SOLIDEOR

Simple & Sustained Benefits

Maintain elevated well production levels through stick technology

What we do

SOLIDEOR

- *Supplying Solid Stick technology to the Global Oil & Gas industry*

Solid Stick technology…

- ✓ *Originates from the heart of the Texas oil belt*
- ✓ *Proven for over 50 years*
- ✓ *Easy to apply*
- ✓ *Mobilizes quickly*
- ✓ *Has short interruption times*
- ✓ *Requires minimal investment*
- ✓ *Uses existing installations*
- ✓ *Is safe in operation*
- ✓ *Is biodegradable*



EOR Solutions

SOLIDEOR

- *Solid stick technology offers a wide range of EOR solutions to the oil & gas industry*
- *Every well is different and requires a tailor-made solution*
- *The chemical make up is designed to actual well data*
- *To clean out wells initially, increase water injection*
- *And then to maintain achieved production levels*



Sticks work on…

- ✓ *Removing carbonate scale and rust deposits, lowering injection pressure*
- ✓ *Inhibition of paraffin, salt, scale and corrosion*
- ✓ *Removing liquid columns of gas and gas condensate wells; unloading to the flow line with zero flaring (i.e. Greener/Environmentally Friendly)*
- ✓ *There are drilling, anti-freeze sticks and other specialty products*

Stick Types

- *Stick combination depending on fluid composition per well*
- *Stick sizes to suite bore sizes*
- *Stick densities depending on well target areas*





- ✓ ***Soap sticks*** *– designed to foam water in the tubing, therefore lightening the fluid column and allowing the formation pressure to unload the fluid from the well*
- ✓ ***Oil foam stick*** *– same principle as a soap stick, used in wells that have a fluid column composed of 75% condensate or greater*
- ✓ ***Acid sticks*** *– primarily used in water injection wells to removed carbonate scale and rust deposits and also to lower injection pressures*
- ✓ ***Paraffin inhibitor sticks*** *– oil soluble sticks that release paraffin inhibitor to prevent paraffin deposition from crude oil in production systems*
- ✓ ***Salt inhibitor sticks*** *– chelating action to keep salt in solution, prevents salt build-up in tubing and perforation of the gas well*
- ✓ ***Scale inhibitor sticks*** *– prevents carbonate types of scale from developing down hole in oil and gas wells, casing, tubing and flow lines*
- ✓ ***Corrosion inhibitor sticks*** *– control common corrosion problems found in producing oil and gas well systems, controls breeding grounds of bacteria by reducing under deposit corrosion*



Application

- *Manual dropping straight in the well head*
  - ✓ *Relatively simple procedure*
  - ✓ *Easy and quick mobilization*
  - ✓ *Excellent HSE characteristics*
  - ✓ *Can be undertaken by the Operator*

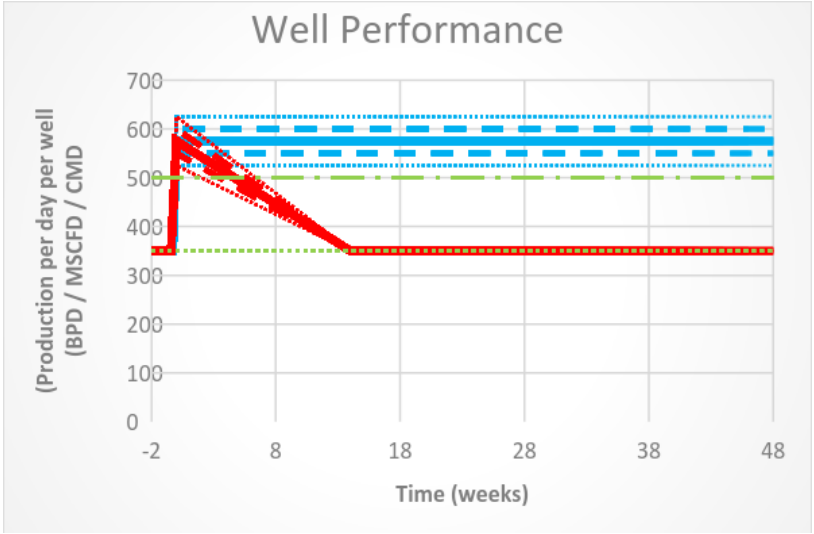
- *Autoloader dropping*
  - ✓ *Periodically automatically dropping sticks*
  - ✓ *Maintaining high production levels*
  - ✓ *Suitable for remote areas*
  - ✓ *Electrical, compressed air solutions*

