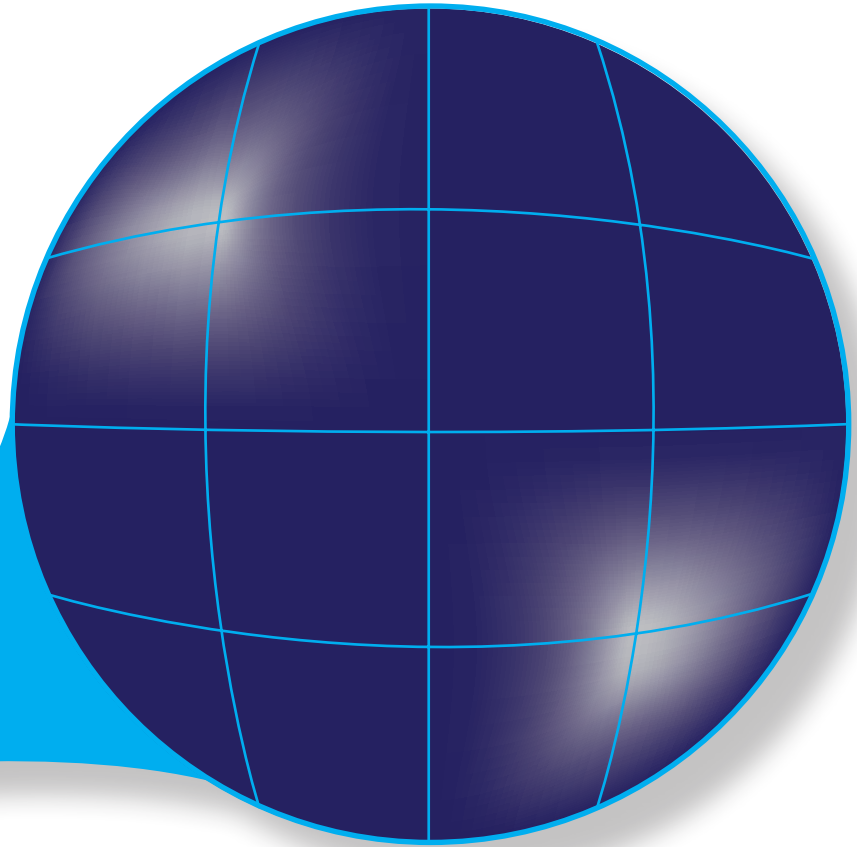


***GlobalEnhanced
Dispersed Thermal Sub-
Nanotechnology for
Disposal and Injection
Well Applications.***

GlobalEnhanced

A **CLEAN SWEEP** PRODUCT



Fluid Solutions

Developed to provide highly efficient drilling, completions, exploitation, disposal, and environmental solutions in a competitive market with maximum ROI.

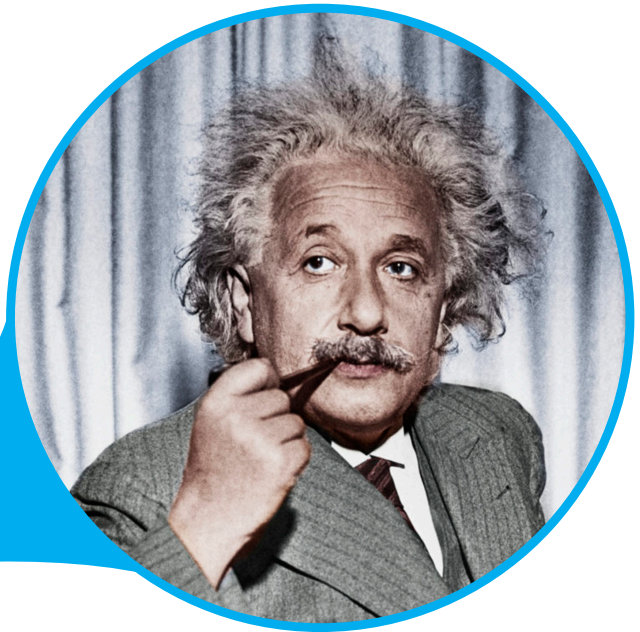
GlobalEnhanced was developed for EOR and injection solutions development.

We take pride in working with our partners to maximize fluid efficiencies for disposal, production, and water management.

