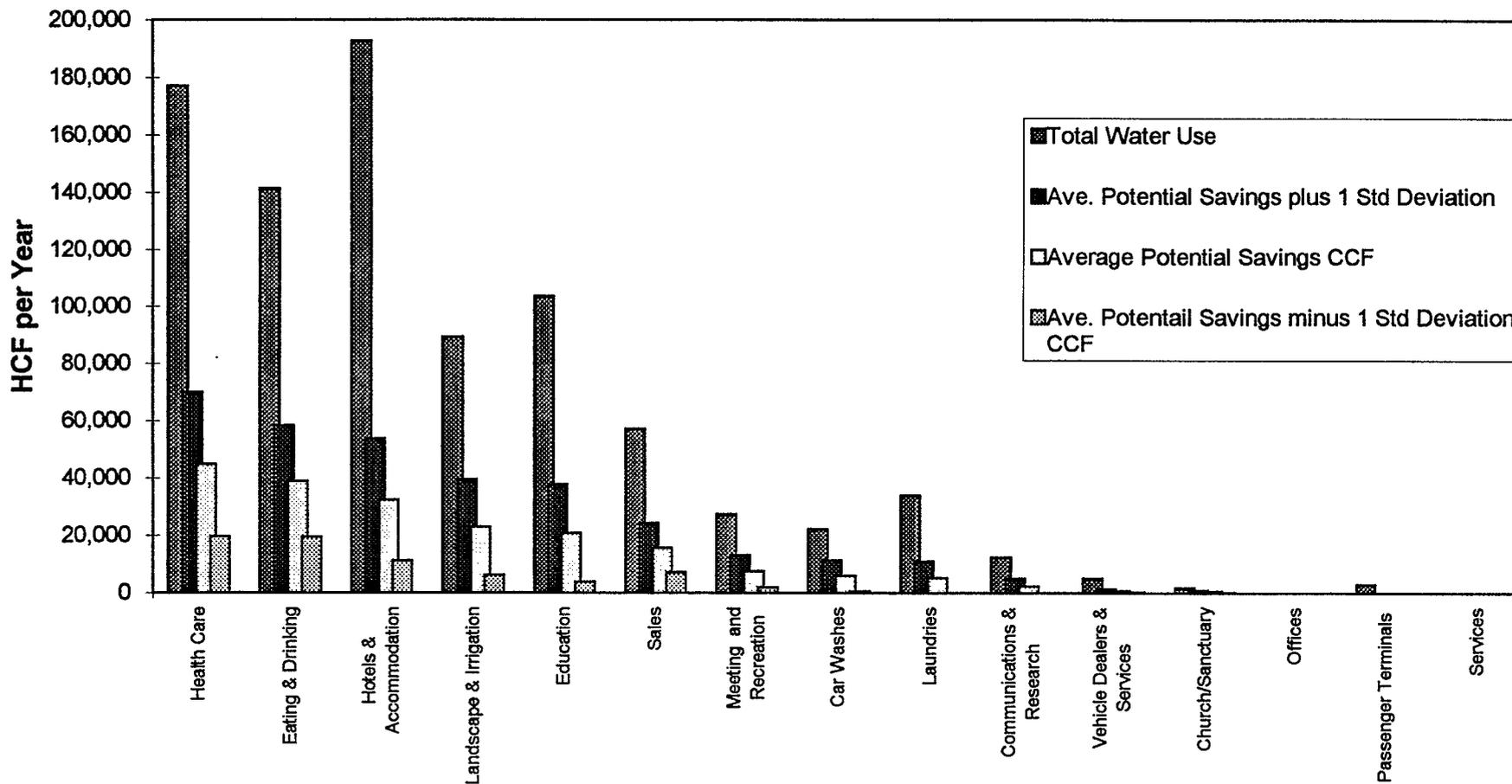
## San Diego, CA Potential Water Savings by Commercial Users 1995 data



Total reported commercial use: 7,674,446 HCF (17618 AF)  
 Total average potential savings: 1,738,296 HCF (3991AF)  
 Overall potential savings 22.6%

