

Dilution vs. Source Capture

Comparing energy costs, performance, and indoor air quality

ENERGY COSTS

Source Capture results in up to

\$398,295

cost savings over a 15 year lifespan

Which could represent as high as

\$26,553

savings per year

This is more than

1.5x

the cost of new equipment

INDOOR AIR QUALITY

Source capture is

2x

as effective as dilution at removing chloramines

Source capture has been measured to reduce chloramines to **below World Health Organization defined maximum “safe range”**

TABLE OF CONTENTS

The difference between Dilution and Source Capture

- | | |
|---|---|
| 1. Indoor Air Quality Comparison | 3 |
| 2. Effect of Source Capture on Nitrogen Trichloride (NCL3) at a YMCA by Purdue University | 4 |
| 3. Cost Savings Analysis | 4 |

Common Myths of the Dilution Approach

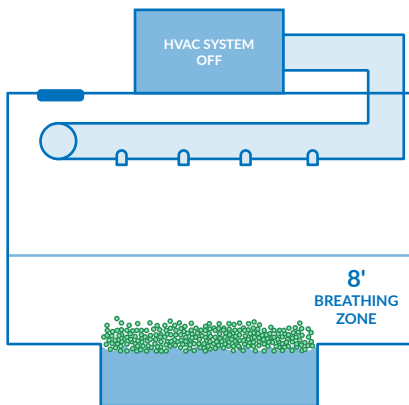
5

The Benefits of the Source Capture Approach

6

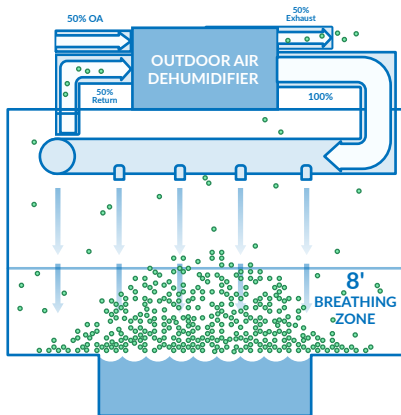
I- THE DIFFERENCE BETWEEN DILUTION AND SOURCE CAPTURE

1. Indoor Air Quality Comparison



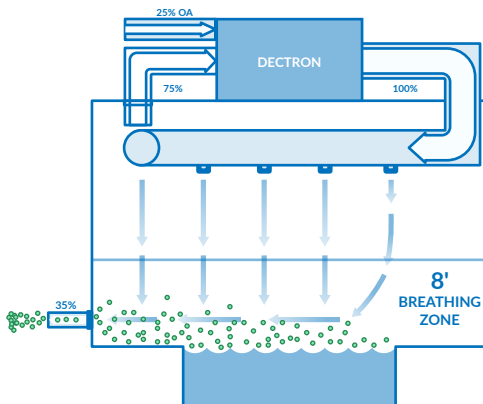
✗ No Air Movement

Chloramines are 4 times denser than air, leading them to settle on the pool surface or “breathing zone”, like a layer of scum, in the absence of any air disturbance



✗ Dilution/100% Outside Air

The dilution approach to indoor air quality requires bringing in large volumes of outside air, targeting the pool surface. This causes the chlorine layer to be disturbed and absorbed into the rest of the room, leading to poor indoor air quality (IAQ). The chloramines are then partially exhausted.