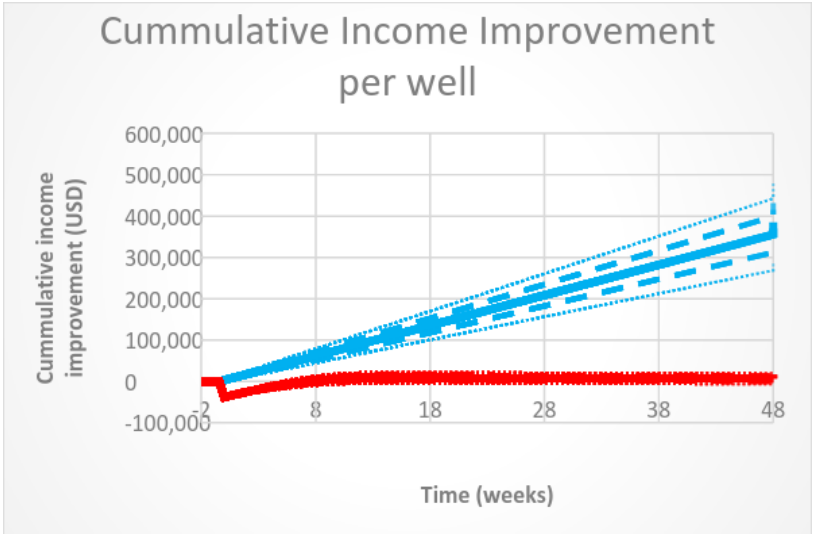




Results

- ***Initial Well Stimulation***
  - ✓ *Tailor made solution per well, highly effective*
  - ✓ *Well returns to normal production, 5% to 25% extra witnessed*
  - ✓ *Short production interruption*
  - ✓ *Minimal investment*
- ***Continued Well Treatment***
  - ✓ *Continued monitoring of performance*
  - ✓ *Stabilized higher production levels and income*
  - ✓ *Easy to maintain at relative low cost*
  - ✓ *And without interruptions*





The Process

1. ***Preparation***
   - ✓ *Well data – by Operator*
   - ✓ *Well selection on well data analysis and financial analysis*
   - ✓ *Stick selection and production for the target wells*
   - ✓ *Order and supply of sticks to site*
   - ✓ *Execution plan, HSE plan*



2. ***Initial well treatment***
   - ✓ *Dropping sticks into the well directly from the well head*
   - ✓ *Bringing the well back to normal and even elevated production levels*

3. ***Continued well treatment***
   - ✓ *Either automatic or manual dropping of sticks as per requirement to maintain production levels*
   - ✓ *Training of operational team*
   - ✓ *Supply of sticks to operational team*
   - ✓ *Dropping sticks/refilling of autoloader – by Operator*
   - ✓ *Well performance monitoring and reporting*

SOLIDEOR

Partnership

Select Industries

- ✓ *50 years in the Oil & Gas industry*
- ✓ *Texas based*
- ✓ *Largest and oldest solid stick producer worldwide*

Al-Waid Oil Field Services

- *Oil Service company in the Middle East*
- *Omani based, applying solid stick technology*
- *Hamoud Al Habsy brings 30+ years of oil field experience*

AL-WAID OIL FIELD SERVICES

الواعد لخدمات النفط

خدمات النفط

SOLIDEOR

Clients

Selection of major clients



The Team

Dirk Geerligs

- *MSc Civil Engineering*
- *20 years in construction in the Russian Federation, Africa, Australia and Europe*



Joep Geerligs

- *MSc Chemical Engineering*
- *20 years oil & gas engineering in the Middle East*