Figure 12

**Santa Monica, CA  
Potential Water Savings by Commercial Users  
1995 data**

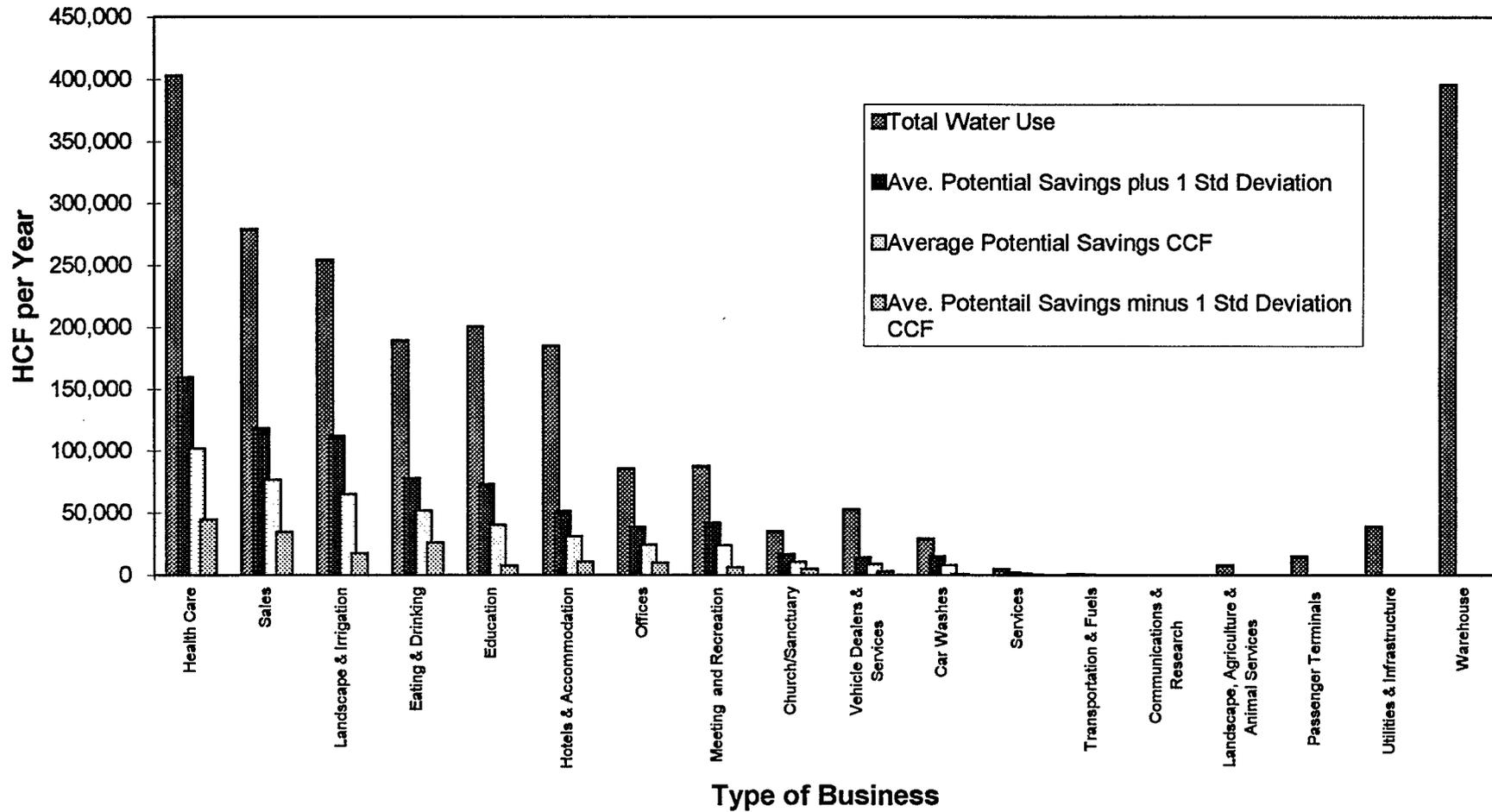


Total Reported Commercial Use: 866,404 HCF (1989 AF)  
 Total Potential Savings: 197,626 HCF (454 AF)  
 Overall Potential Savings: 22.8 %

