On Site Hypochlorite Generation

The Safe, Sound, Clean & Green Disinfection Option

By

Brian W Branch

PSI On-Site Disinfection
A UGSI SOLUTIONS COMPANY

One Water

As Times Change So Do Disinfection Options

Why On site Generation of NaOCl?

Safety

Increasing cost of bulk NaOCl

Regulations – RMP CFATS

Continuity of Operation

No storage or handling of hazardous materials

Consistent concentration

Reduced operational costs

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PANDEMIC INFLUENZA

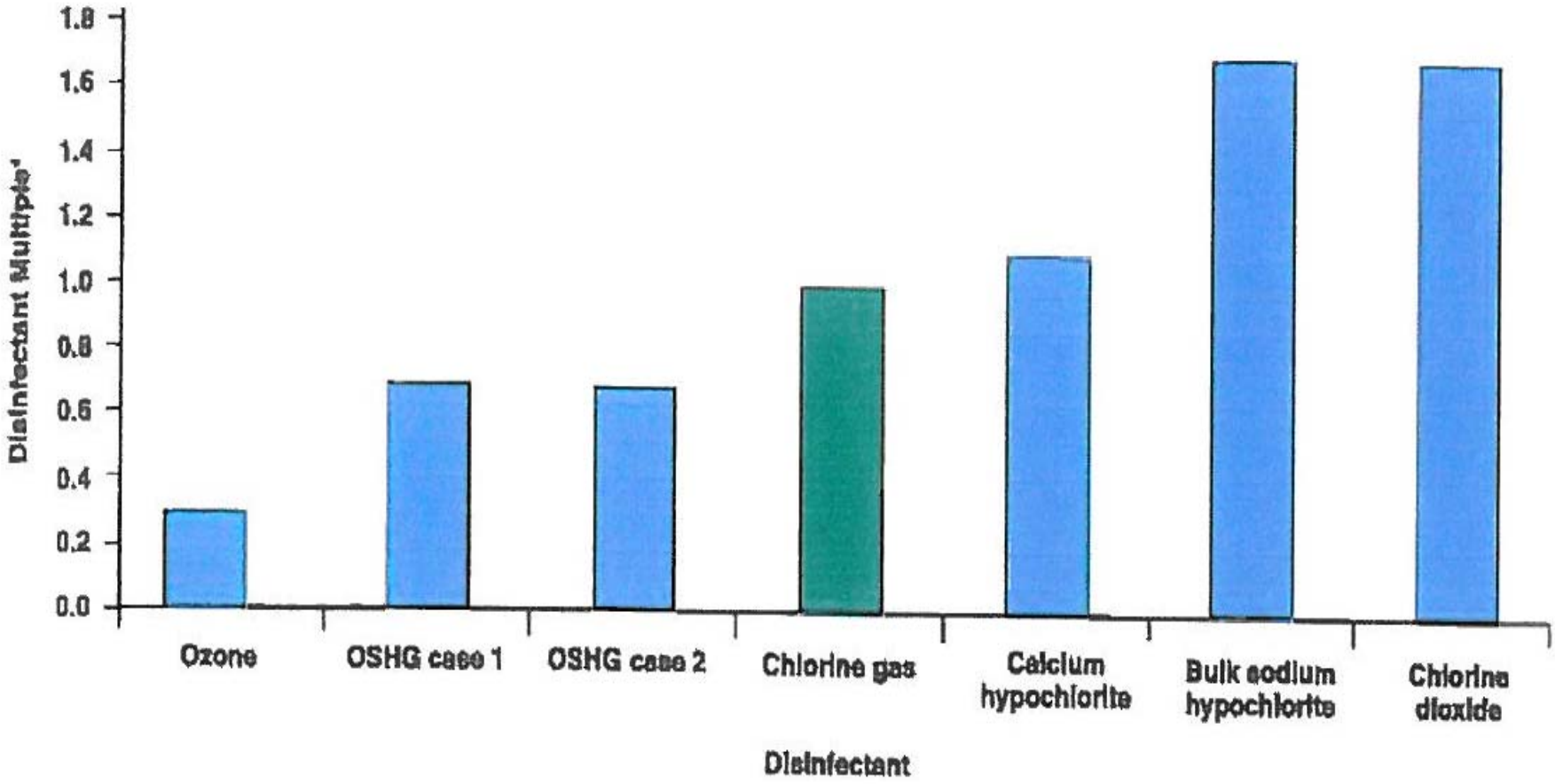
Preparedness, Response, and Recovery

GUIDE FOR CRITICAL INFRASTRUCTURE AND KEY RESOURCES

Homeland Security

Annex:
Water and Wastewater Sector Pandemic Guideline

FIGURE 3 Transportation relative to chlorine



OSHG—onsite hypochlorite generation

**A lower multiple indicates fewer greenhouse gas emissions.*

Source: Journal AWWA (August 2012) Article: Security & Preparedness Authors: Shannon Spence, Kevin M. Morley & Jeffery T. Sloan