Michael Cordy

- *BA Political Science*
- *30 years business development in EMEA Region*



CONTACT DETAILS: e-mail michael.cordy@solideor.com

SOLIDEOR

Back-up slides

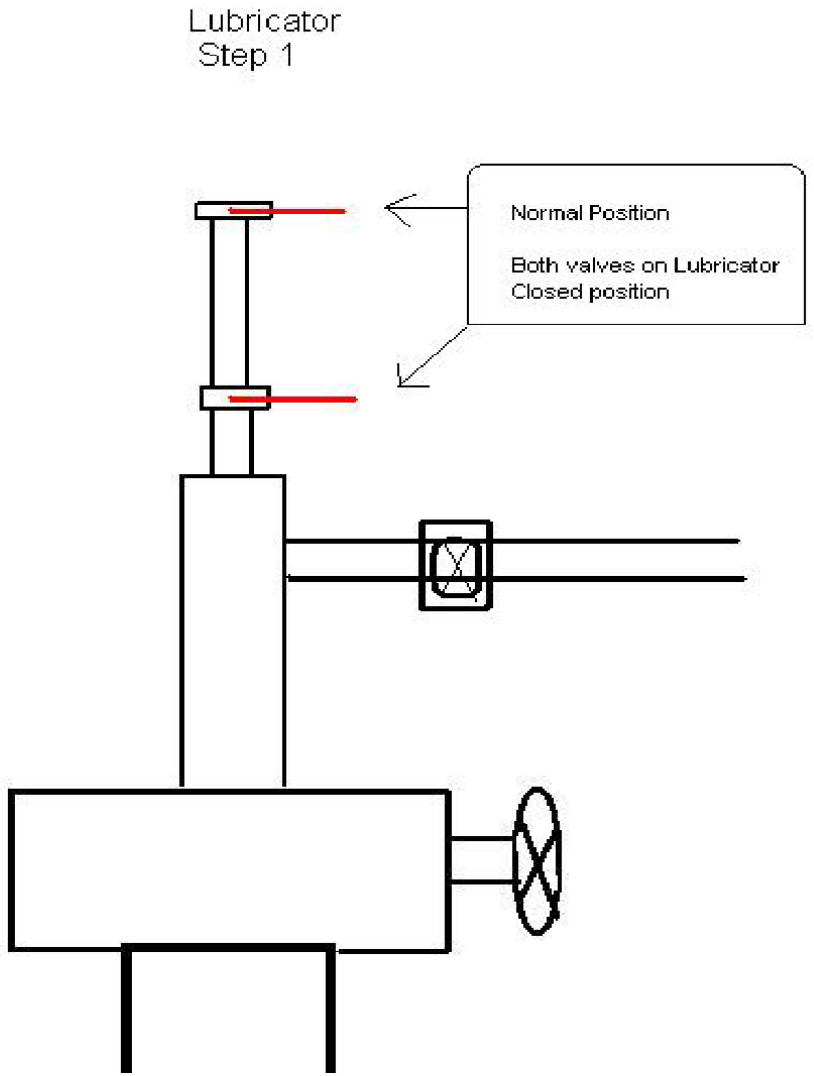


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

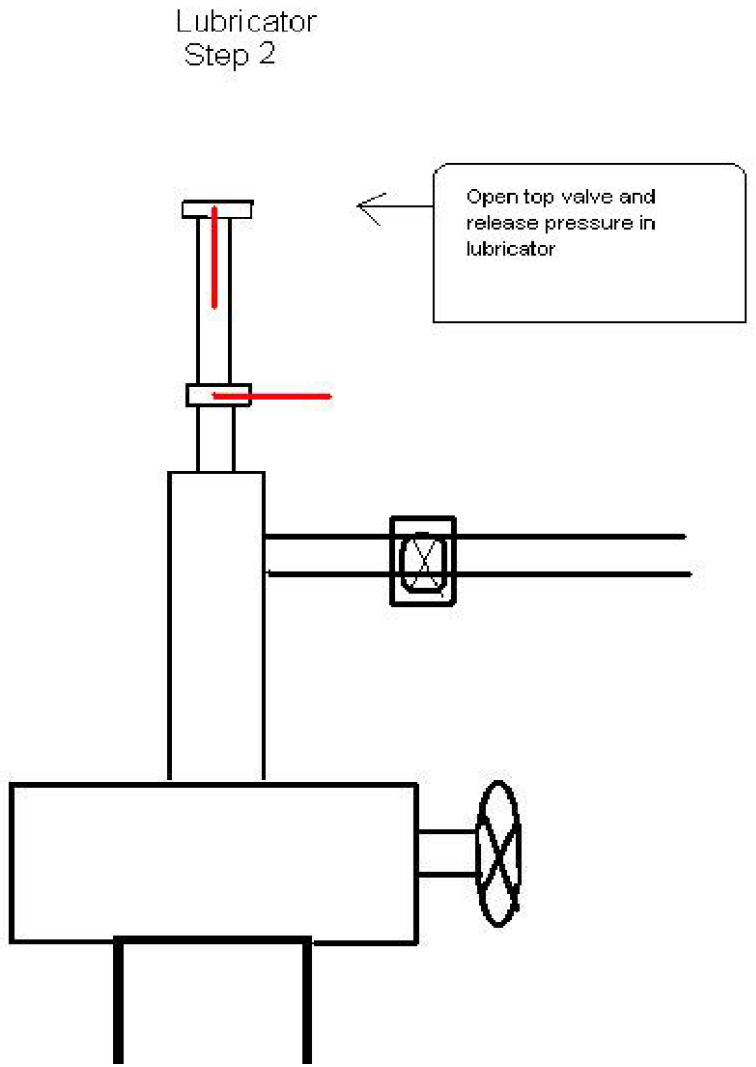
- ***<u>Step 1</u>: Ensure both valves are closed***



How the technology works

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- ***Step 2: Open top valve and release pressure in lubricator***