Type of Business

Figure 13

## St. Paul, MN Potential Water Savings by Commercial Users 1995 data



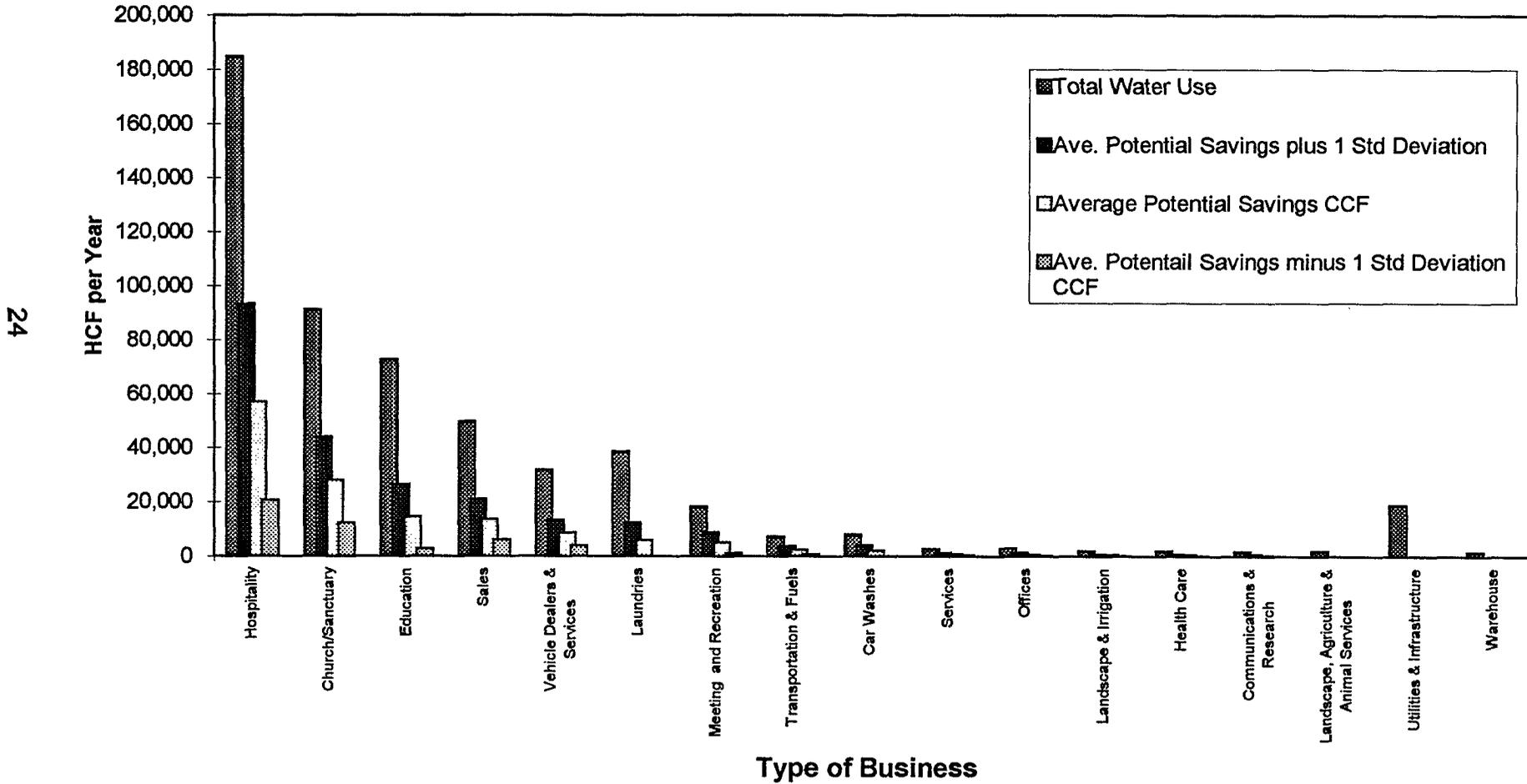
Total Reported Commercial Use: 2,265,195 HCF (5200 AF)  
 Total Potential Savings: 444,140 HCF (1020 AF)  
 Overall Potential Savings: 20 %

23

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Figure 14

**Santa Rosa, CA  
Potential Water Savings by Commercial Users  
1994 data**



Total Reported Commercial Use: 536,385 HCF (1231 AF)  
 Total Potential Savings: 140,499 HCF (322 AF)  
 Overall Potential Savings: 25 %

One of the questions that arises for CII program managers is: "Do the largest commercial water users have the largest potential for water savings?" To answer the question, we ranked from largest to smallest the water-use categories for all of the utilities. They were numbered accordingly, 1 being the highest water use, and 22 being the lowest. Quartiles were assigned:

- ranks 1-5, top quartile
- ranks 6-10, second quartile
- ranks 11-15, third quartile
- ranks 16 and above, the bottom quartile

The number of times the categories occurred in each quartile was then counted. Figure 15 "Rank of Commercial Water Users" displays the categories by order of water use. The largest water users are:

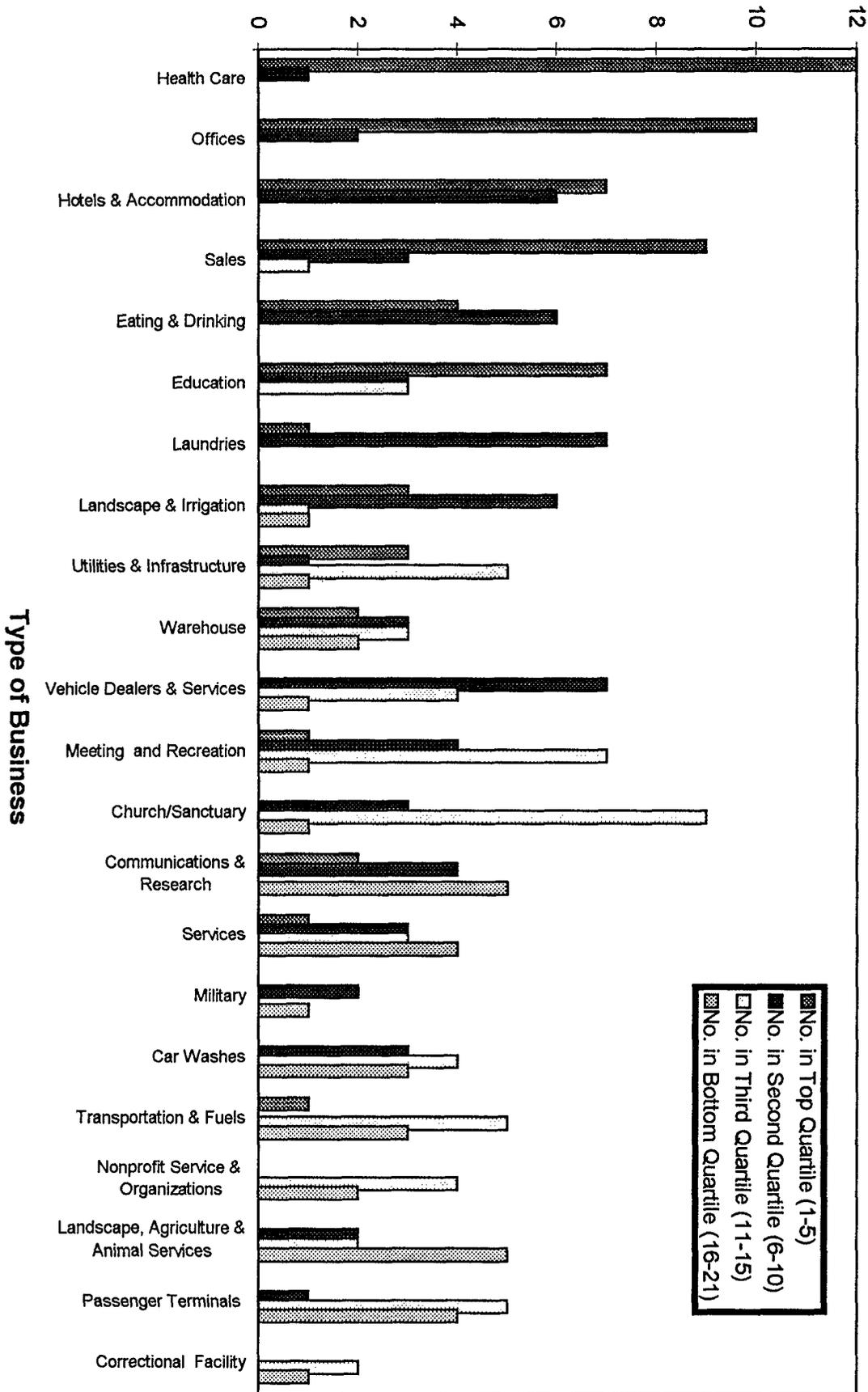
- health care
- offices
- hotels and accommodations
- sales
- eating and drinking
- education
- laundries
- landscape irrigation

The volume of potential water savings was ranked in the same way as the volume of water use and is displayed on Figure 16 "Rank of Potential Water Savings." The largest potential water-savings categories are:

- offices
- health care
- sales
- eating and drinking
- hotels and accommodations
- education
- landscape irrigation
- laundries
- meeting and recreation

The largest water-use categories are also the categories with the largest volume of potential savings.

