



USA/Canada - Latin America & Caribbean
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 YouTube: BTProcessing Greenzyme EOR

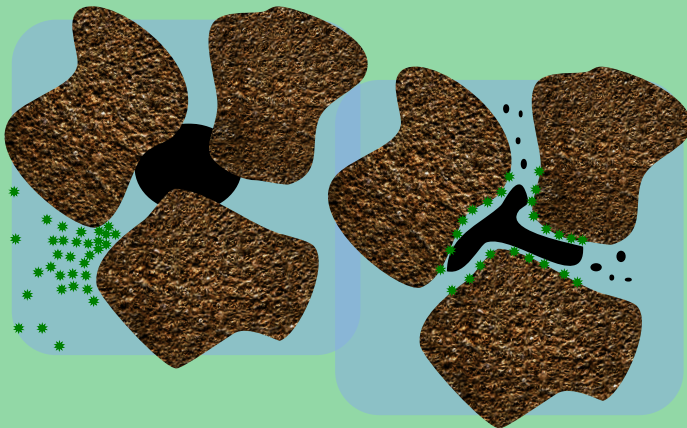
GreenZyme® for IOR/EOR

GreenZyme® is the first biological liquid enzyme used in enhanced oil recovery, in the world. GreenZyme is a long-acting, protein based, non-living enzyme, that has been proven to reduce Interfacial Tension, bring about changes in Wettability, and Mobilize remaining oil.



GreenZyme® is a Catalyst NOT a Chemical!

GreenZyme® solution, catalyze reactions between the substrate (oil), rock formation and water. Contact angles become more water-wet following exposure to GreenZyme® changing the adhesion behavior of oil from adhesion to non-adhesion, prompting oil to slide off formation rock or sand.



GreenZyme® works with any PH level, Salinity, & Temperature, immune to the presence of Metallic Ions, Radio-active isotopes, paraffins, naphthatenes, asphaltenes, and/or sulfur in any amount.

GreenZyme® is Perfect for:

Waterflooding Systems

Mature wells with a continuous decline in recent years

Wells with clogging problems and/or accelerated increase in the watercut

New wells with rapid decline in production

Environments of high salinity, temperature, and non-neutral PH



GreenZyme® Works to:

Change and Improve Wettability

Mobilize oil of any viscosity

Break up near well-bore wax and paraffin build-up

Increase a formation's capacity for waterflooding

Provide a non-toxic, cost effective, biodegradable alternative to chemicals

Diffuse into deeper regions of surrounding formations creating new "fingerings of flow"

Extend the production life of wells

Environmentally friendly, enzyme fluid technology gives operators new, effective ways to recover more remaining oil.



GreenZyme® Field Test Time Lapse



GreenZyme® Treatments Yield Additional 440,703 BOP in 6 Years For a Single Well.

Lake Maracaibo, La Salina Oil Field, Venezuela

Background:

In 2000, PDVSA, a Venezuelan Operator, had many blocked, underperforming wells located around Lake Maracaibo in La Salina Oil Field. Well TJ1319 was chosen to receive multiple treatments of GreenZyme, to test whether the recovery factor would increase after each treatment. GreenZyme had already established success in single treatment applications, but prior to this pilot, no multiple applications of GreenZyme had been recorded in South America.

Challenge:

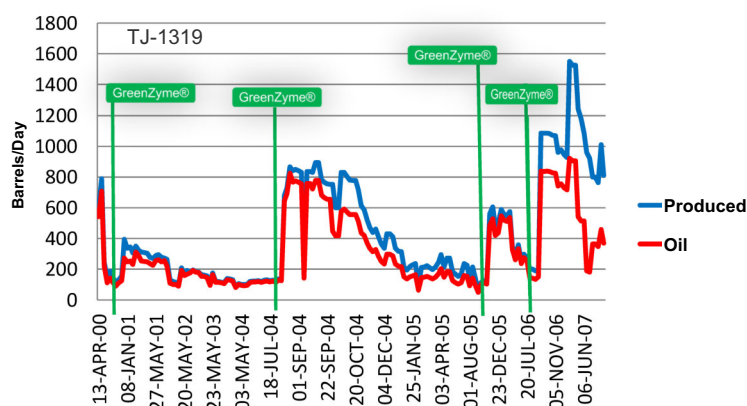
Having not previously conducted a multiple test pilot in the same well, Reservoir Engineers had to decide at what decline in production level, a new treatment was needed. Further consideration had to be made to the extraction process to prevent sand from restricting the wellbore. The production rate at which to re-treat TJ1319 with GreenZyme was partially a subjective process and partially quantified by the decline curve.

Solution:

Each treatment was accomplished by pumping under pressure one full column unit of produced water through the tubing side of the oil well, then pumping the GreenZyme diluted to 5% solution strength. A full column unit of produced water was then pumped down the same tubing to fully disperse GreenZyme deep into the reservoir. Upon completion TJ1319 was capped to let the enzyme carry out its biological function. Rate exclusion was employed to prevent the flow of sand into the wellbore once production resumed.

Results:

Initial fluid production increased with produced water being extracted first, followed by oil production. Treatments effectively removed wellbore blockage for improved relative permeability. Increased recovery was maintained as long as seven months in one case, before starting to decline. GreenZyme was found to be effective in any type of oil environment (heavy, medium, light).



Multiple applications of GreenZyme yielded significant increases in production following each treatment, with no negative external effects. Over a 6 year span, TJ1319 received 4 applications of GreenZyme. Each time TJ1319 was treated with GreenZyme it yielded an increase in BOPD, and in total over the entire length of the test, saw an **average production increase of 335% and 440,703 barrels of additional oil.**

Well	Field	API	K (Md)	Porosity	Payzone (ft.)	Pressure (Lpc)	Temp (F)	Before		GreenZyme®			BOPD Gain	Increased %	
								BPPD	BOPD	Watercut	BPPD	BOPD			Watercut
TJ 1319	LL-08	36	390	32	28	945	144	157	124	20	394	273	30	149	120,2
TJ 1319	LL-08	28.5	390	32	28	945	144	131	120	4	679	530	22	410	341,7
TJ 1319	LL-08	28	390	32	28	945	144	114	102	10	606	530	12	428	419,6
TJ 1319	LL-08	29	390	32	28	945	144	196	150	22	1086	838	22	688	458,7