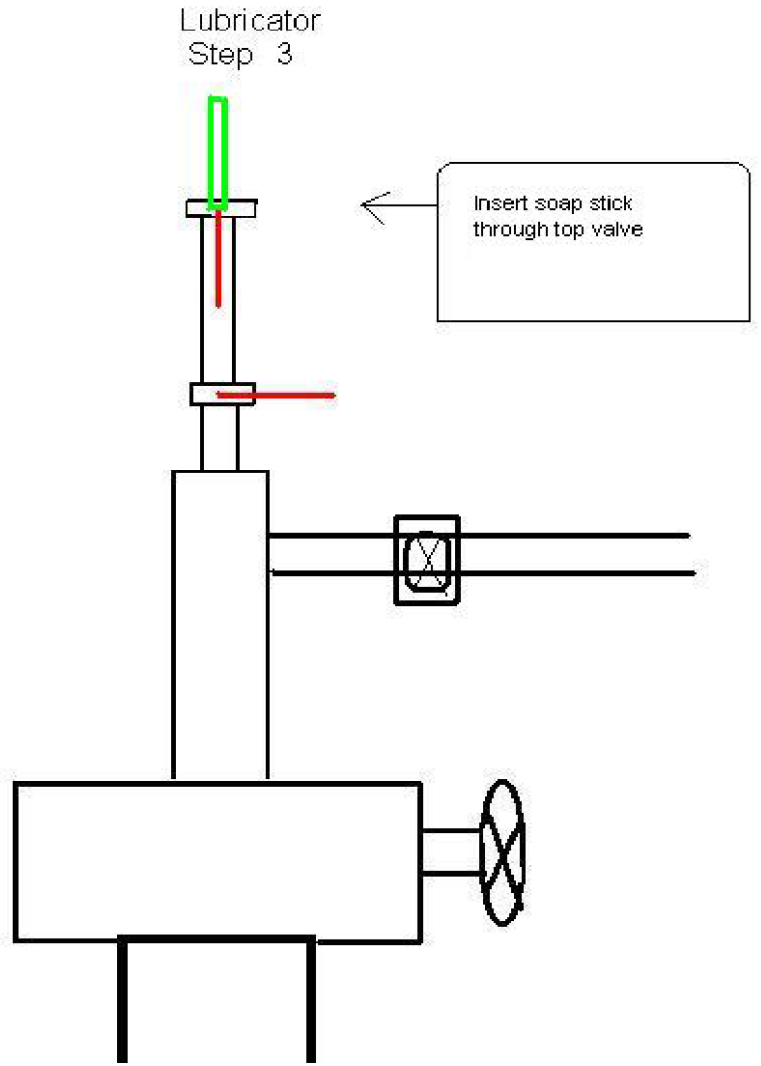


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- ***Step 3: Insert soap stick through top valve***

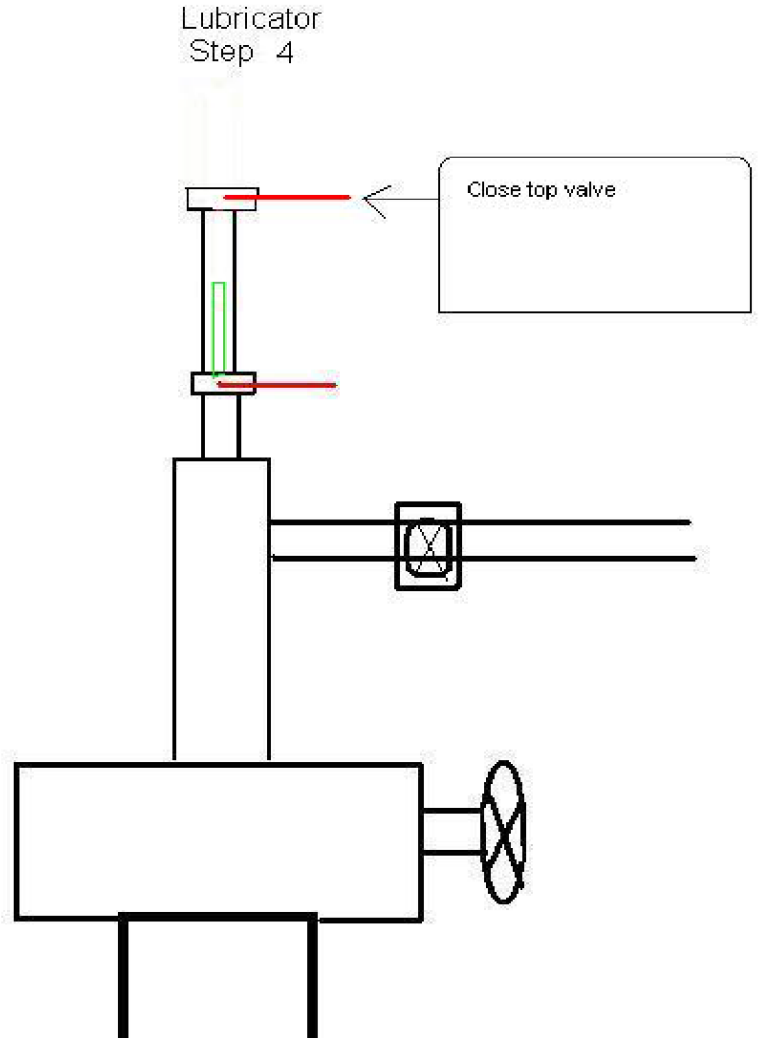


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- ***Step 4: Close top valve***