We continuously pursue various other partnerships to provide best-in-class solutions.

“*We cannot solve our problems with the same thinking we used when we created them.*”

Albert Einstein



Injection & Disposal Well Applications

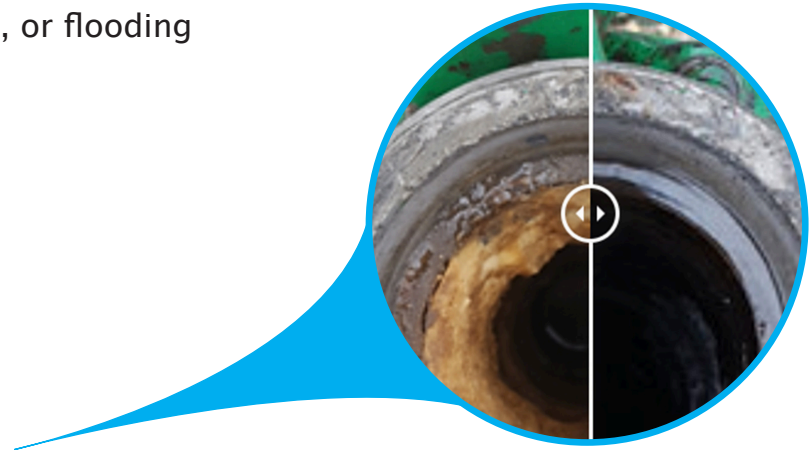
Wells encounter a variety of damage mechanisms which prevent efficient and profitable disposal, injection, or flooding of fluids.

- Emulsions/IFT
- Solids/Fines
- Wax/Paraffin
- Mixed Wettability/Compatibility
- Viscosities/Polymer Blockages
- FeS
- Bacteria, etc.

Traditional repair/remedial operations are expensive and problem specific, as well as short lived with potential adverse effects (acid, solvent, oxidizers, mechanical means, etc.).

Limited to capital/operational funding to maximize.

Limited and expensive access for remedial operations.



*Before and after:
wax/paraffin removal*

Sub-Nanoparticle Applications

Sub-nanoparticles are 10^{-15}m in size.

Sodium metasilicate dispersion is manufactured at $<15\text{nm}$.

GlobalEnhanced nanotechnology functions through Brownian Motion mechanisms:

- Dis-joining Pressure (Wedge Effect)
- Fragmentation

GlobalEnhanced sub-nanotechnology goes further, faster, more efficiently into tight reservoirs.

Non-discriminatory on fluids, blockage, damage, etc. encountered due to physics of the mechanism.

*presentation videos to demonstrate

10^{-1}

Water Molecule



10^6

Period



10^8

Tennis Ball



Wettability Manipulation

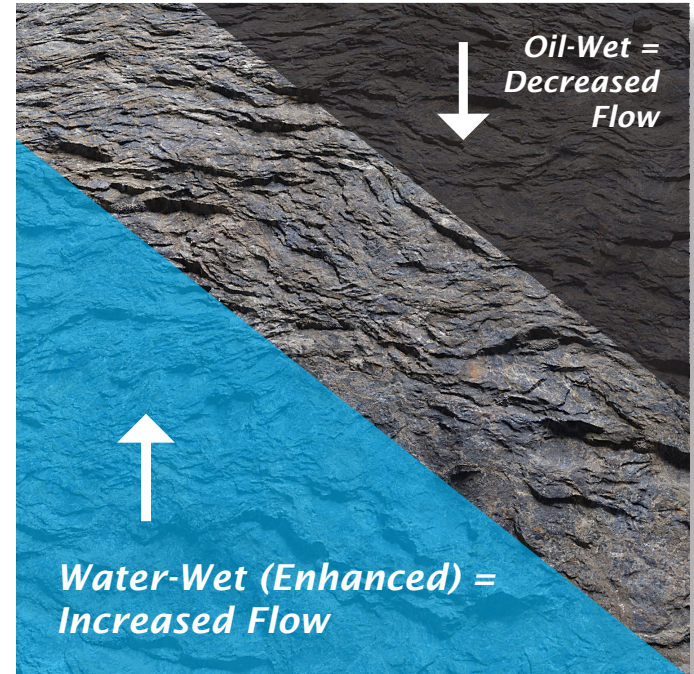
Wettability affects relative permeability, electrical properties, nuclear magnetic resonance relaxation times, and saturation profiles in the reservoir.