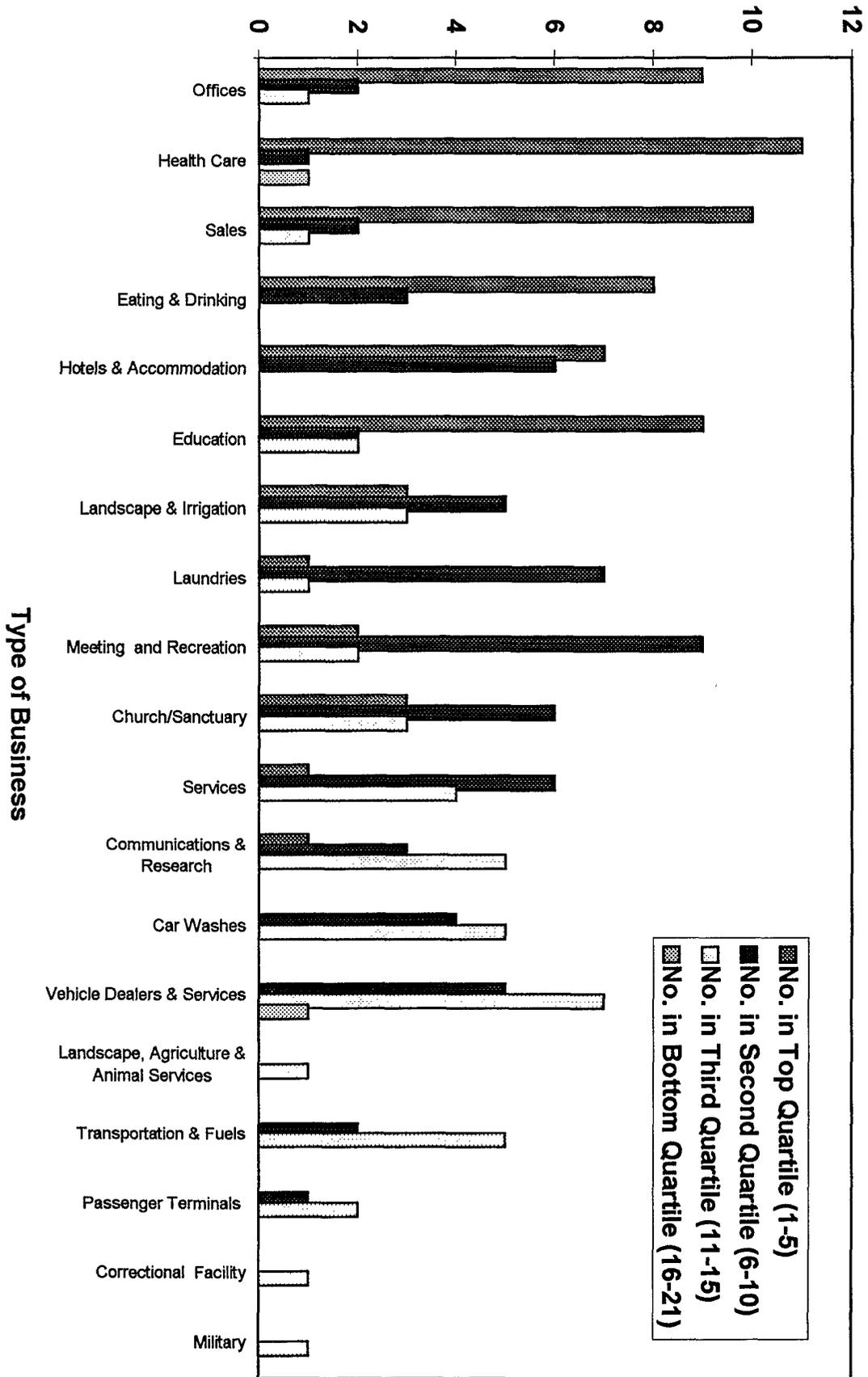
Number Agencies with Business in Quartile



Rank of Commercial Water Users

Figure 15

Number of Utilities with Business in Quartile



Rank of Potential Water Savings

Figure 16

## Conclusions & Recommendations

This study successfully quantified water use for 22 categories of commercial water customers. The study also successfully quantified potential water savings for 18 categories of commercial water customers. The study findings are:

- Commercial water-use volume may be cost-effectively reduced by approximately 22 percent.