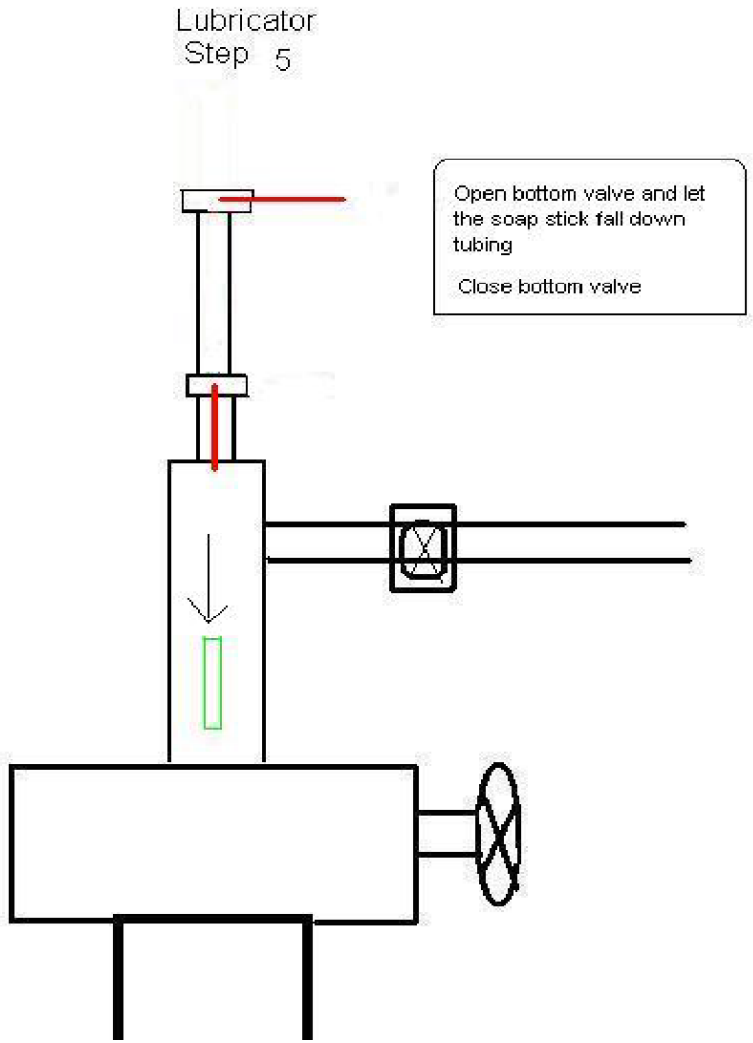


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- *Step 4: Close top valve*
- ***Step 5: Open bottom valve and let the soap stick fall down tubing. Close bottom valve***

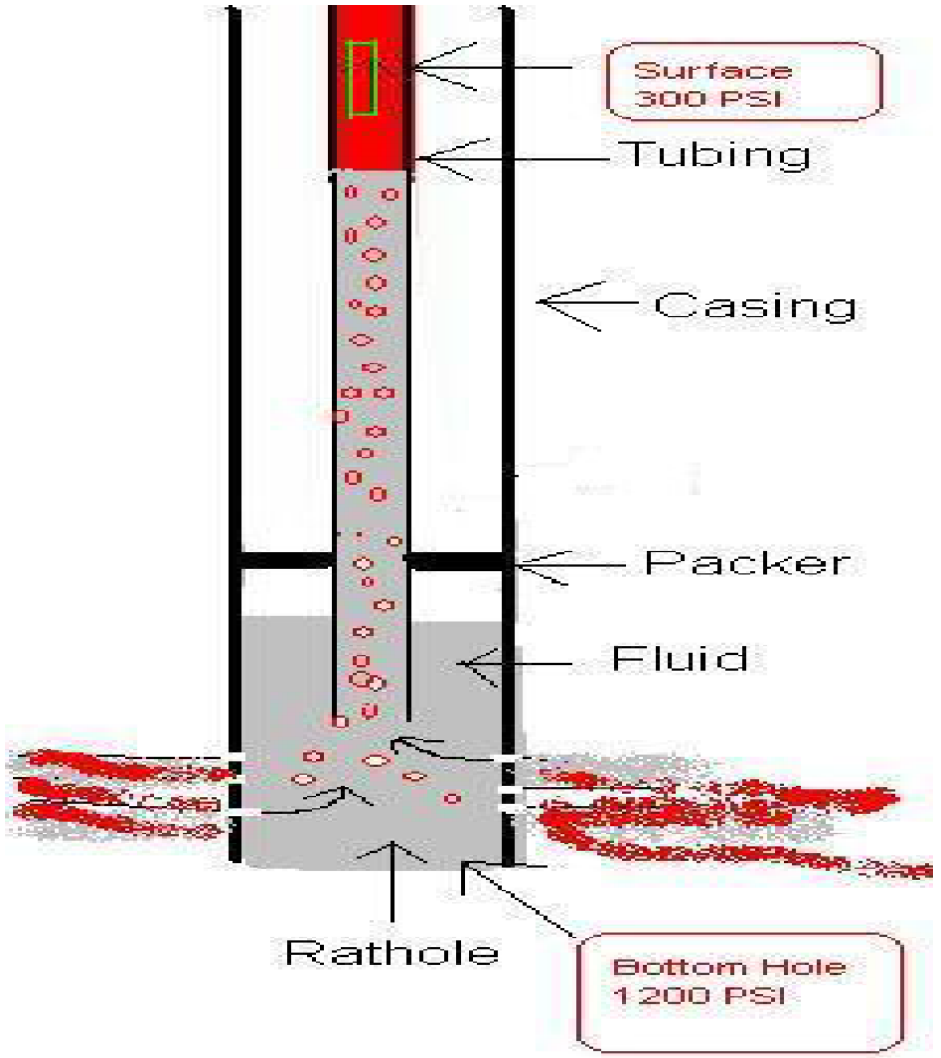


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- *Step 4: Close top valve*
- *Step 5: Open bottom valve and let the soap stick fall down tubing. Close bottom valve*
- ***Soap stick falling in a liquid loaded gas well***

