

A high-speed photograph of a water splash, showing intricate droplets and a central column of water, set against a light background. This image is positioned in the upper left quadrant of the slide, partially overlapping a black diagonal band and a white background.

## *Choosing A Biocide for Well Interventions*

Protecting Your Equipment, Your Fluids, and the Reservoir

**October 19<sup>th</sup> 2016**

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**OSP** —  
*Proven Chemistries, Intelligent Solutions*

# ***BIOCIDE SELECTION***

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This presentation will review the most common biocides available, their compatibility with well intervention programs and what successful microbial control looks like.

- Biocide Basics
- Microbial Control – Why?
- Selection & Application
- Ensuring it Works



# ***BIOCIDES***

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The US Environmental Protection Agency (EPA) defines biocides as "a diverse group of poisonous substances including preservatives, insecticides, disinfectants, and pesticides used for the control of organisms that are harmful to human or animal health or that cause damage to natural or manufactured products".

These substances can be used for other applications, however, when used intentionally for killing/controlling bacteria → **Strict Regulation (EPA, PMRA)**



# *BIOCIDES*

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## How does this affect YOU?

- APPLICATION
  - Has to be registered for use i.e. hydraulic fracturing
- DOSAGE
  - Minimum & Maximum dosages
- DIFFERS BETWEEN US & CANADA

NEW registrations: upwards of 3+ years and \$500K.

# *SELECTION & APPLICATION*

## Biocide Lingo

- Filmers/Foamers
- Surface Active
- Ionic

- Fast Acting
- Preservatives

- Multiple Modes of Action
- Cell Rupture vs Membrane Crosslinker

- <sup>5</sup>• Kill Study



charge = they interact with  
ces that have a charge!  
od or bad...

- Fastest = O
- Persistent =
- Everything c
- between...

- What type of cell destruction is employed...?
- Can dictate monitoring tools or results interpretation.

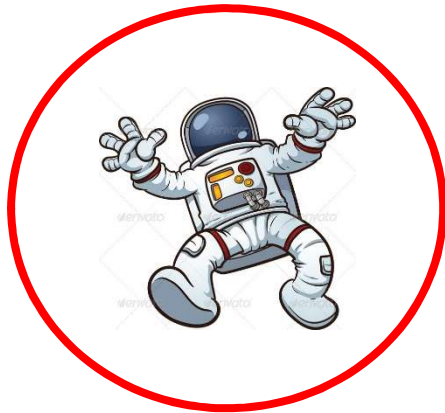
- Biocide Selection – Lab Testing

# *MICROBIAL CONTROL*

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**Planktonic vs Sessile**

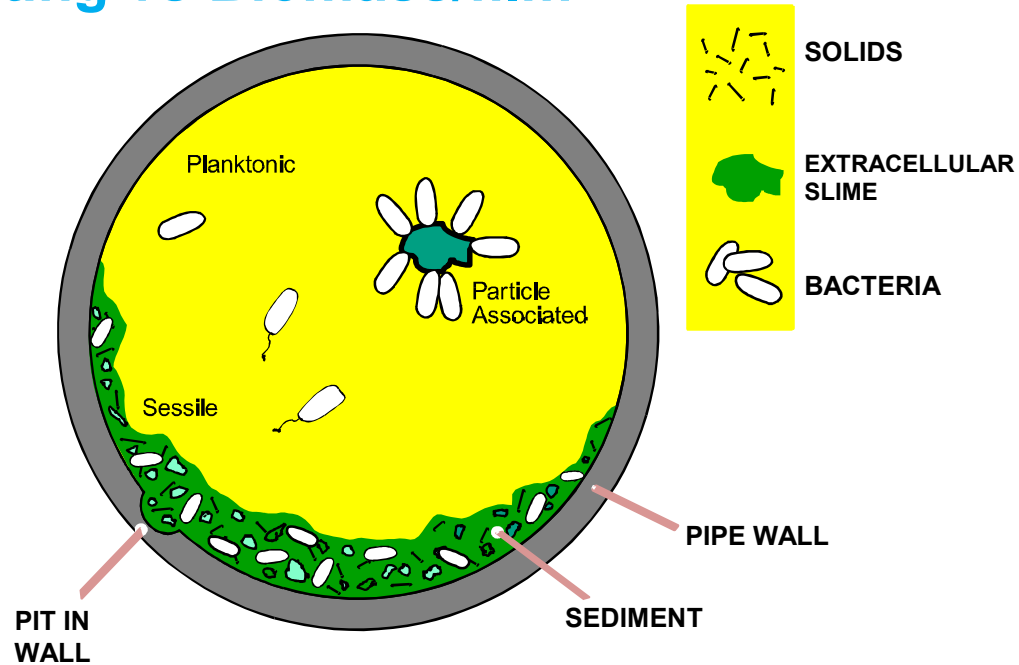
**Free Floating vs Biomass/film**



# MICROBIAL CONTROL

## Planktonic vs Sessile

## Free Floating vs Biomass/film



# ***BIOCIDES***

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## **What does the tool kit look like?**

Bronopol

Glutaraldehyde

Acrolein

ADBAC, DDAC (Quaternary Amines)

THPS (Tolcide)

Diamine Acetates (Cocodiamine)

CMIT, MIT (Isothiazilinone)

