

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



How Much Water Does a Swimming Pool Use?

WaterSmart Innovations
Conference and Exposition
October 7-9, 2009



Russ Horner
Russ_Horner@watermgt.com



**Drowning is the leading cause
of unintentional death among
children ages 1 to 4**

**Drowning is the 2nd leading
cause of unintentional death
among children ages 1-14**



In 2005, there were
3,582 fatal drownings in
the United States.

Averaging ten deaths per
day.



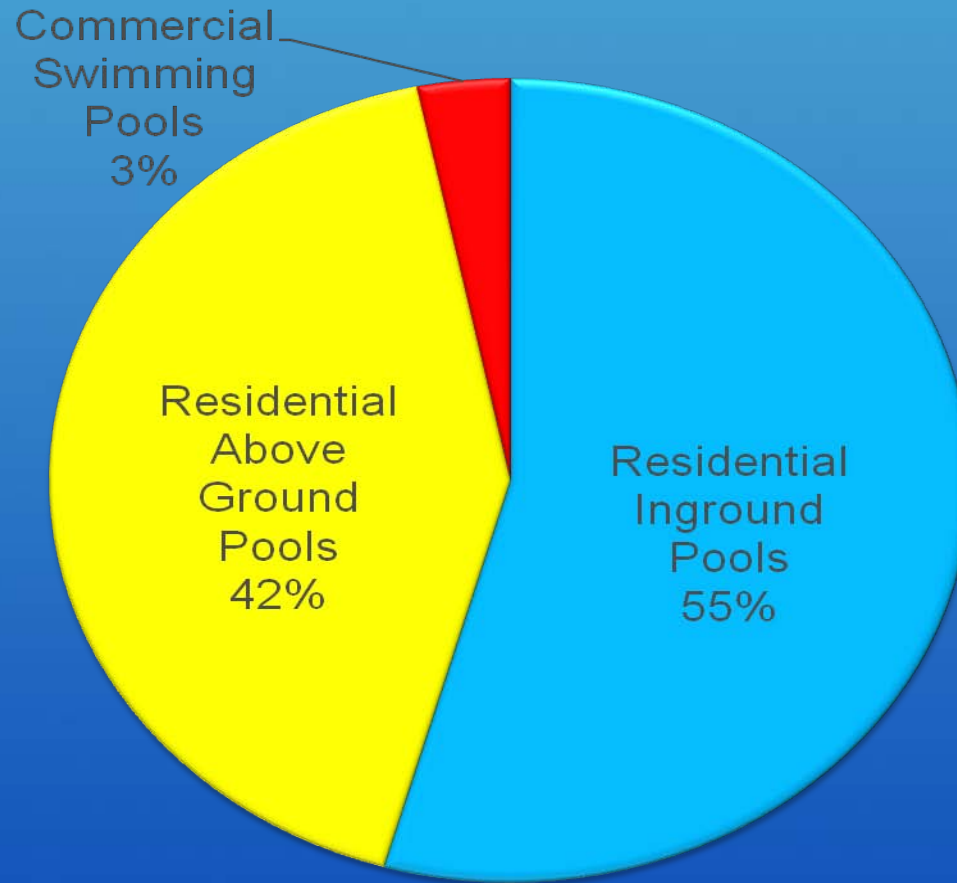
What is the major risk factor?

Lack of barriers and supervision.

- ❑ Children under one year most often drown in bathtubs, buckets, or toilets.
- ❑ Among children ages 1 to 4 years, most drownings occur in swimming pools.



There are 9 million pools in the United States....(270,000 commercial)



Does a lawn or pool use more water on a square footage basis???





Splash or Sprinkle Report (Maddaus and Mayer, 2001)

- ❑ 1,129 homes in 14 cities were studied as part of the REUWS (Residential End Use Water Study)
- ❑ Using water use estimates for a typical home in Sacramento and Tampa, it was determined that swimming pools and irrigated lawn area use approximately the same amount of water on a square footage basis.



