PARAFFIN CONTROL SYSTEMS FOR OIL WELLS AND TRANSPORT LINES USING LINEAR KINETIC CELL TECHNOLOGY

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INTRODUCTION

Recent technology has contributed many breakthroughs in the use of electromagnetic technology in the industrial, medical, automotive, and commercial marketplace.

Among these applications are electromagnetic brakes and clutches, magnetic resonance in the medical field, flow meters, electromagnetic polarization, etc.

Ener-Tec was formed in 1977, solely to develop the technology of applied electromagnetic polarization to liquids, gases, and solids (fluid stabilization). The first product, a Linear Kinetic Cell (LKC), was introduced in 1978 as an effective means of scale control in water systems. Over 7,000 systems have been installed throughout the United States as well as in 47 foreign countries. Applications for the product are many and varied.

In 1982 the electrostatic control system was introduced to reduce electrostatic charges in dry materials with great success. At approximately this same time Ener-Tec, Inc. was experimenting with the LKC system on oils of various types in an effort to determine if there was an application for the system in the petroleum industry.

Tests showed that the LKC system would prevent deposition of paraffin and other minerals by polarizing the molecules within the fluid using electromagnetic fluid stabilization.

At this time the Permian Corp. was contacted and they reported the problems that are faced in the oil fields on a regular basis. The worst problem reported was paraffin buildup in oil wells and pipelines. A LKC test unit proved to be very effective in dealing with this problem.

THE LKC SYSTEM

Oil, like water, contains minerals of various amounts and types which have either saturated or been in intimate contact with the oil over many years. These minerals are in the dipole stage, having a positive and negative end, similar to tiny microscopic magnets. Among these charged particles is the paraffin molecule which is a major source of paraffin deposition problems in oil wells and pipelines.

The LKC system polarizes these molecules, resulting in molecular

suspension. The paraffin molecule remains in suspension and will not deposit onto the piping surface, providing a clean, trouble-free system.

The LKC is made up of a treatment chamber and its external power supply. As the crude oil is pumped through the treatment chamber, the electromagnetic flux energy saturates the carbon steel cell chamber, plus other steel connected to the cell creating a massive polarization chamber in which the fluid flows. The electromatic polarization has a reversing action, polarizing in both directions from the point of installation of the LKC system.

The system is powered by a U.L. Approved solid state control module, powered by 110 or 220 VAC. Each power supply monitors the cell by means of an ammeter, which displays the amperage draw at all times, confirming proper energy is being generated through the treatment chamber. The cell is hermetically sealed, eliminating any possibility of damage from the environment or any other source. The estimated life expectancy of the total system is 20+ years.

ADVANTAGES

One of the first users reported that the LKC system effectively controlled paraffin deposition 11,000 feet (well depth) before entering the cell, and 49 miles after leaving the cell. These claims have been confirmed, and documented. At this time it is not known how far the polarization effect will carry.

Ener-Tec offers a high technology product with fast payback and has the following advantages:

1. Elimination of chemicals
2. Elimination of paraffin disposal problems
3. Elimination of hot oiling
4. Minimized pigging
5. Increased production
6. Decreased labor

APPLICATIONS

Case History No. 1

Howard County, Texas: 4" seven-mile pipeline, 255 barrels oil per hour, 25 API gravity oil.

The operator was running a 4-inch "cup" pig five times a month and was getting 1-1/2 to 2 barrels hard paraffin per pig run. Gauger was spending two hours for each pig run removing and cleaning pig trap, plus having to dispose of accumulated hard paraffin. Operator installed a LKC at the pig launcher in the 4-inch pipeline. The cell has completed two years continuous service. Paraffin has been reduced to 1/2 gallon of soft paraffin and pig runs have been reduced to one pig run per week.

Case History No. 2

Hockley County, Texas: 4" nine-mile pipeline, 200 barrels of oil per hour, 32 API gravity oil.

The operator was running a 4-inch "cup" type pig three times a week and was getting two barrels of hard paraffin per pig run. Gauger was spending 1-1/2 hours after each pig run to clean and remove hard paraffin from pig basket and trap, plus having to dispose of hard paraffin. After 12 months of continuous service the LKC had reduced the paraffin to five gallons soft paraffin per pig run.

Case History No. 3

Andrews County, Texas: 4" 4.5-mile pipeline, 300 barrels of oil per hour, 32 API gravity oil.

The operator was running 4" "cup" pig 12 times a month and was getting 7 to 9 gallons of hard paraffin with each pig run (2 barrels of hard paraffin per run). Gauger was spending 1 hour each pig run to remove and clean pig basket and pig trap, plus having to dispose of accumulated hard paraffin. The LKC has completed three years continuous service in the pipeline. Paraffin has been reduced to a trace of soft paraffin with one pig run per week. The operator has since installed several more LKC systems in pipelines with the same positive results.

Case History No. 4

Ochiltree County, Texas: Marmaton formation, perforations 6400-6420 ft, production 80 barrels oil per day, 3.7 MCF per day, CO_2 flood, 2-7/8" N80 tubing, sucker rod pump, temperature of oil at wellhead 34°F.

