



**SABRE**  
TECHNOLOGIES

**Ethanol Refining  
Bacterial Decontamination  
Yield Improvement**

## Company Profile

- Industry-changing technology for the control of microorganisms – designing and implementing biosecurity, decontamination and protection systems
- Over 70 issued patents relative to chlorine dioxide
- Peer Reviewed publications under cooperative research and development agreements with USDA, US EPA and other government agencies



## Track Record of Success

### Bacterial Decontamination in Industry

- Oil & Gas Wells Bacteria and production increase
- Egg Layers with heavy bacterial contamination
- Industrial Process Water Treatment

### Large buildings with bacterial/viral contamination

- Biopharmaceutical manufacturing facilities
- Hospitals with pervasive mold
- Ready-to-eat food processing plants

### Chiller Loop Treatment

- Large universities
- Vehicle assembly plants

### Mold treatment following natural disasters

- Malls, offices, churches, restaurants, etc.

### Large-scale animal disease outbreak response

- Highly pathogenic avian influenza (HPAI)

## Antibiotics Vs. Chlorine Dioxide (DiKlor®)

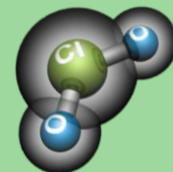


- Antibiotic use drives resistance
- Antibiotics in ethanol processes leave residues in distillers grains (DGS)
- Antibiotic use in ethanol production can exit the plant through DDGS and be used to feed cattle, pigs and poultry
- 3000 PPM DiKlor® is a more cost-effective treatment technology than Stabilized Chlorine Dioxide (not a pure  $\text{ClO}_2$ )
- Chlorine Dioxide ( $\text{ClO}_2$ ) is an EPA and USFDA approved chemical for bacterial decontamination
- $\text{ClO}_2$  does not produce any toxic chemicals like Dioxins & THMs
- $\text{ClO}_2$  is GRAS and therefore suitable for use

## Bacterial Water Treatment with DiKlor®

### Bacteria cannot build tolerance to chlorine dioxide

Chlorine dioxide is a broad-spectrum microbicide that has been used for over 70 years as a drinking water disinfectant. **DiKlor®** is a pure chlorine dioxide solution which is more efficacious, easier to apply and measure, and safe to store.





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## Why is Bacterial Contamination a Problem?

Bacterial contamination leads to a decreased yield in ethanol production

Loss of yield is loss of profits

Excessive bacterial contamination can lead to process shutdown for extended periods

Even 1% yield improvement can add up to \$1MM for a 50 MMGal/yr plant capacity

Huge benefit to the bottom line

## Benefits of ClO<sub>2</sub> Treatment

The use of DiKlor® can be key in optimizing ethanol production and biofuels

ClO<sub>2</sub> helps ensure the maximum ROI for your plant

ClO<sub>2</sub> achieves better control of bacterial population

ClO<sub>2</sub> is an EPA Approved biocide.

- Vehicles generate 3 g/L ClO<sub>2</sub> (DiKlor®), onsite and effective eradication of bacteria and other harmful microbes in the water system for 2-4 weeks.
- We connect to the water system at customer site in a closed loop and treat the entire system
- A slight residual of DiKlor®-S is left to build up overtime, resulting in a more effective long-term treatment than bleach
- No hardware installed or left on customer location except for the storage tank
- As-needed basis (biweekly, monthly, quarterly, etc.)
- Flow paced to treat the water system on a pulsing or continuous basis

**BioWall™**



## More Commonly Known Technologies

- Antibiotics
- Hydrogen Peroxide
- Installed Chlorine Dioxide Generators

These technologies are more costly and ineffective.