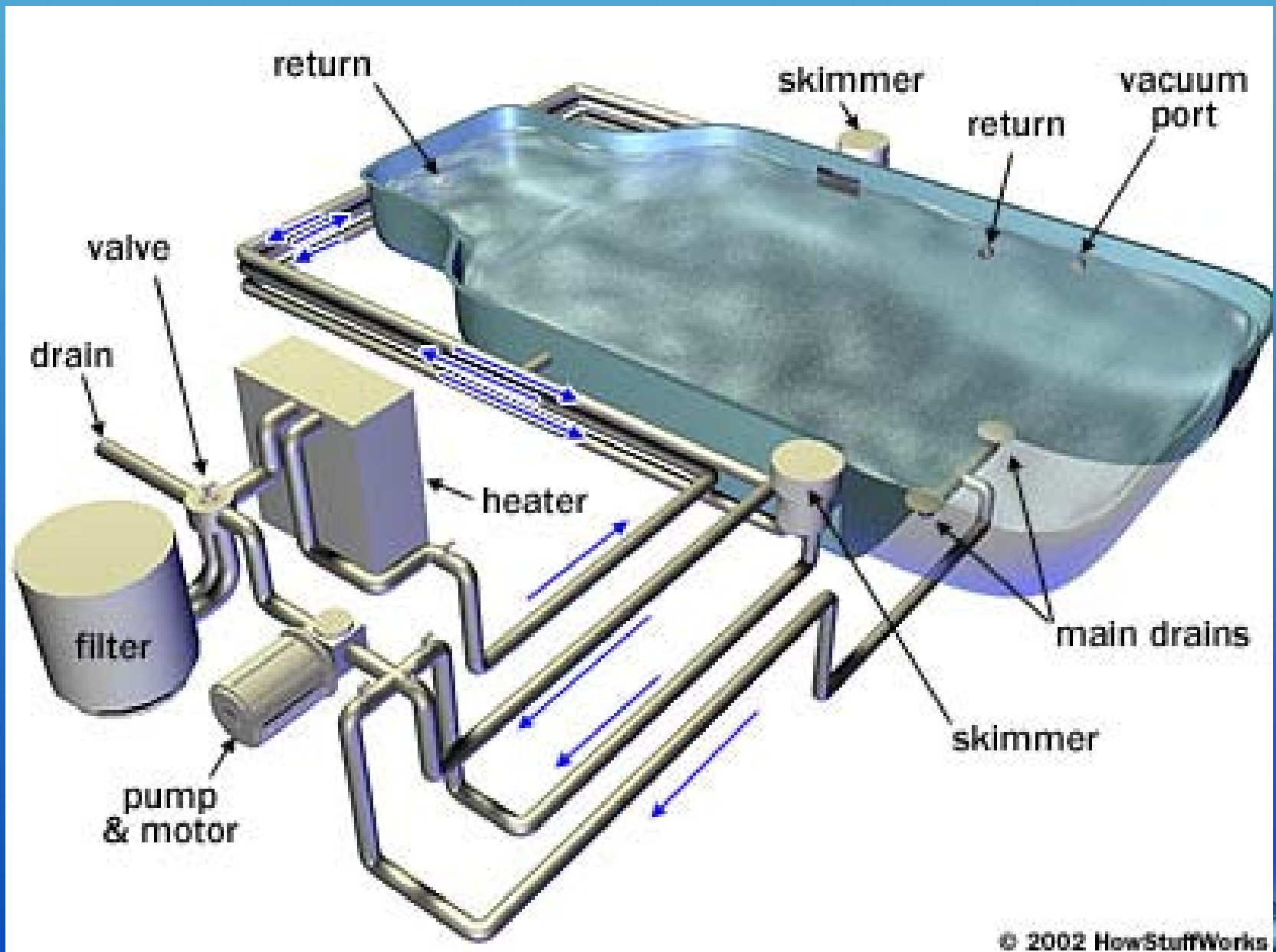
Water use is affected by a variety of factors:



- Size of the pool (surface area and depth)
- Amount of evaporation (related to local climate)
- Frequency of backwashing
- Leakage, splashing, deck cleaning
- Presence and use of a pool cover
- Temperature of pool water (warmer water evaporates faster)
- Presence of a fountain or waterfall
- pH and chemical content of pool water
- Individual maintenance habits, overfilling of pool



The Basics



Pool Volume Calculator

Length

40

Width

40

Depth

5

Cubic feet

8,000

Volume of Pool

59,840



Two most significant means of water loss:

Evaporation



Filters and Backwashing



Evaporation



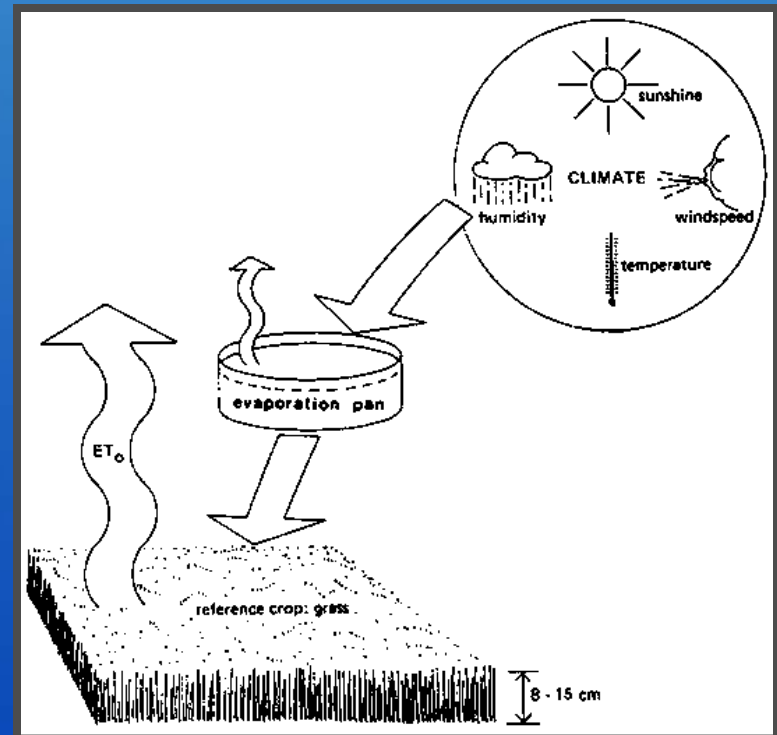
Water Use vs. Energy Loss

- In the summer, evaporation ranges from five to ten inches a month (The Association of Pool and Spa Professionals).
- Using a pool cover eliminates almost all evaporation. If a pool is heated, as much as 70 percent of heat is lost through evaporation (U.S. Dept. of Energy – EERE Consumer's Guide).

