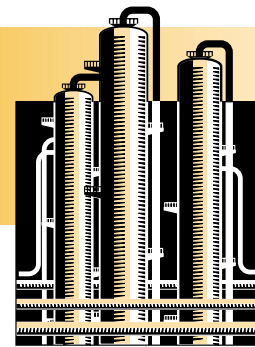


PETROLEUM

Project Fact Sheet



NEW TECHNOLOGY FOR SULFIDE REDUCTION AND INCREASED OIL RECOVERY

BENEFITS

- Improves oil recovery
- Sweetens gas
- Cleans wells
- Reduces corrosion
- Lowers production costs
- Creates safer working environment for personnel

APPLICATIONS

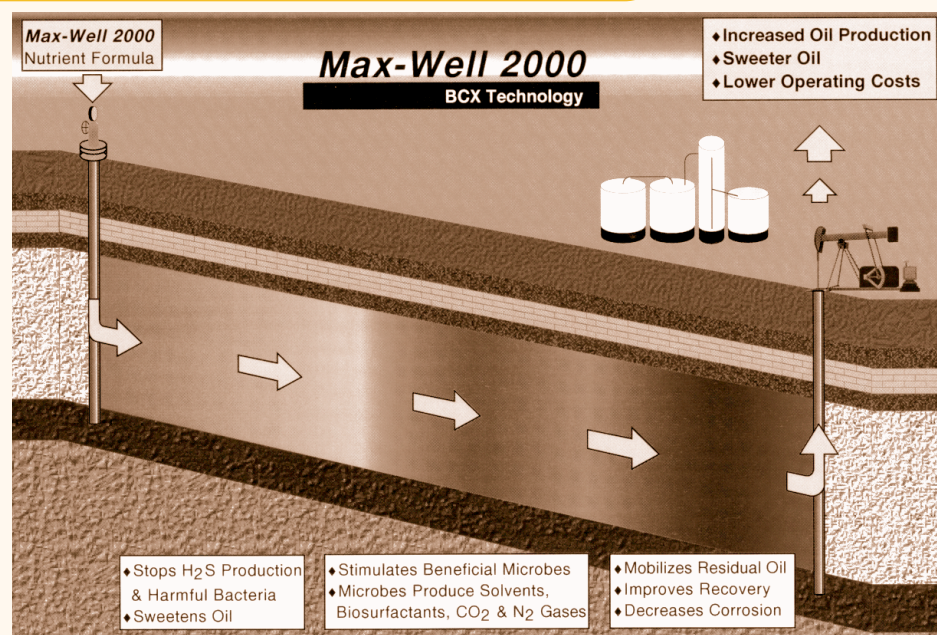
BCX is applicable in the petroleum industry for both oil and gas wells. While traditional methods of tertiary oil recovery are costly for widespread use, BCX offers an alternative. Periodic applications of low cost Max-Well 2000 products enable oil producers to recover the enormous residual oil resource missed by standard production methods.

BIO-COMPETITIVE EXCLUSION TECHNOLOGY PRODUCES MORE OIL AND REDUCES CORROSION

Traditional methods of tertiary oil recovery are effective but are costly for widespread use in the oil industry. However, a new technology, called Bio-Competitive Exclusion (BCX), results in significantly greater oil production at a reduced cost and prevents the production of poisonous and corrosive hydrogen sulfide in oil and gas reservoirs. BCX features low cost, environmentally-friendly products that are easily added at the wellhead. The result is increased revenue, improved quality and higher value oil, reduced costs from corrosion, and safer working conditions.

This bio-competitive process is initiated and maintained by a new product, called Max-Well 2000. In Max-Well 2000, organic nutrients are custom designed to stimulate and harness the tremendous power of targeted beneficial microorganisms that live in virtually every oil and gas reservoir. Rapid growth of these bacteria both excludes activity of harmful sulfide-producing bacteria and produces by-products that serve as effective and inexpensive tertiary oil recovery agents.

USING THE BCX PROCESS FOR TERTIARY OIL RECOVERY



The in situ BCX process suppresses harmful sulfide-producing bacteria and stimulates beneficial bacteria to reduce sulfide production (also known as “sweetening”) and mobilize residual oil.



Project Description

Goal: The goals of this project are to use field trials to demonstrate technology efficiency and economics and to verify previous laboratory and field results.

BCX technology works by setting off a chain of events that benefit oil and gas well operations. Injection of Max-Well 2000 nutrients greatly improves the growth conditions for beneficial bacteria already present in most reservoirs. These bacteria grow rapidly, outcompeting harmful sulfate reducing bacteria (SRB) for basic carbon nutrients. The SRB stop producing new hydrogen sulfide and iron sulfide. Existing sulfides are removed by inorganic reactions and bacterial degradation, both a result of Max-Well treatments. The rapid growth of the beneficial bacteria also produces solvents, surfactants, carbon dioxide, and nitrogen, all of which act to mobilize trapped oil within the reservoir. Oil and gas production is both increased and sweetened.

Geo-Microbial Technologies and the LATA Group are developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- BCX technology has been successfully laboratory and field tested.
- The process and Max-Well 2000 products are now being marketed.
- *R&D Magazine* awarded the BCX technology its prestigious R&D 100 Award.
- Several comprehensive well treatment programs have been established in a multi-state area in both primary and secondary oil and gas recovery wells.
- Treatment protocols, product formulae, and frequency have been field tested over extended periods of time.
- Recorded monitoring data verify that the targeted microorganisms outcompete sulfate-reducing bacteria when stimulated with Max-Well 2000 products.
- Improved oil production and reduction of poisonous hydrogen sulfide gas and corrosive, pore-plugging iron sulfide have been demonstrated.

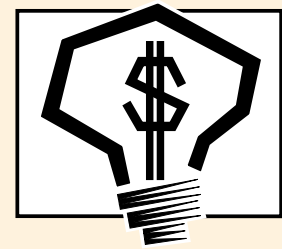
Economics and Commercial Potential

- Sulfide control and removal is already a \$40 million per year industry.
- Stripper wells—accounting for 14% of U.S. production—are a prime market for BCX technology.
- The National Institute of Petroleum and Energy Research estimates that 27% of oil reservoirs are good candidates for microbial improved oil recovery.
- Any increase in the current low prices of oil and gas would greatly increase demand for tertiary treatment.

INDUSTRY OF THE FUTURE—PETROLEUM

Petroleum is one of nine energy- and waste-intensive industries that is participating with the U.S. Department of Energy's (DOE) Office of Industrial Technologies' Industries of the Future initiative. Using an industry-defined vision of the petroleum industry in the year 2020, the industry and DOE are using this strategy to build collaborations to develop and deploy technologies crucial to the industry's future.

OIT Petroleum Team Leader: Gideon Varga (202) 586-0082.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

PROJECT PARTNERS:

Geo-Microbial Technologies, Inc.
Ochelata, OK

Inventions and Innovation Program
Washington, DC

The LATA Group, Inc.
Ochelata, OK

FOR PROJECT INFORMATION, CONTACT:

Mike Dennis
The LATA Group
P.O. Box 360
East Main Street
Ochelata, OK 74051
Phone: (918) 535-2147
Fax: (918) 535-2564
mike@latagroup.com
www.latagroup.com

FOR PROGRAM INFORMATION, CONTACT:

Sandy Glatt
Program Manager
Inventions & Innovation Program
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585
Phone: (202) 586-2079
Fax: (202) 586-7114
sandy.glatt@ee.doe.gov

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Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, DC 20585



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