The operator was using hot oil treatments daily for paraffin in flowlines and hot oiling down the casing every week to eliminate paraffin buildup. A LKC was installed at the wellhead in the flowline. The only treatment the well is now receiving is from the Linear Kinetic Cell and the well has completed 12 months continuous service without hot oil treatments. Several other wells in the same field using the LKC installed at the wellhead are experiencing the same positive results. Payout for the LKC is estimated at four months.

Case History No. 5

Campbell County, Wyoming: 6" 31- mile pipeline, 500 barrels oil per hour, 34 API gravity oil.

The operator was running a 6-inch "cup" pig 16 times a month and receiving eight to 12 gallons hard paraffin per pig run. (Four to five barrels hard paraffin a month.) The gauger was spending approximately two hours per pig run to clean and remove paraffin from pig basket and trap, plus disposing of accumulated hard paraffin. The LKC system has

completed two years of continuous service and paraffin buildup has been reduced to 1-1/2 gallons of soft paraffin per month with one pig run per week. The operator has installed several other LKC systems with the same positive results.

Case History No. 6

Rangley County, Colorado: 2-3/8 tubing, production 30 barrels per day, rod pump, 32 API gravity oil.

The well was experiencing a decline in production to 5 barrels per day because of paraffin buildup in the tubing at 600 feet, and occurring in the flow lines. The operator was using hot oil in the tubing and in the flow line four times a month. The operator installed a LKC in the flow line three feet from the wellhead and within 30 days production was holding steady at 25 barrels per day. Well has completed one year of continuous production at 25 barrels per day. The only treatment the well is now receiving is from the LKC.

Case History No. 7

Claiborne Parish, Louisiana: Smackover "B" formation, production 1 MCF and 530 barrels per day, 2/38" N 80 tubing, surface pressure 5000 psi.

The well was experiencing paraffin buildup because of temperature drop. Paraffin was forming in chokes, tees, ells, etc. and in the flowline from the facilities to the tank battery (2 miles away). The operator was injecting 12 gallons of paraffin solvent per day plus using a heater until installation of a LKC on the flowline three feet from the wellhead. The well has completed 1-1/2 years of continuous service without the use of paraffin solvent or surface heater since installation of the LKC.

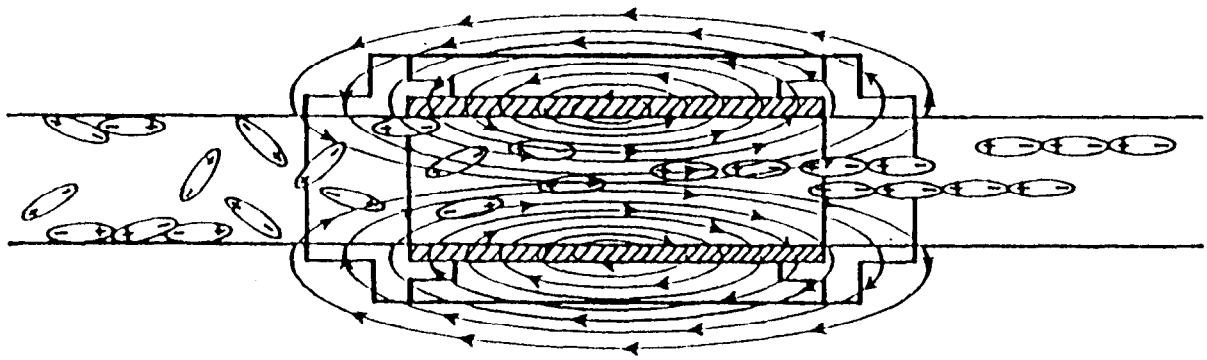
Case History No. 8

St. Martin Parish, Louisiana: Lower Hackberry formation, perforations 11292-11322 ft., initial production 125 barrels per day, 2-7/8" N 80 tubing, sucker rod pump.

The operator was treating the well two times a month by circulating hot oil and was daily treating with paraffin solvent. In addition, the operator had to pull the sucker rods and pump when production was reduced to 40 to 45 barrels per day, which averaged over four to five weeks because of paraffin buildup at 4000 ft depth. The operator installed a LKC at the surface in the flowline, approximately 12 ft from the wellhead. The well has now completed nine month continuous service and production is steady at 75 barrels per day since installation of the LKC.

In the tenth month a fuse blew out in the well's fuse box. The regular pumper was on vacation and the relief pumper was not informed about the LKC. After three weeks the well paraffined up, and a workover was required to clean up the paraffin. The workover required four days (four days lost production). The well is back on production and the pumper checks the LKC frequently. The LKC controls paraffin downhole when attached at the surface, without magnetizing the pump (set at 11000 ft).

The operator installed a heavier breaker in the transformer to accommodate the amps required to operate the cell. The well has now operated twelve months, paraffin free.



(a) (b) (c)

(a) The molecules as they appear in untreated oil under normal conditions.

(b) The path of the flux field which travels at the speed of light. This force is concentrated within the cell creating proper energy required to polarize the molecules within the oil, upstream as well as downstream from the unit.

(c) The molecules after they have been polarized by the Linear Kinetic Cell. The internal forces orient the positive and negative poles in such a way as to produce a molecular chain, resulting in stabilization of the oil.

SCHEMATIC OF LINEAR KINETIC CELL SYSTEM