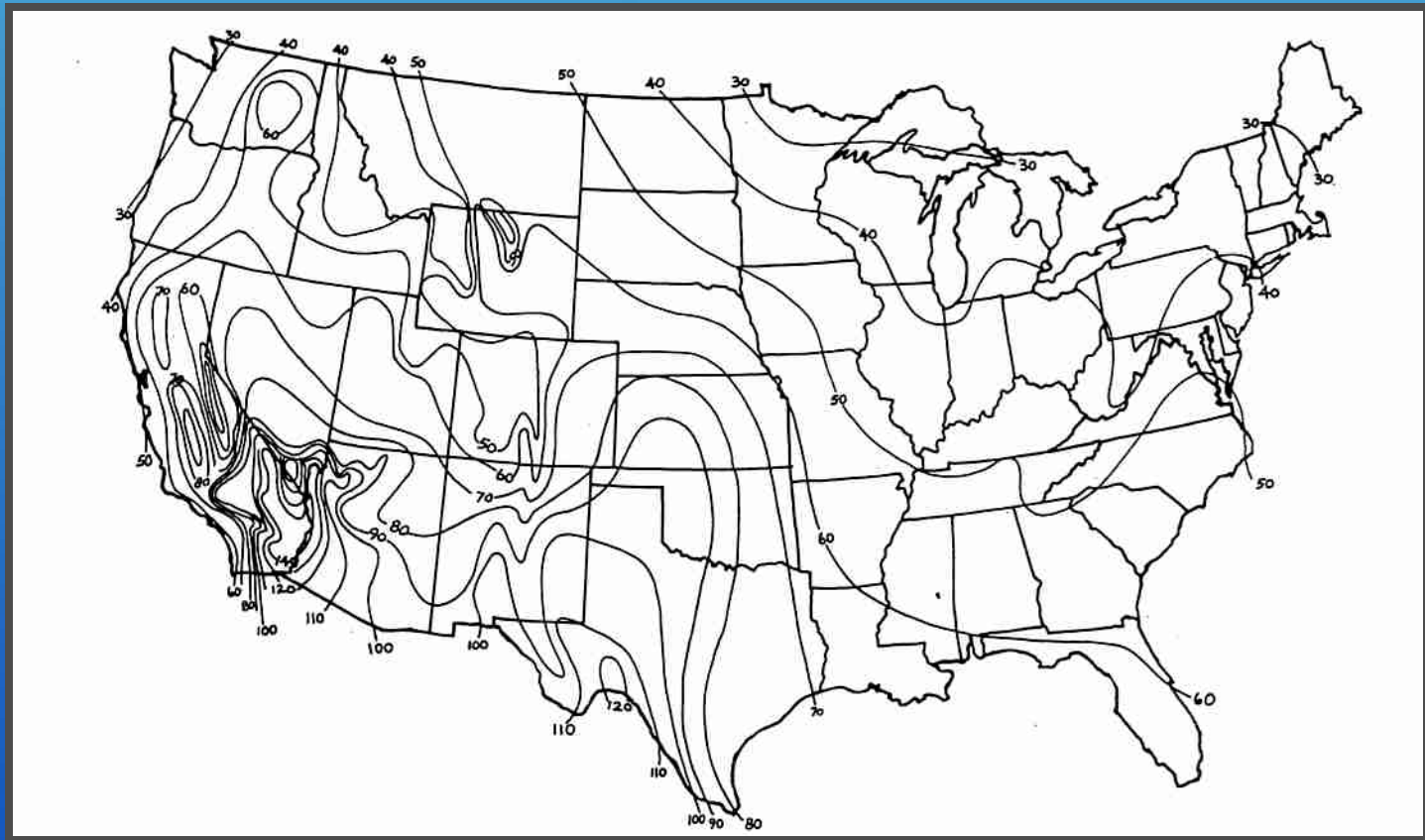


Pan Evaporation

- ❑ An evaporation pan is used to determine the quantity of evaporation at a given location.
- ❑ Evaporation is measured daily as the depth of water evaporates from the pan. The measurement day begins with the pan filled to exactly two inches (5 cm) from the pan top. At the end of 24 hours, the amount of water to refill the pan to exactly two inches from its top is measured.
- ❑ If precipitation occurs in the 24-hour period, it is taken into account in calculating the evaporation. Sometimes precipitation is greater than evaporation, and measured increments of water must be dipped from the pan.



Annual evaporation map from the National Weather Service



The average annual evaporation rate for Tucson, AZ is roughly 100 inches.



Evaporation Rates across the US

City	Annual evaporation rate	Daily evaporation rate	Weekly evaporation rate	Daily evaporation Hotel pool (gals.)	Annual evaporation Hotel pool (gals.)
Boston	30	0.082	0.575	82.2	30,000.0
NYC	40	0.110	0.767	109.6	40,000.0
Omaha	50	0.137	0.959	137.0	50,000.0
Miami	60	0.164	1.151	164.4	60,000.0
Houston	70	0.192	1.342	191.8	70,000.0
Albuquerque	80	0.219	1.534	219.2	80,000.0
Austin	90	0.247	1.726	246.6	90,000.0
Las Vegas	100	0.274	1.918	274.0	100,000.0
Tucson	110	0.301	2.110	301.4	110,000.0
Death Valley	120	0.329	2.301	328.8	120,000.0

Indoor evaporation is approximately 0.25" per day.

Source: Dehumidifier Corporation of America.