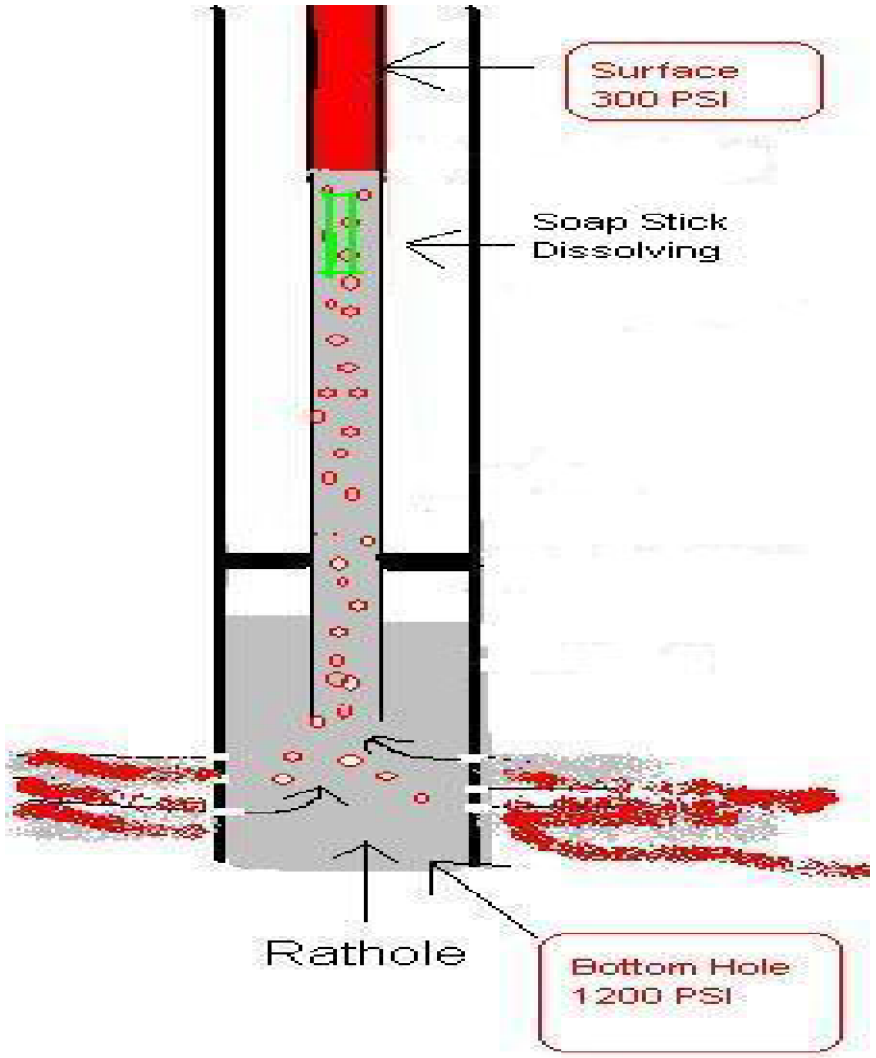


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- *Step 4: Close top valve*
- *Step 5: Open bottom valve and let the soap stick fall down tubing. Close bottom valve*
- *Soap stick falling in a liquid loaded gas well*
- ***Soap stick hitting fluid and beginning to dissolve***