Potential water savings varies widely from as little as 0 percent to as much as 50 percent.

- The largest water-use categories are also the categories with the largest volume of potential savings. These categories are:

Health Care  
Offices  
Hotels and Accommodations  
Sales  
Eating and Drinking  
Education  
Laundries  
Landscape Irrigation  
Meeting and Recreation

- Although car washes are highly visible targets for water-efficiency programs and have an average potential to improve water efficiency of 27 percent, the volume saved falls in the bottom quartile.

- Some large-water-using categories have been ignored for water audits. Water audit programs need to include:

Warehouses  
Correctional Facilities  
Military Bases (including National Guard)  
Utility Systems  
Passenger Terminals

- Most water utilities cannot identify type of business, specific use of water, and quantity of water for each customer, because they do not collect and retain data in a readily usable format.

Incentives are needed to assist water utilities in becoming more familiar with their customers' water use and potential for water savings.

Incentives are also needed to encourage water utilities to use data management systems that can provide water-use data in a standard format. A model data display should be developed to provide an example of the desired format.

**Appendix 1  
Commercial Water Use Detail**

Category	AUSTIN TEXAS 1992	BUFFALO NEW YORK 1995	BURBANK CALIF. 1995	EBMUD CALIF. 1994	GLENDALE CALIF. 1995	MIAMI FLORIDA 1995	ORLANDO FLORIDA 1995	PORTLAND OREGON 1995	SAN DIEGO CALIF. 1995	SANTA MONICA CALIF. 1995	ST. PAUL MINNESOTA 10/94-9/95	SANTA ROSA CALIF. 1994
	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF
Car Washes		67,535	12,240	98,781	7,767		22,206		58,848	22,044	29,046	8,084
Church	187,219	9,898	7,008		51,784	255,528	77,880	122,741	81,164	1,824	34,857	18,368
Communications & Research	14,597	2,000	290,292	39,965	149,153		115,119		227,760	12,396	84	1,726
Correctional Facility	90,875						17,226					
Education		30,549					171,570					72,731
schools	421,420		106,272	2,167,958	133,630	1,590,888			680,460	94,968	141,440	
museums & libraries	14,048				2,101						5,613	
colleges/other schools	1,023,894		0		1,642			78,477	195,216	8,676	53,532	
<b>SUBTOTAL</b>	<b>1,459,362</b>	<b>30,549</b>	<b>106,272</b>	<b>2,167,958</b>	<b>137,373</b>	<b>1,590,888</b>	<b>171,570</b>	<b>78,477</b>	<b>875,676</b>	<b>103,644</b>	<b>200,585</b>	<b>72,731</b>
Health Care												107,576
health services			23,364	808,657	180,108			52,246	390,864	37,092	41,800	
hospitals & nursing homes	763,544		151,032	660,751	169,497	2,494,689		976,521	448,812	139,908	361,342	
		376,400					531,574					
<b>SUBTOTAL</b>	<b>763,544</b>	<b>376,400</b>	<b>174,396</b>	<b>1,487,408</b>	<b>349,605</b>	<b>2,494,689</b>	<b>531,574</b>	<b>1,029,767</b>	<b>839,676</b>	<b>177,000</b>	<b>403,142</b>	<b>107,576</b>
Hospitality												
restaurant/bar	670,031	360,182	38,652	1,074,437	146,888	1,392,051		754,514	355,284	141,300	240,424	
overnight accommodations	893,233	298,612	83,844	394,647	105,569	2,120,486		701,057	2,209,992	192,732	98,577	
other group shelter	173,760			393,324	5,808	47,441		145,145	65,808		35,121	
				213,004		244,953						
<b>SUBTOTAL</b>	<b>1,737,024</b>	<b>658,794</b>	<b>122,496</b>	<b>2,075,412</b>	<b>258,265</b>	<b>3,804,931</b>	<b>3,862,083</b>	<b>1,600,716</b>	<b>2,631,084</b>	<b>334,032</b>	<b>374,122</b>	<b>184,953</b>
Irrigation												
landscape	285,515	158,989		5,733,586	98,219		87,366	462,448	234,824	89,376	66,650	
golf courses		2,538					1,707		80,984		7,480	1,983
<b>SUBTOTAL</b>	<b>285,515</b>	<b>161,525</b>		<b>5,733,586</b>	<b>98,219</b>		<b>89,074</b>	<b>462,448</b>	<b>325,908</b>	<b>89,376</b>	<b>73,130</b>	<b>1,983</b>
Landscape, Agriculture & Animal Services	5,972	71,063	10,500	109,808			16,507	479,187				1,945
Laundries			36,732	660,800		628,061	235,928	323,973		33,916		38,683
Meeting and Recreation		107,246					58,455					2,869
convention center	5,540								17,616			
recreation & theaters	120,342		25,812		184,084	56,513			7,692	27,240	83,664	
								1,463				
amusement parks				556,598				633	140,868		33,100	
<b>SUBTOTAL</b>	<b>125,882</b>	<b>107,246</b>	<b>25,812</b>	<b>556,598</b>	<b>184,084</b>	<b>56,513</b>	<b>58,455</b>	<b>2,096</b>	<b>166,176</b>	<b>27,240</b>	<b>116,764</b>	<b>2,869</b>
Military	316,728						1,964					2,183
Misc. Commercial						6,736,551	49,914				10,760	
boat dock									4,946			
<b>SUBTOTAL</b>						<b>6,736,551</b>	<b>49,914</b>		<b>4,946</b>		<b>10,760</b>	
Nonprofit Service & Orgs.		44,774		611,818	11,326		84,823		16,228		18,258	3,263
Offices	1,829,299	497,413	118,524	1,852,697	245,340	2,666,588	1,074,104	1,672,894	582,840		305,756	101,261
Passenger Terminals	58,881	36,707	24,060		1,000		1,127	87,445	17,148	2,844	3,806	