□ Solutions to Eliminate Evaporation



Reduce Evaporation: Pool Covers



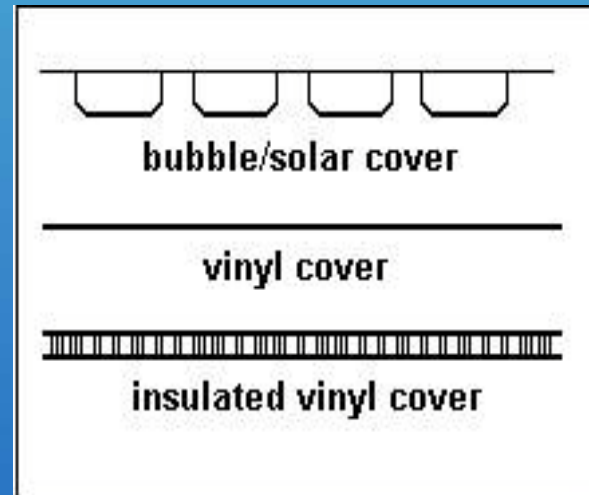
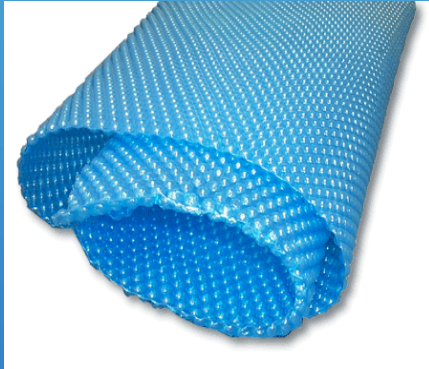
Covering your pool when not in use reduces heating loss by 50 - 70%

Pool covers also reduce the amount of make-up water required by 30 – 50%, and

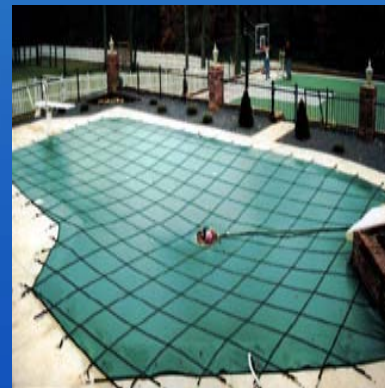
Reduce chemical consumption by 35 – 60%



Types of Pool Covers and Additional Benefits



Solar Pool Cover



Vinyl Pool Cover

Insulated Vinyl Cover



Liquid Pool Cover



- Heatsavr is a transparent liquid pool cover that greatly reduces heat loss.
- The liquid forms a barrier on the surface of the pool, inhibiting evaporation.
- Heatsavr has been tested and proven to be completely safe and biodegradable.



Heatsavr...

Heatsavr is a liquid which automatically floats to the surface of the pool and spreads itself across the swimming pool surface. It acts as an evaporation inhibitor, much as a conventional solar blanket performs.