Operating Material Requirements

Salt

Softened water

Electricity

Chemical Process

$$2NaCl + 2H_2O + \text{DC power} \Rightarrow 2NaOCl + 2H$$

3 lbs. Salt

2 kWh A.C. power

15 Gal. Potable Water

= 15gal. 0.8% NaOCL = 1lb. Free Available Chlorine

Where Does Chlorine Come From?

SALT!

2,000 lb. bag–loaded brinemaker

40 Ton Bulk-Loaded Brinemaker w/ Heat Retention

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Two 80 Ton Brinemakers

@ 70 MGD SWTP

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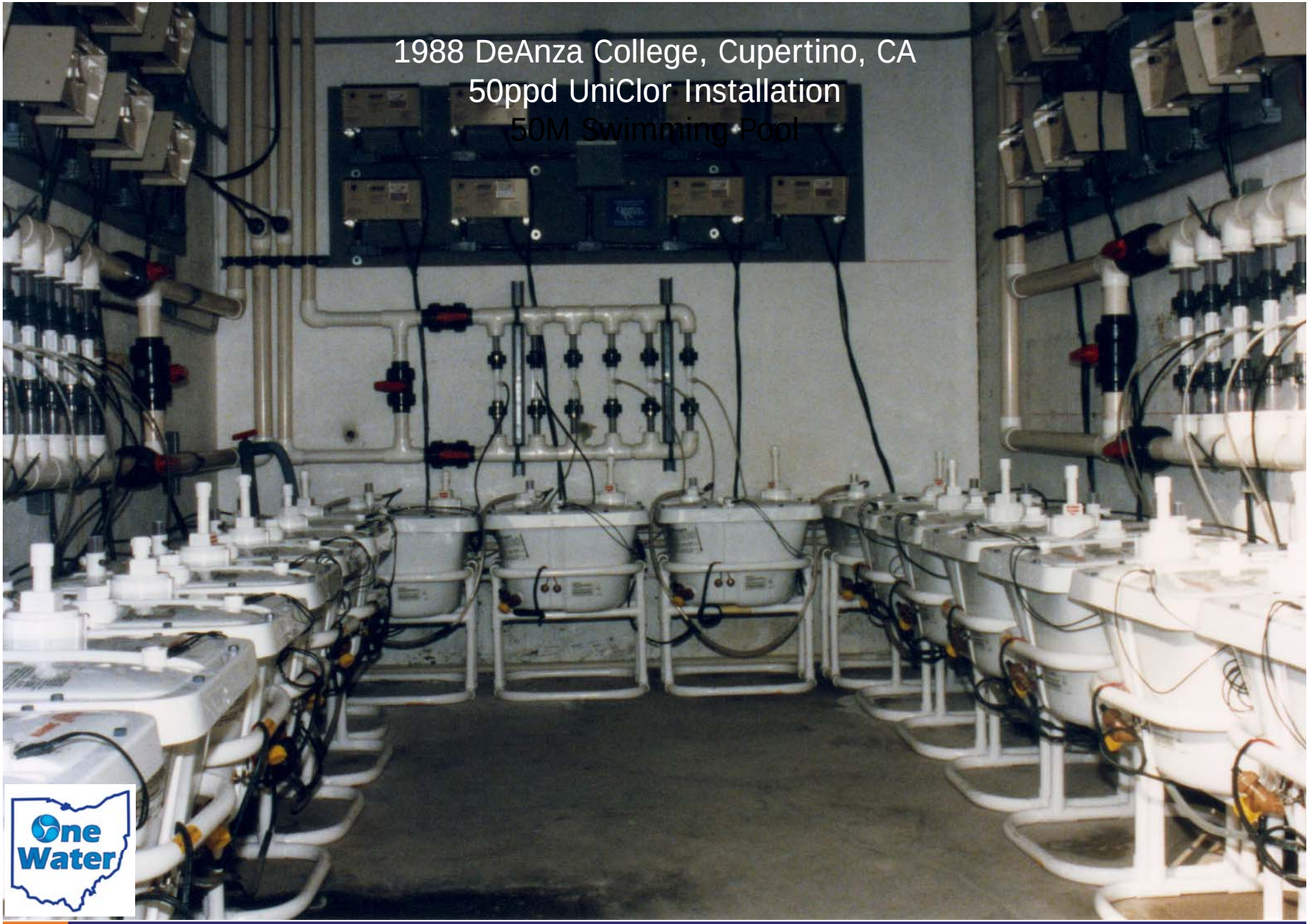
1988 DeAnza College, Cupertino, CA
50ppd UniClor Installation
50M Swimming Pool

1990 Well #10 Madera Valley Water
20ppd UniClor Installation

Sanilec B50 X 2
1994

Onsite Hypochlorite Equipment Suppliers – U.S.A.