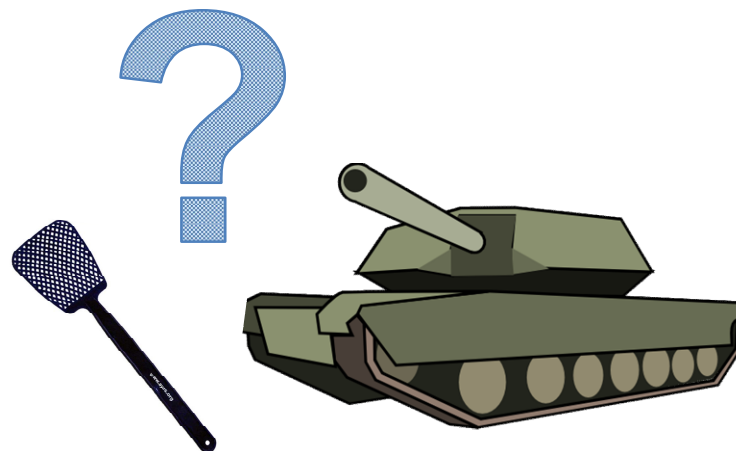
TTPC

Dazomet

DBNPA (organic oxidizer)

THMN, CTAC, DMO (formaldehyde releasers)

Oxidizers (bleach, chlorine dioxide, peracetic acid, ozone)





# BIOCIDES

## Work Horses

Bronopol  
Glute



## Surface Active

Quats (ADBAC, DDAC)  
Diamine Acetates (Coco)  
TTPC (phosphonium quat)



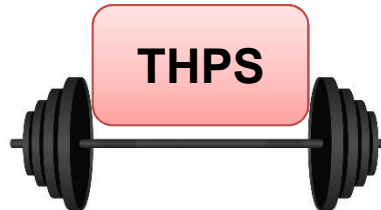
## DBNPA

## Oxidizers

Bleach  
Peracetic Acid  
Chlorine Dioxide



## THPS



## Formaldehyde Releasers

THMN, CTAC, DMO



# *MICROBIAL CONTROL*

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## Why do we need to control bacteria?

1. **Microbially Influenced Corrosion** → Longer run time on our assets (coiled tubing and associated equipment)!
2. Generation of H<sub>2</sub>S & Fluid Degradation
3. Contamination of downstream equipment, and production activities post-job.

# *MICROBIAL CONTROL*

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## **Fluids**

- Fluid Stability
- H<sub>2</sub>S/MIC in Storage

**Free Floating  
PREVENTION**

## **Equipment**

- MIC - Coil
- MIC - System Contamination

**Free Floating  
PREVENTION &  
Biofilm CLEAN OUT**

## **Reservoir**

- Irreversible contamination
- Control required for well life

**Free Floating  
PREVENTION**

# *SELECTION & APPLICATION*

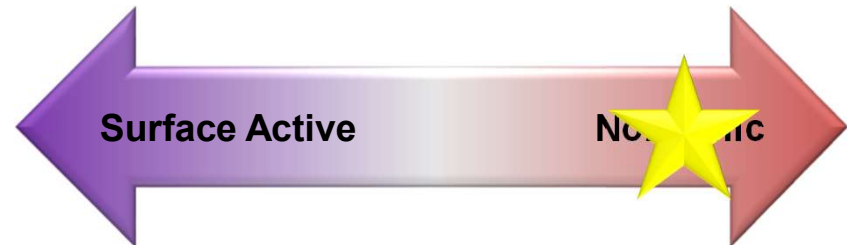
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## Coiled Tubing – Preventing MIC

### 1. **Operations**

- Treat during or previous to job (fluid storage)
- Prevent contamination of equipment or wellbore
- Compatible with fluid systems, safe & easy to handle

**Work Horses**  
Bronopol  
Glute



# *SELECTION & APPLICATION*

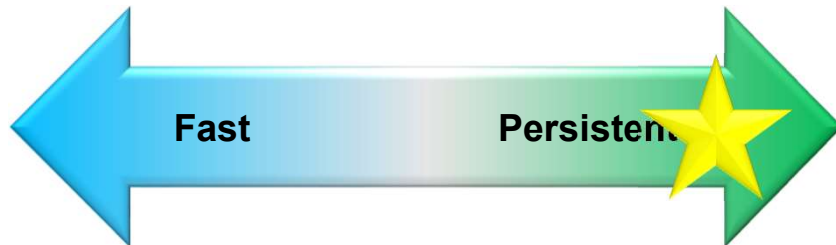
## Coiled Tubing – Preventing MIC

2. **Storage** – residual water
- Maintain long term control

Formaldehyde Releasers

Surface Active

Work Horses



# *SELECTION & APPLICATION*

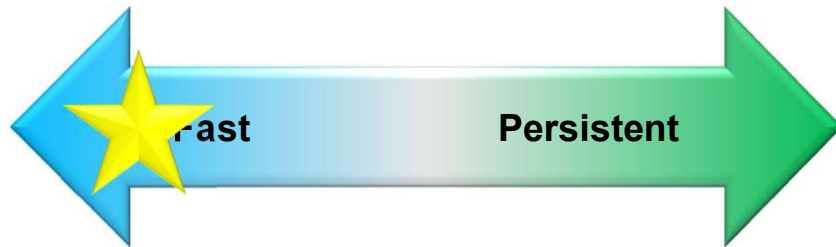
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## Coiled Tubing – Preventing MIC

Oxidizers

### 3. **Clean-Out** of Contaminated Coil

- Fast Kill
- Penetrates Biofilms (sessile microbes)
- Safe on equipment materials



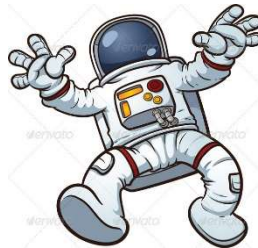
# ***DID IT WORK?***

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## **Monitoring**

1. Source Water – Determine Dosage
2. Prior to Use – Was kill achieved/maintained?
3. Post Treatment – Was kill maintained?
4. Hydrotest Waters – Same process.

## **LifeCheck ATP – Planktonic or Sessile**



# QUESTIONS?

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