Heatsavr Pool Cover Installation Results

Before



After

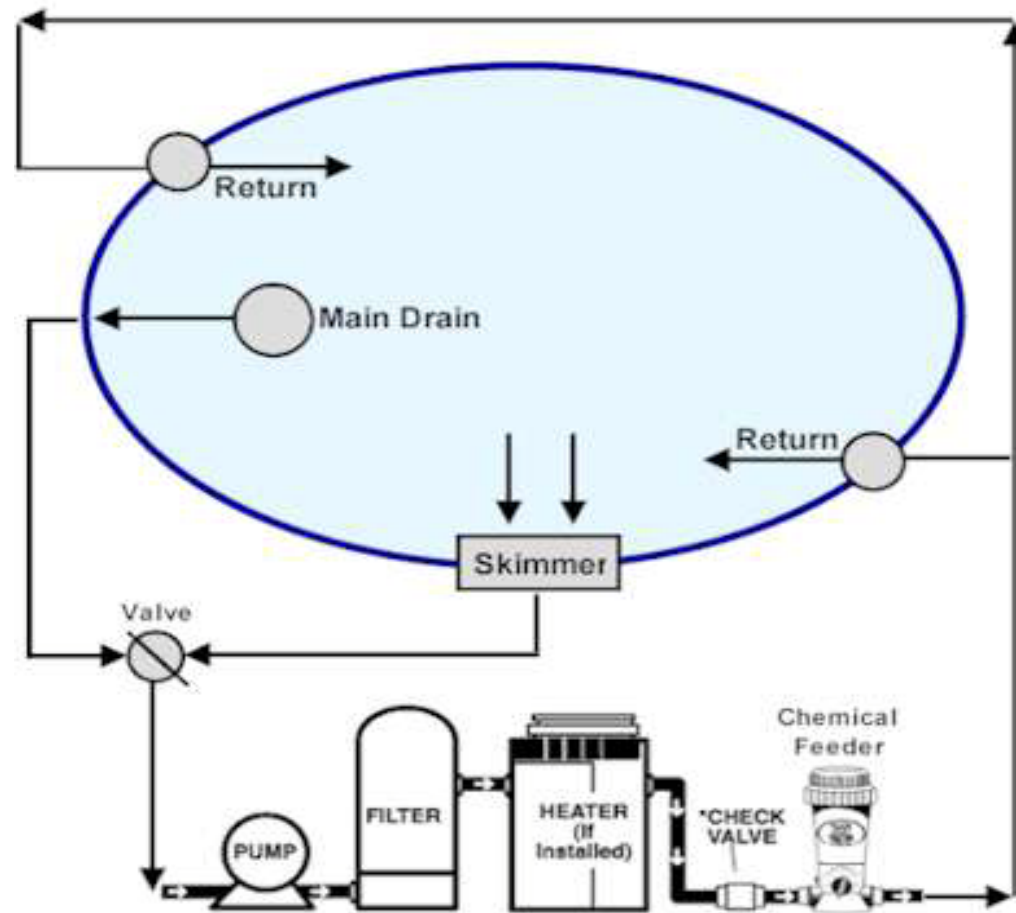


Filtration Systems and Backwashing



Pool Water Flow

A Typical Pool System



Understanding Recirculation Rates

Recirculation Rate	
Dimensions of Pool (cubic ft)	8,800
Volume of Pool (gallons)	65,824
Recirculation / Hour	8,228
Recirculation / Minute	137



Time that it takes to backwash 1" of water

Pool type	Square feet	total pool volume 4.5 ave. depth (gallons)	Filter Re- Circulation Rate	gallons in 1" of water	minutes to backwash 1" of water
Hot tub	201.1	6,767.8	37.6	125.3	3.3
Residential	450.0	15,147.0	31.6	280.5	8.9
Hotel	1,000.0	33,660.0	70.1	623.3	8.9
Community	2,625.0	88,357.5	184.1	1,636.3	8.9
Olympic	9,750.0	328,185.0	683.7	6,077.5	8.9



TABLE 2. Number and percentage of pool inspections* having specific violations of state and/or local health regulations, by type of violation and pool type — selected states and counties, United States, May–September 2002

Type of violation	Hotel/Motel†		Condominiums/ Apartments§		School/ University¶		Private club**		Wading/ Children's††	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Water chemistry										
Free chlorine level	120	(14.0)	386	(12.9)	7	(8.8)	62	(13.1)	98	(18.4)
pH	91	(10.5)	252	(8.4)	4	(5.0)	29	(6.1)	89	(16.7)
Other water chemistry¶¶¶	158	(18.0)	787	(26.4)	23	(28.4)	67	(14.1)	71	(13.2)
Filtration/Recirculation system****	326	(37.1)	1,207	(40.4)	40	(49.4)	246	(51.7)	209	(39.1)
Policy/Management										
Test kit	42	(4.8)	83	(2.8)	2	(2.5)	5	(1.1)	18	(3.4)
Pool operations training	18	(14.1)	539	(35.7)	4	(7.6)	21	(9.8)	7	(6.0)
Record keeping	105	(12.7)	424	(15.0)	4	(6.3)	48	(15.6)	61	(13.1)
Pool licensed	0		7	(4.2)	1	(5.6)	10	(6.0)	4	(5.8)
Total Number of Pools Inspected	878		2,987		81		476		539	
Type of violation	Water parks§§		Medical/ Therapy¶¶		Municipal***		Camp grounds†††		Total§§§	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Water chemistry										
Free chlorine level	15	(7.8)	2	(14.3)	5	(4.5)	5	(5.0)	700	(13.1)
pH	9	(4.7)	2	(13.3)	15	(13.6)	11	(11.1)	502	(9.4)
Other water chemistry¶¶¶	7	(3.6)	8	(47.1)	9	(8.0)	23	(22.3)	1,153	(21.4)
Filtration/Recirculation system****	70	(36.5)	11	(64.7)	86	(76.8)	35	(34.0)	2,230	(41.4)
Policy/Management										
Test kit	0		2	(12.5)	4	(3.6)	4	(3.9)	160	(3.0)
Pool operations training	0		0		0		0		589	(27.6)
Record keeping	6	(3.8)	3	(17.6)	4	(8.9)	14	(13.9)	669	(13.9)
Pool licensed	0		N/A		0		0		22	(3.8)
Total Number of Pools Inspected	192		17		112		103		5,385	

**** Aggregate variable. A positive could include one or more violations in any area (e.g., backwash, cross connections, filter, flow meter, pressure gauges, recirculation system, turnover, and turbidity).