**Appendix 1 (continued)  
Commercial Water Use Detail**

Category	AUSTIN TEXAS 1992	BUFFALO NEW YORK 1995	BURBANK CALIF. 1995	EBMUD CALIF. 1994	GLENDALE CALIF. 1995	MIAMI FLORIDA 1995	ORLANDO FLORIDA 1995	PORTLAND OREGON 1995	SAN DIEGO CALIF. 1995	SANTA MONICA CALIF. 1995	ST. PAUL MINNESOTA 10/94-9/95	SANTA ROSA CALIF. 1994
	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF	HCF
<b>Sales</b>												
grocery stores	187,701		56,220	326,442	37,838			760,517	147,948	25,572	21,396	
convenience stores										1,860	17,490	
dry goods	705,340		41,340	639,264	30,068			116,990	407,220	29,700	113,748	
miscellaneous		571,091		56,883		1,797,959	256,773				128,128	49,612
<b>SUBTOTAL</b>	<b>893,041</b>	<b>571,091</b>	<b>97,560</b>	<b>1,022,589</b>	<b>67,906</b>	<b>1,797,959</b>	<b>256,773</b>	<b>877,507</b>	<b>555,168</b>	<b>57,132</b>	<b>280,762</b>	<b>49,612</b>
<b>Services</b>												2,833
service	738,595	6,941		180,363	80,231		49,702	220,230	583,740			
misc. repair services				13,848	2,524				388,304			
crematories, funeral homes			6,132	49,327	842				11,100		4,684	
laboratories				404,437								
printing				33,297	11,833				40,116			
<b>SUBTOTAL</b>	<b>738,595</b>	<b>6,941</b>	<b>6,132</b>	<b>681,272</b>	<b>95,430</b>		<b>49,702</b>	<b>220,230</b>	<b>1,003,260</b>		<b>4,684</b>	<b>2,833</b>
<b>Transportation &amp; Fuels</b>		36,238		365,697	11,058			82,029	593		14,202	7,350
<b>Utilities &amp; Infrastructure</b>							619,718					
police/fire station	7,878		8,016								1,354	4,453
public works/utility	4,227,302	4,559						21,461,833	16,572		7	8,805
elect steam natural gas		174		16,951	3,220							686
gas production & distribution		4,166										
sanitary collection & disposal		6,750		183,858	40,963				2,508			92
construction		5,314		319,067	118,750				55,908			6,037
fumigating				1,190								
septic tank cleaning				166								24
<b>SUBTOTAL</b>	<b>4,235,180</b>	<b>20,963</b>	<b>8,016</b>	<b>491,222</b>	<b>162,933</b>		<b>619,718</b>	<b>21,461,833</b>	<b>74,988</b>		<b>1,361</b>	<b>18,798</b>
<b>Vehicle Dealers &amp; Services</b>	118,227	106,674	2,496	152,872	80,043	207,131	233,356	146,263	202,068	4,956	79,089	31,759
<b>Warehousing</b>												
warehousing	234,856	309,647		685,501	8,619	1,460,366		817,348	2,508		2,634	1,646
warehouse-cold storage		31,175									393,234	
<b>SUBTOTAL</b>	<b>234,856</b>	<b>340,822</b>		<b>8,038,751</b>	<b>8,619</b>	<b>1,460,366</b>	<b>3,427,453</b>	<b>817,348</b>	<b>2,508</b>		<b>395,868</b>	<b>1,646</b>
<b>TOTAL REPORTED COMMERCIAL USE</b>	<b>13,094,795</b>	<b>3,146,634</b>	<b>1,042,536</b>	<b>26,127,234</b>	<b>1,919,904</b>	<b>21,699,183</b>	<b>11,078,483</b>	<b>29,382,518</b>	<b>7,674,446</b>	<b>866,404</b>	<b>2,346,277</b>	<b>657,624</b>