UGSI – PSI - MicrOclor

Severn Trent Services- ClorTec

Evoqua – Siemens – W&T OSEC

Miox – Parkson Maximos

psi process solutions, inc.

MICROCLOR

One Water

City of Albuquerque

- First installation in 1995 Sanilec
- Complete system conversion 1997 ClorTec
- 28 Systems
- Capacities from 20 ppd to 6,000 ppd.
- Next Generation Implementation began in 2006 MicrOclor
- Complete upgrade to begin Phasing Winter 2009
- Experience with 4 manufacturers over 14 years

Albuquerque Well #1
New unit installed
by maintenance staff
MICROCLOR
psi
psi
(408) 370-6540

Albuquerque Water Authority
Volcano Cliffs 200 pounds per day.
Installed December 2006
MICROCLOR
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Rancho California Water Dist.

- 28 Well Sites
- Used 150 Pound Cylinders
- Well sites in residential neighborhoods
- Pilot Tested MicrOclor Spring of 2008 for 90 Days – Money Back Guarantee
- Concerned about operator Acceptance
- Engineering and Operations Approval Summer 2008
- System Wide Conversion began immediately
- Completed Summer 2009

Rancho California WD
20ppd MicrOclor
Turnkey Installation
One Ton
Brinemaker
10/15/2009
One Water

Rancho California WD
20ppd MicrOclor
Turnkey Installation
MICROCLOR
psi
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WARNING
10/15/2009
One Water

40ppd Integrated System

JOHNSTON
BOILER
COMPANY
eSolution
250
200
150
100
50
Sodium Chloride
0.8% Solution
earthwise
One
Water

Auburn, AL Well #3
2 MGD – 60ppd OSHG System
DANGER
SODIUM HYPOCHLORITE
MICROCLOR
One Water

High School
Daphne, AL
Trojan WTF 3 MGD

MicrOclor MC-100

One Ton
Brinemaker
MicrOclor MC-100

Salt Delivered By
Lowes Hardware
One Water

Pine Bluff WTP #2 – 8 MGD
300PPD OSHG System
Owner Installed
One Water

Pine Bluff WTP #2

Pine Bluff WTP #2

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Indiana American Water
Hidden Lake SWTP
6MGD – 2 X 200ppd

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Orange Beach, AL WTP
7.5 MGD – 400ppd

Columbus Water Works
Ft. Benning, GA WTP
8MGD – 400ppd

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Opelika Utility Board
Betts WTP 20 MGD – 600ppd
One Water

Spartanburg Water
R B Simms SWTP
64MGD – 2 X 1,000ppd
SPARTANBURG
WATER SYSTEM
R B SIMMS FILTRATION PLANT

MICROCLOR
psi
MICROCLOR
psi
BRINE
WATER INLET PRESSURE
+GF+
One Water
Spartanburg Water
R B Simms SWTP
64MGD – 2 X 1,000ppd

Bonita Springs, FL ROWTP
20 MGD – 1,500ppd
SIEMENS
ON
OFF

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psl
DILUTION AIR
DANGER
ELECTRICAL HAZARD
One Water
Missouri American Water
Meremec WTP – 50 MGD
MicrOclor MC-1800 X 3
5,400 Pounds Per Day FAC

Missouri American Water
Meremec WTP – 50 MGD
MicrOclor MC-1850 X 3
5,400 Pounds Per Day FAC

One Water

Missouri American Water
South SWTP – 42 MGD
MicrOclor MC-1200 X 3
3,600 Pounds Per Day FAC

Missouri American Water
South SWTP – 42 MGD
MicrOclor MC-1200 X 3
3,600 Pounds Per Day FAC

Upper Trinity Regional Water Dist.
Taylor SWTP 70 MGD
3 X 2,000ppd

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process solutions, inc
(408) 370-6540
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Campbell, CA 95008
MICROCLOR
CHILLED WATER
SOFTENED WATER