The wetting state impacts water flooding and aquifer encroachment into a reservoir.

*The **GlobalEnhanced** product line changes the wettability of oil-saturated rock surfaces making them more water-wet.*

Treatments that change the wettability of the formation from oil-wet to water-wet can significantly enhance productivity/injectivity and flood efficacy.*

*University of Alberta Study



Emulsion/Interfacial Tension (IFT) Interactions

Effects on contact angle, interfacial tension reduction, and **Brownian Motion** fragmentation break emulsions and decrease IFT of fluids to enhance injection rates in conjunction with decreasing surface pump pressures.

GlobalEnhanced dispersions are inert. They do not create emulsions with their interaction in the blended fluids.

This enhances injectivity into to the reservoir or flood. The motion of the particle and its surfactant will break emulsion blockages and enhance injectivity.

Brownian Motion seen in dust particles suspended in air.



Gummy Bear Effect—Polymer Blockages

Various polymers with various charges and sizes are routinely added to disposal wells and during drilling, frac, and flooding operations.

Xanthan Gum, Guar, Polyacrylamides, Cellulose, etc. becomes a cumulative problem.

Non-discriminatory interaction of the dispersed nanotechnology on the “Gummy Bear” blockage releases the blockage.

Fragmentation of the blockage into smaller monomers allows the impediment to be broken up and dispersed throughout the disposal formation.

MMMMMMM. Delicious.



SAGD Opportunity

We have developed a **novel thermally stable sub-nanoparticle surfactant** dispersion for oilsands SAGD operations. This dispersion, when added in small doses, enhances the flow potential of liquids and gases in *any* form, *including steam*. **Projected operational enhancements include:**

- **Potentially significant reduction in the volume of water required** to build the steam chamber required to recover oil from the reservoir.
- **Reduced emissions** through the significant reduction of water required, and therefore natural gas required to produce steam.
- Enhanced efficiency of the steam that is injected into the injection leg.
This increased efficiency could result in increasing the steam chamber production, decreasing the time required to form an effective steam chamber, and promoting the penetration of the steam into the reservoir increasing oil recovery.
- **EOR from the producing leg** by fragmenting and mobilizing the heavy oil in the reservoir.
Manipulating the reservoir to water-wet may also assist in increased recovery.
- Reduced corrosion rates.
- Increased downstream flow rates.
- Decreased wax and paraffin formation in downstream infrastructure.



Case History—Nacotoch Formation, Louisiana

NACOTOCH FORMATION

- Upper Cretaceous—Sandstone/Mudstone.

TREATMENT

- Acid/Solvent pre-flush.
- Subsequent additions of nanoparticle dispersions.
- Follow immediately with injection water.

RESULTS

- Injectivity went from 500–1500 bpd at 3700 psi, up to 1 year continued success.
- Previous acid/solvent treatments only increased injectivity 200–300 bpd, initial increase short lived.

COMMERCIAL IMPLICATIONS

- ***At \$1.00/bbl injection, nanoparticle application paid off in 30 days.***

**\$1.00 / bbl
injection,
nanoparticle
application
paid off in
30 days.**

Benefits

MINIMAL OPERATIONAL REQUIREMENTS

- Storage Tanks
- Mixing Pumping Unit
- Application complete in 1-2 Days
- Can work with present infrastructure

**When YOU WIN,
we win!**

RETURN ON INVESTMENT

- Case by cases analysis can be provided per the Case Study in the presentation.

ABILITY TO ADDRESS VARIETY OF DAMAGE/BLOCKAGE MECHANISMS

DECREASED REQUIREMENT FOR CORROSIVE AND DANGEROUS ADDITIVES FOR REMEDIAL OPERATIONS

PRODUCTION LONGEVITY

LUBRICITY, SCALE AND CORROSION INHIBITION ARE SECONDARY BENEFITS

GLOBAL ENHANCED FLUID SOLUTIONS

A **CLEAN SWEEP** PRODUCT



Maximizing your investment with customized, conscientious fluid solutions.

We help our customers across industries increase their bottom line through lower production costs, increased efficiencies, increased production volumes, improved safety, and a smaller environmental footprint.

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