Solid Chemical Stick Applications
For OPTIMIZATION Of Gas Production

Select Industries, INC.
Benefits of Solid Chemical Sticks

- Cost effective.
- Increase of production.
- When used with automatic soap stick launchers, decreases man-hours of oil and gas producers.
- No liquid chemicals, bulk tank, or containment.
How Soap Sticks Work

- Dropping the Soap Sticks
- Step 1

- Insure Both Valves are Closed
How Soap Sticks Work

- Dropping the Soap Sticks
- Step 2
  - Open top valve and release pressure in lubricator
How Soap Sticks Work

- Dropping the Soap Sticks

Step 3

- Insert Soap Stick through top valve
How Soap Sticks Work

- Dropping the Soap Sticks
- Step 4
- Close Top Valve
How Soap Sticks Work

- Dropping the Soap Sticks

- Step 5
  - Open Bottom Valve and Let the Soap Stick Fall Down the Tubing
  - Close the Bottom Valve
How Soap Sticks Work

- Soap Stick Falling in a Liquid Loaded Gas Well
How Soap Sticks Work

- Soap Stick Hitting Fluid and Beginning to Dissolve
How Soap Sticks Work

- Soap Stick Continuing to Fall and Dissolve
How Soap Sticks Work

- Well Bore With Soap Stick Almost or Completely Dissolved
- Notice surface pressure increase
How Soap Sticks Work

- Unloaded Gas Well

- Well will slowly begin to load with fluid again.

- Soap Sticks need to be dropped on a regular basis to prevent loading.
Types of Solid Chemical Sticks

- Soap sticks –
  - Designed to foam the water in the tubing, therefore lightening the fluid column and allowing the formation pressure to unload the fluid from the well.
  - They are usually either a hard stick packaged in a split cardboard tube or a removable bag, or a soft stick or gel in a water soluble tube.
Types of Solid Chemical Sticks

- Oil foam stick.
  - Same principle as soap stick.
  - Used in wells that have a fluid column composed of 75% condensate or greater.
Types of Solid Chemical Sticks

- Combination sticks.
  - Typically one-half soap and one-half oil foam stick.
  - Used in wells where there are unknown variables and wells that produce 25-75% condensate.
Types of Solid Chemical Sticks

Paraffin inhibitor sticks.

- Oil soluble sticks that release paraffin inhibitor to prevent paraffin deposition from crude oil in production system.
- They will not readily remove deposits already in place.
Types of Solid Chemical Sticks

- Acid stick.
  - Primarily used in water injection wells to removed carbonate scale and rust deposits and also to lower injection pressures.
  - More economical than conventional acid jobs.
Types of Solid Chemical Sticks

- **Salt inhibitors.**
  - Chelating action to keep salt in solution.
  - Prevents salt build-up in tubing and perforation of a gas well.

- **Scale inhibitors.**
  - Developed to prevent carbonate types of scale from developing down hole in oil and gas wells, casing, tubing and flow lines.
Types of Solid Chemical Sticks

- Corrosion inhibitors.
  - Oil or water soluble.
  - Control common corrosion problems found in producing oil and gas well systems.
  - Controls breeding grounds of bacteria by reducing under deposit corrosion.
Determination of Correct Solid Chemical Stick for Your Application

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 Height

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.

- Calculation of feet of fluid in column
  - Example form*

  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

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

  300 = 693 feet of water in tubing
  .4330

* This is a rough estimate. Other factors can effect pressure loss between the formation and the well head.
Example of fluid column calculation

- 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 / .4330 = ft of water in fluid column

900 / .4330 = 2079 feet of fluid in tubing
Example form using 2 3/8 EUE tubing

- Feet of water: 333

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
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.
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.
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.
- Producers should provide oil to water ratio, to calculate hydrocarbon content.
Bottom Hole Pressure

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.
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.
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.
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.
A large variety of chemical sticks are available for different applications of oil and gas wells.

Solid chemical sticks are cost effective.

Solid chemical sticks require no liquid injection system, bulk tanks, or containment.