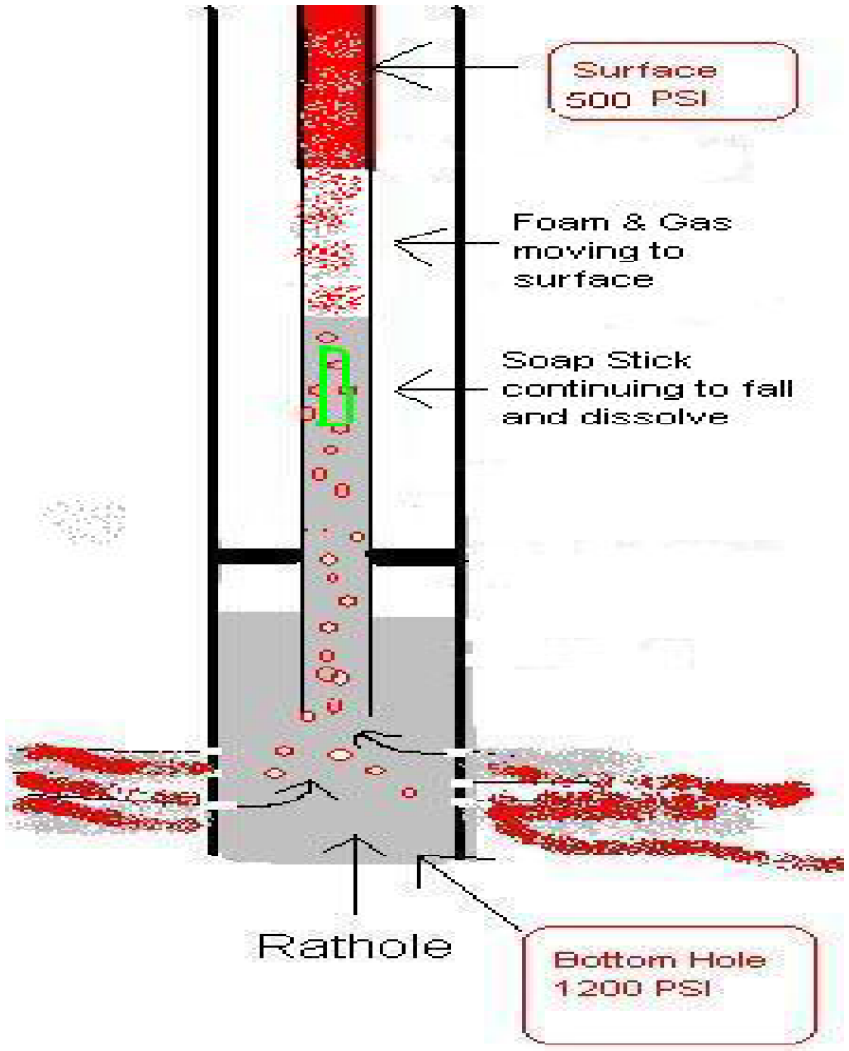


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- *Step 4: Close top valve*
- *Step 5: Open bottom valve and let the soap stick fall down tubing. Close bottom valve*
- *Soap stick falling in a liquid loaded gas well*
- *Soap stick hitting fluid and beginning to dissolve*
- ***Well bore with soap stick almost or completely dissolved. Notice surface pressure increase.***

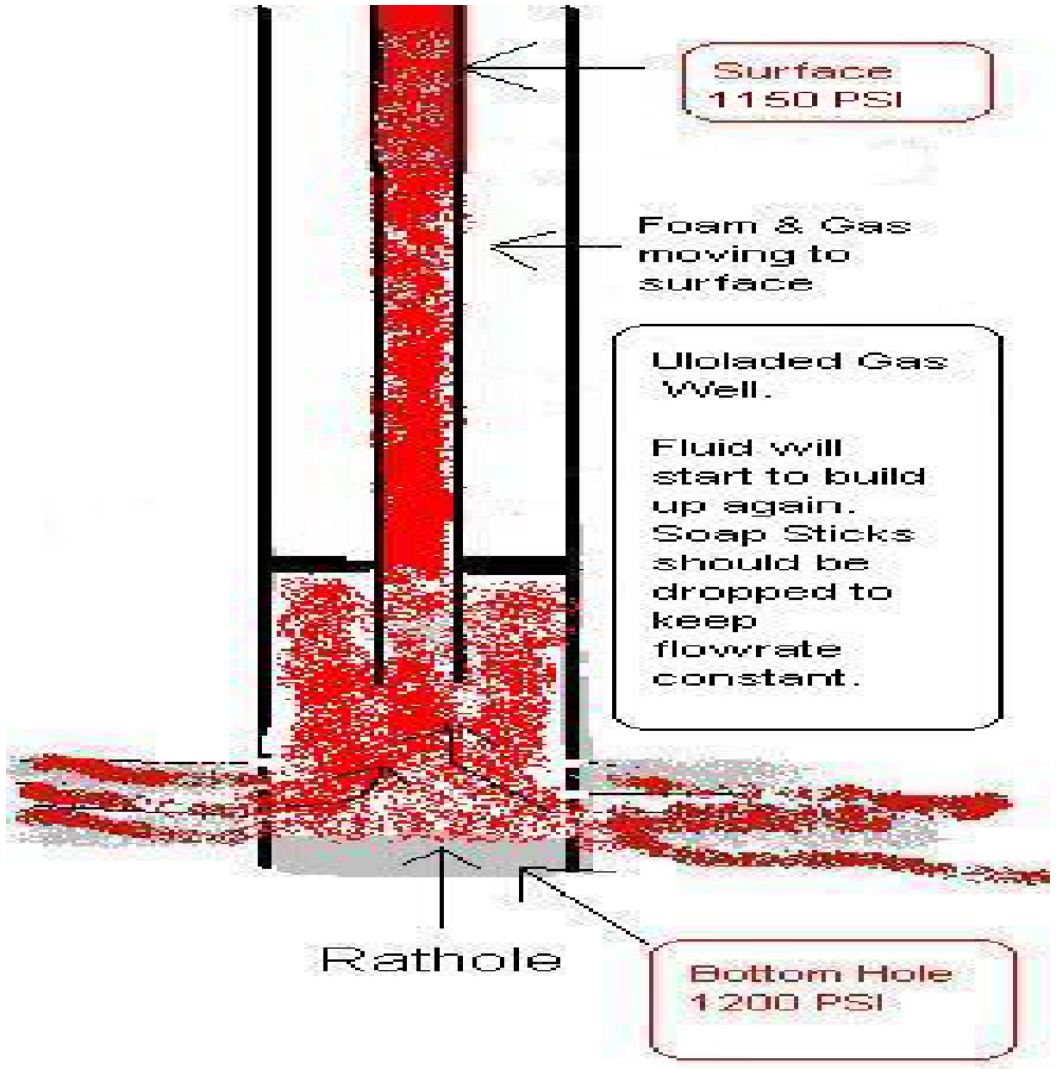


How the technology works

SOLIDEOR

Example: Dropping the SOAP stick:

- *Step 1: Ensure both valves are closed*
- *Step 2: Open top valve and release pressure in lubricator*
- *Step 3: Insert soap stick through top valve*
- *Step 4: Close top valve*
- *Step 5: Open bottom valve and let the soap stick fall down tubing. Close bottom valve*
- *Soap stick falling in a liquid loaded gas well*
- *Soap stick hitting fluid and beginning to dissolve*
- *Well bore with soap stick almost or completely dissolved. Notice surface pressure increase.*
- ***Unloaded gas well. Well will slowly begin to load with fluid again***



Determination of correct solid chemical stick for your application

SOLIDEOR

The key to your chemical stick programs success is based on specific parameters

Determination factors:

- Fluid column height
- Chloride levels
- Hydrocarbon content
- Bottom hole pressure
- Flow of well
- Daily Production
- Tubing size

Fluid column calculation with known bottom hole pressure

SOLIDEOR

Bottom hole pressure if known, the psi at the well head can be subtracted from the bottom hole pressure to calculate the approximate fluid column height

Bottom Hole Pressure = 1200 psi

Surface Pressure = 300 psi

Pressure drop = 900 psi

Pressure drop per ft of depth of water is .4330 psi

Pressure drop = ft of water in fluid column (psi per foot of depth)

900 / 4330 = 2079 feet of fluid in tubing

Fluid column calculation with unknown bottom hole pressure

SOLIDEOR

Fluid column height is rarely known, however a calculation of the surface pressure can give you some type of indication of the fluid column height.

Example calculation of feet of fluid in column

Normal flow pressure 1200 psi

Present flow pressure - 900 psi

Amount of drop in pressure 300 psi

Pressure drop per ft of depth of water is .4330 psi (constant)

Pressure drop = feet of water in fluid column (psi per ft. of depth)

300 / 42330 = 693 feet of water in tubing

* This is a rough estimate. Other factors can effect pressure loss between the formation and the well head.

SOLIDEOR

Chloride analysis

Chemical foam sticks are formulated specifically to perform best in a determined chloride range

Various chemical foam sticks may foam in fresh water, but may not foam in 50,000 ppm or higher of Chlorides

A water analysis is needed to determine what formulation of chemical stick is needed. Chemical foam sticks can be formulated to perform in levels of Chlorides up to 200,000 ppm of salt

SOLIDEOR

Hydrocarbon content

Hydrocarbon content in a fluid column will have dramatic effects on the way a soap stick performs.

Hydrocarbon content is part of the analytical data required by the producer in order to make the efficient solid chemical stick selection.

Operators should provide oil to water ratio, to calculate hydrocarbon content.

SOLIDEOR

Well flow

If the well is not flowing, there most likely is no fluid movement and foam sticks will not be able to create foam. However, fluid may be present in a stagnate state.

If the well is dead then gas generating sticks will be recommended for use in combination with a recommended foam stick.

SOLIDEOR

Daily production

Production rate is needed to determine not only how many sticks will be required to keep the well unloaded, but where applicable, it also helps in determining how often to set parameters of automatic soap stick launchers

SOLIDEOR

Tubing size

Tubing size will affect the volume of fluid to be removed down hole versus the size stick recommended.

Use the stick diameter size manufactured that best matches up to the tubing size down hole.

Determination of correct amount of solid chemical sticks for your application

SOLIDEOR

After the well conditions have been determined, you can calculate the proper amount of chemical sticks.

Feet of water 333

2 3/8 EUE tubing 4BBLS/1000 ft.

333 (ft of water) divided by 1000

Amount of water = 4 X .3 = 1.2 BBLS

Gallons of water = 1.2 x 42 gals./ BBLS. = 50.4 gallons

Weight of water = 8.3 lbs/gallon

50.4 gallons x 8.3 lbs/ gallon. (ppm of salt is ignored) = 418.32

The initial slug usage of solid chemical sticks is often based on .005% by weight of water in well.

418.32 x .005 (of stick) = 2.09 lbs of chemical stick needed

SOLIDEOR

Addition EUE factors

1” EUE tubing = 1.1 BBLS/1000 ft.

2” (2 3/8) EUE tubing = 4 BBLS/1000 ft.

2 ½” (2 7/8 EUE tubing = 6 BBLS/1000 ft.

3 inch EUE tubing =9 BBLS/1000 ft.

3 ½” EUE tubing = 12 BBLS/1000 ft

SOLIDEOR

Business proposition

We allow operators to improve profitability quickly. Solideor stick technology allows you to do so virtually tomorrow, at minimal investment, using existing physical and personnel infrastructure, with easy mobilization, simple & safe operation, and minimal deferment.

If you would like to experience the positive results that stick technology can bring to your well performance, and agree with us that there is huge upside with little downside, we can start this long-term relationship small and work bigger and better in the future once you have experienced yourself how the technology directly contributes to your corporate business goals.

SOLIDEOR

A solid solution

A solid team

A solid business