Appendix 2 Stat AVE

Type of Business	Count Site Audits	Min Excl Irri Sav	Min w Irri Sav	Ave Exclude Irri Sav	Ave w Irri Savings	Max Excluding Irri Sav	Max w Irri Savings	St Dev Exclude Irri Savings	St Dev w Irri Savings
Car wash	12	2.52%	4.34%	25.27%	27.08%	69.52%	69.52%	25.01%	24.42%
Church - Nonprofit	19	0.00%	0.00%	18.68%	30.88%	47.67%	61.20%	13.88%	17.33%
Communications & Reseach	10	1.91%	1.91%	18.14%	18.14%	74.22%	74.22%	22.05%	22.05%
Corrections	2	8.48%	9.95%	9.21%	14.28%	9.95%	18.61%	1.04%	6.12%
Eating & Drinking	102	0.00%	0.00%	25.58%	27.49%	85.32%	85.32%	13.76%	13.74%
Education	168	0.00%	0.00%	14.14%	20.05%	78.97%	78.97%	14.28%	16.33%
Healthcare	90	0.00%	0.71%	22.28%	25.35%	64.31%	65.42%	13.96%	14.23%
Hospitality	222	0.00%	0.00%	19.30%	21.71%	85.32%	85.32%	13.44%	13.43%
Hotel	120	0.00%	0.00%	13.97%	16.80%	53.21%	53.21%	10.61%	11.05%
Landscape irrigation	6	0.00%	2.48%	13.46%	25.53%	42.93%	42.93%	16.54%	18.56%
Laundries	22	0.00%	0.00%	15.39%	15.40%	61.83%	61.83%	16.71%	16.69%
Meeting/Recreation	20	1.19%	1.19%	21.12%	27.44%	55.64%	75.79%	16.38%	20.55%
Military	1	8.84%	8.84%	8.84%	8.84%	8.84%	8.84%		
Offices	19	0.00%	0.00%	22.41%	28.27%	51.38%	60.87%	13.97%	16.97%
Sales	56	0.00%	2.10%	24.33%	27.40%	72.72%	72.72%	16.60%	14.95%
Services	58	0.00%	0.00%	20.56%	29.98%	74.19%	74.19%	17.47%	16.80%
Transportation & Fuels	24	0.00%	0.00%	14.46%	30.85%	65.04%	84.29%	17.08%	19.64%
Utility & Construction	3	11.73%	11.73%	447.31%	448.88%	802.36%	804.62%	401.42%	402.66%
Vehicle dealers & Services	12	0.30%	2.24%	10.96%	16.53%	26.16%	32.48%	8.54%	10.31%
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