Sand Filters



- ❑ Because of its simplicity of operation and maintenance, the high-rate sand filter is the most popular type.
- ❑ Sand filters use layers of specially graded sand (#20 silica sand) to trap tiny particles (20-100 micron range). Over time, the collected dirt and debris in the sand slow down the water flow. An increase in the water pressure on your filter gauge is sign that the filter needs to be cleaned.



DE Filters

- The most efficient type of pool filter on the market is the DE (Diatomaceous Earth) filter. However, along with the effectiveness comes increased maintenance and complexity.



A DE filter contains diatomaceous earth, a fine white powder made from the chemically inert, fossilized remains of sea organisms called diatoms. This powder, which can filter out very small particles (1 to 5 microns), is held in place by grids or “elements”. As water passes through the coated grids, particles are collected on the surface..



Cartridge Filters

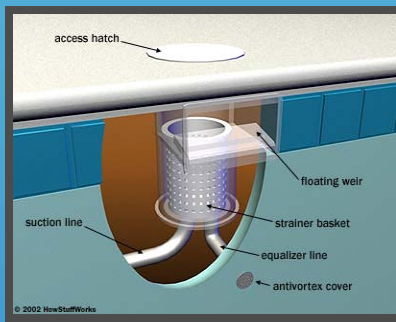


- Cartridge filters are the choice for most spas and many smaller above ground pools because they are easy to clean and have a low replacement cost.
- Cartridge filters use replaceable pleated filters made of polyester cloth or corrugated paper – like large oil filters – trapping particles as small as 10 microns.



□ Solutions to improving Filtration and Backwashing





Filtration

- Filtering is a major cost of owning a swimming pool.
- Reducing filtration time can reduce the electricity demand for pumping by 60%.
- Programmable timers can be set to control the pump's cycling. Timer can be set that will activate pump for many short periods each day.
- Several short cycles can keep the pool clean all day.



Timer Based Filtration

Smart Year-round controls:

TightWatt digital pool timers & TightWatt2 Digital Two-Speed Pool Controllers take advantage of seasonal temperature changes by automatically adjusting your pool filter run-time year-round, running your pump more in the summer and less in the winter.

Two-Speed Pool Pumps:

A Two-speed pool pump is a standard pump with an additional low-speed winding. The low-speed mode allows filtration at a cheaper cost per gallon, dramatically reducing the energy cost of a pool. As the two-speed pool pump runs slower, friction and pressure are decreased. California is mandating 2-/multi-speed pumps beginning in 2008.



Backwashing

- Sand filters in heavily used pools need to be backwashed frequently.
- Glass Filtration Media works better – surface area is much greater EcoSmarte (Booth 424).
- Backwashing is typically based on pressure rise. Backwash until sight glass is clear (bad idea).



Portable Filter (approx. cost \$2,000)



Pictured Harmasco Filter
with Hayward Pump



Backwash Automation

FilterLink® 4000 Series (www.linkautomation.com)

Retail cost of Backwash controller = \$4,995

- Filter backwash controller - can initiate backwashes based on pressure differential, gallons filtered since last backwashed, and time since last backwash. If the first backwash is not successful at meeting the pressure goal, it can utilize its repeat-wash function to perform additional backwashes as needed.
- Operators may specify what weekdays and times are acceptable to backwash. FilterLink can backwash at these times only if it is necessary - keeping your filter running at optimal performance, reducing filtration downtime and saving water.



Fire Protection System



Thank you

WaterSmart Innovations
Conference and Exposition
October 7-9, 2009



Russ Horner

russ_horner@watermgt.com

800-394-5325