MC-1850 On Test Rack

Marathon Oil – Nigeria
Containerized 60ppd
MICROCLOR
Friedrich

MICROCLOR
psi
WARNING

Speed X
One Water

One
Water

One
Water

One
Water

Multiple Unit Customers

Albuquerque - 10 units

- *In contract to replace 28 units*

Rancho CA WD – 48 units

Santa Ana – 13 units

Elisinore Valley MWD – 10 units

Cucamonga Valley WD – 10 units

South Coast WD – 6 units

Large Installations

Upper Trinity	6000 ppd – 3 year
Boca Raton	7500 ppd in Construction
Missouri American	5400 ppd – 6 years
Missouri American	3600 ppd – 6 years
City of Austin	4500 ppd in construction
TXU Energy	3600 ppd – 6 years
Springfield MO	3000 ppd - 2 years
Spartanburg	2000 ppd – 2 years
NRG	1800 ppd – 4 years
Bonita Springs	1500 ppd – 2 year
Colorado Springs	1500 ppd – 3 years
Weber Basin WD	1000 ppd 3 year
Salt lake City	1200 ppd 4 years

MICROCLOR

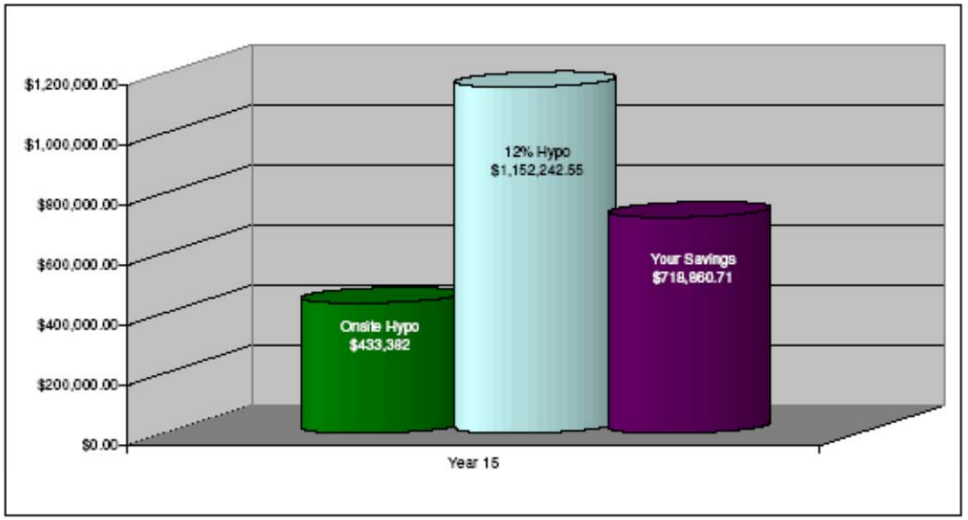
Onsite Hypochlorite Generation System

Estimated 15 Year Cost Comparison

Prepared For: Westland Resources, Inc.

Project: Avra Water Co-Op

Date: 4/3/2006



Site Information

Instantaneous Flow (GPM)	3,000
Flow (MGD)	4.32
Chlorine Dose (PPM)	2.50
Duty Time (%)	100%
Annual Chlorine Demand (LBS)	32,850
Daily Chlorine Demand (LBS)	90

Raw Material Costs

Chlorine Gas per Pound	$ 0.50
12% Bulk Sodium Hypochlorite Cost per Gal	$ 0.80
Salt Cost per Pound	$ 0.05
kWh Cost	$ 0.10
Fully Burdened Labor Cost Per Hour	$ 75.00

Capital Expenditure

MicrOclor	$ 80,000.00
PPD System	100
Chlorine Gas	Not Applicable
12% Bulk Sodium Hypochlorite	$ 10,000.00

Estimated Annual Hourly Labor

MicrOclor	50.00
Chlorine Gas	100.00
12 % Sodium Hypochlorite	100.00

Raw Material Concentration

Chlorine Gas	N/A
NaOCl 12% (Degraded By 15%)	10.00%

Inflation

Chemical Price Index	109%
Consumer Price Index	103%

MicrOclor Raw Material Consumption

Salt	3.0	lbs. per Pound Chlorine Equivalent
Power (kWh)	2.0	lbs. per Pound Chlorine Equivalent

psi process solutions, inc.

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Action Items

Contact OSHG Manufacturers

Visit Other Utilities Using OSHG

Find Out How To Make Your Disinfection System

Clean, Green, Safe & Sound

Questions?

Are there any questions regarding this technology?

Thank you for attending!

PSI – On Site Disinfection
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Email: mail@4psi.net www.4psi.net