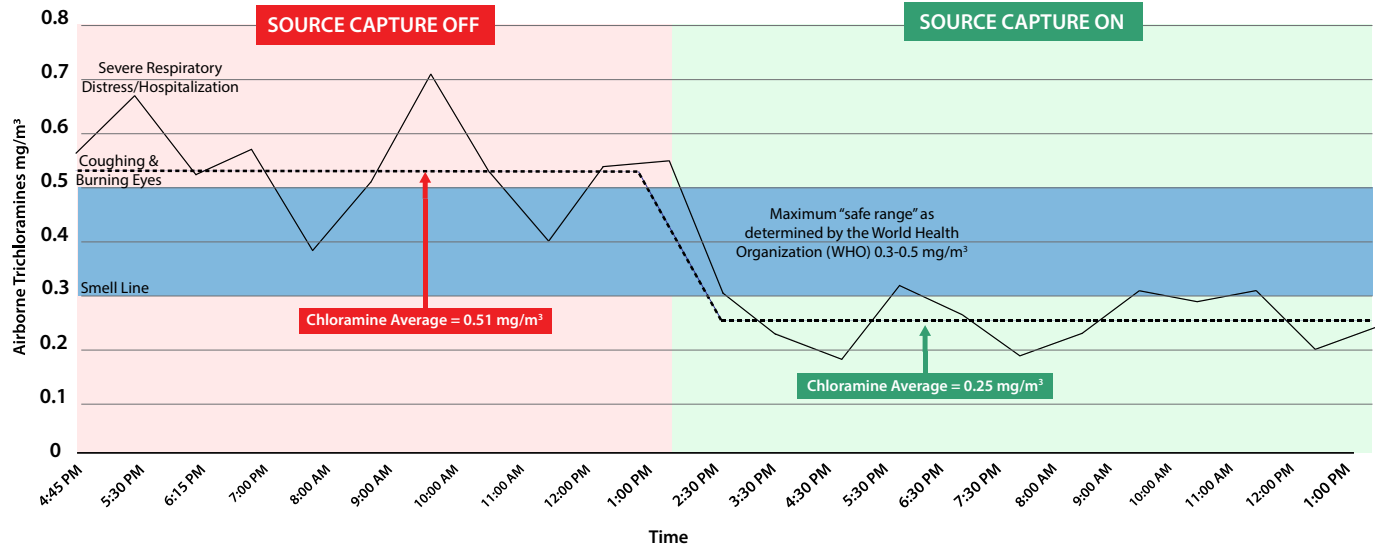


✓ Source Capture

Source Capture introduces a gentle air current at the pool surface level, which exhausts the chlorine-laden air “at the source”, without distributing the chloramines throughout the pool room.

2. Effect of Source Capture on Nitrogen Trichloride (NCL3) at a YMCA by Purdue University

Using Source Capture rapidly brings trichloramine levels well below the safe range as determined by the World Health Organization (WHO)



*Paddock Pool Equipment Company, Inc. *Study of Source Capture of Airborne Chloramines*. Paddock Pool Equipment Company, Inc., 2010. PDF.

3. Cost Savings Analysis

There is a significant operating cost penalty in using the Dilution approach due to the large amounts of outdoor air beyond what codes require being introduced. Source capture allows you to operate at code minimums while delivering lower chemical levels. When the equipment operates at minimums and optimizes the use of outdoor air and compressor operation, there are significant energy savings. *Calculations are based on ASHRAE climate data*

	Dilution (constant outside air)	Dilution (constant outside air and compressor)	Source capture (compressor and optimized ventilation)	Compressor HP	Annual Savings	% reduction using source capture
Denver	\$ 66,952	\$ 70,034	\$ 43,481	20	\$ 26,553	40%
Minneapolis	\$ 66,213	\$ 68,830	\$ 47,801	46	\$ 21,029	32%
Washington DC	\$ 62,558	\$ 65,640	\$ 45,836	46	\$ 19,804	32%
Chicago	\$ 64,493	\$ 66,945	\$ 46,611	46	\$ 20,334	32%
Atlanta	\$ 59,464	\$ 66,845	\$ 45,353	38	\$ 21,492	36%
Dallas	\$ 57,979	\$ 65,360	\$ 45,308	38	\$ 20,052	35%
Boston	\$ 60,363	\$ 61,476	\$ 42,236	30	\$ 19,240	32%
Los Angeles	\$ 58,405	\$ 58,617	\$ 37,904	20	\$ 20,713	35%
Average	\$ 62,053.38	\$ 65,468.38	\$ 44,316.25	Average reduction using source capture	\$ 21,152.13	34%

II- COMMON MYTHS OF THE DILUTION APPROACH

The following myths used to sell 100% outside air (OA), can cost you money, while yielding disappointing IAQ and overall comfort.

1. Myth: Using Outside Air alone provides energy savings over using compressors for humidity control.

✓ **Fact:** Calculations we've seen which show Outside Air to be more energy efficient incorrectly assume that compressors are operating at 100% 24/7, 365 days a year. Operating costs are 34% lower on average with Source Capture compared to Dilution (Refer to table on page 4).

✓ **Fact:** Geography strongly affects how feasible and energy efficient Outside Air is, but there are savings to the compressor and optimized ventilation approach even in mild climates like Los Angeles (Refer to table on page 4).

✓ **Fact:** A vast majority (>90%) of successful installations use a combination of both to ensure year-round comfort and energy savings.

2. Myth: Dilution by bringing in more Outside Air than the code requires results in good Indoor Air Quality.

✓ **Fact:** Dilution's impact on Indoor Air Quality depends on air distribution. Even when 100% Outdoor Air is supplied, if it is not properly distributed from the supply duct to the breathing zone, certain areas will continue to experience Air Quality issues.

✓ **Fact:** Source Capture chemical removal is not dependent on the supply air distribution to be effective, and has proven to bring chloramine levels below the World Health Organization "safe range" (Refer to chart on page 4).

III- THE BENEFITS OF THE SOURCE CAPTURE APPROACH

The dilution air approach was mostly abandoned in the 80s when people discovered the compressorized approach to controlling their space delivered more reliable results and saved energy. Source capture delivers superior indoor air quality without the need for bringing in more outside air than the code requires.



Reduced Operating Costs

Reduce energy costs by 1/3 compared to constant OA systems.



Reduce your carbon footprint

This system has the smallest energy footprint, reducing your carbon footprint to the absolute minimum.



Reduced Maintenance Costs

When you dramatically reduce the corrosive chemical levels you save money on associated maintenance issues.



Green Dehumidification Design

This system has the lowest refrigerant charge in the industry.



Improved IAQ

With an integrated source capture solution, effectively removes chemicals from the source.



Peak Performance

Your athletes will perform at their absolute best when swimming in a better environment.