

MAGNETICS, DO THEY REALLY INHIBIT PARAFFIN & MINERAL SCALE DEPOSITION?

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Odessa, Texas USA 2002

ABSTRACT

The purpose of this article is not to discuss the hows and whys of magnetism, nor necessarily to dissuade any one of their convictions. The aim here is to cause readers to consider certain documented facts and then to arrive at their own conclusions about those who continue to scoff at any new developments about magnetism.

Oilmen who are open-minded toward new ideas and are willing to listen and experiment with these new ideas, will gain knowledge about one of today's most interesting, narrowly studied and little known phenomenon of science, Magnetism. They would experience without question a vital technology of the next century. MagnetoHydroDynamics.

MagnetoHydroDynamics (MHD), is the science that deals with the interaction of a (perpendicular) magnetic field with an electrically conducting fluid. MHD depends completely upon highly specialized magnetic fields as its only source of energy rather than external sources such as electricity or other secondary equipment or paraphernalia.

Over the past several decades much has been written about the use of Magnets to reduce, inhibit or eliminate what is considered by most (surely by those who have the problem) to be one of the major problems and expenses in the production of petroleum paraffins and mineral scales.

HISTORY OF MHD

Practical uses of Magnetohydrodynamics have been around for decades. In the period following the Russian Revolution, extensive research of "magnetic water treatment" (MWT) was conducted in the USSR under laboratory and industrial conditions. Though little was known about magnetic water treatment in those days, this lack of understanding did not, and has not, greatly suppressed its practice in that part of the world.

This is not necessarily true in the major industrial nations of the world. Over the years many came to think of MWT as black magic. Many scientists ridiculed anyone who seriously considered the possibility that MWT just might have scientific basis.

Others seriously committed to proving magnetism's worth, continued to experiment and add to their knowledge of MWT. Success was followed by the occasional setback in field tests and laboratory experiments in particular. As so often is the case in science, those times when MWT did not work were more widely presaged than those occasions when successful experimentation was achieved.

A major change was on the way. It was not their ideas nor their theories that were necessarily faulty, but the magnet designs and materials available at the times that were deficient.

One of the many achievements of the United States' space program and the National Aeronautics and Space Administration was a fundamental advancement in the study of MHD. NASA and its contractors designed a new array of highly specialized magnets. Ceramic magnets devised with properties far superior and far different from any available. Because of its unique design this particular device has the ability to be located at the

precise problem point in the production or transportation system. In its application for

subsequent to that time. Magnets so different they can be focused and aligned directionally and have their polar directions altered or changed. Rare earth magnets that are extremely powerful and permanent.

In the late 1970s, serious experimentation and testing was undertaken on these new and revolutionary types of magnets. Initial results developed a product for use in residential and small commercial applications for the control of certain types of mineral scale. These devices were used primarily for calcium carbonate and sodium chloride (NaCl), but were equally effective on many other similar depositional salts.

THE PETROLEUM INDUSTRY AND PARAFFIN

The success of these magnetic devices, at least in the eyes of some, caused others in the petroleum industry that were interested in the control of these same mineral scales to initiate experimentation using similar designs but on appreciably larger applications. Their purpose was not only if and how these magnets affected mineral scales, but, and more importantly to them, what effect would these magnets have on paraffins.

Their experimentation and resultant improvements led to a new field of study called MagnetoPetroDynamics (MPD) and a patented design, which when properly engineered and installed, is capable of inhibiting expensive paraffin deposition.

The tools are designed to be a structural part of the tubing string or part of flowlines or other surface lines. They are also designed to be set with locators or packers for use in flowing well or gas-lift well operations.

This modern design does not require the use or assistance of other scientific measures such as cumbersome & finicky venturi systems or electricity. These tools are manufactured full bore with no internal obstructions, fabricated of all type of materials and strengths and patterned in accordance with accepted crude oil production methods.

MAGNETOPETRODYNAMICS IN THE OIL FIELD

As previously mentioned, the theme of this article is not to discuss the hows and whys of MPD, but the whens and wheres....those examples of successful installations. Here are several:

Andrews, Texas USA

Several of these inline, full bore tools were installed in the flow line of a well considered by this operator to have a corrosion and paraffin problem so severe they found it necessary to replace the normal 2" steel flow line with 4" black PVC line. (According to the Senior Engineer in charge this was done to elongate the operating period before the line accumulated sufficient paraffin deposits to require hot oiling treatments!).

It was agreed the well be allowed to operate for two months without the normal monthly hot oiling or chemical injection occurring. Upon inspection the line downstream was found to be clean. Upstream (the wellhead) contained some paraffin buildup.

The well was pulled and a full-bore tool was located within the tubing string at a designed & specified depth. On subsequent inspections both two months and eighteen months later, the well was found to be completely clean and free of paraffin or depositional corrosion.

Until the field was later sold, this well continued to operate without chemicals or hot oil treatments.

Santa Fe Springs, CA

The operator installed a full-bore tubing tool in May 1993 at 3,700 below surface on a water injection well for a major US company. All chemical treatment was discontinued with an approximate monthly saving of \$400 per month. The well continues to be on injection without any workers since installation of the tool. According to the operator this well had to be pulled every 4 to 6 months due to scale-blocked tubing.

Maracaibo, Venezuela

This operator installed a 2-7/8", J55 Tool in well C-203. According to their own figures they saved in two years approximately US\$28,000 on workover costs and US\$13,500 on increased production because of no downtime or tubing restrictions.

Ozona, Texas USA

This well had to be pulled and/or hot-watered once a month due to paraffin problems. Repair & replacement of downhole equipment had been continuous & costly each time the well was pulled due to rod pump repairs, rod partings & downtime.

Two 2-3/8", J-55 Tools were installed in the well at the specified locations, at which time all chemical treatment was discontinued. Since the installation of the tools this well has not been pulled or received any chemicals.

Savings on this well, according to the operator, amounted to almost US\$47,000 over three (3) years.

Midland, Texas USA

On 5 Oct. 1995, 2-3/8" J55 Tools were installed in a well in Dawson County, Texas, USA. The well was producing 15 to 18 BOPD before magnetic tools were installed and it was being hot oiled once per month.

After being returned to operation the initial well production was approximately 30 BOPD or an increase of 15 BOPD. This well has averaged 25 BOPD since the tools were installed.

The operator feels this increase is due to a combination of dynamic variations such as a reduction in surface pressure, the elimination of paraffin and scale buildup and environmentally harmful chemical treatments.

Casper, Wyoming USA

This operator had a flowing well with severe paraffin problems requiring mechanical scraping on a weekly basis.

Because the operator did not wish to shut-in the well to install tubing tools, a tool designed to be located within the tubing string itself was used. Several of these smaller tools were suspended by wireline at specified locations. Because the operator was concerned that the tools might not work and therefore become encased in paraffin, one tool was not placed within the upper area of paraffin accumulation (above cloud point).

The well was returned to operating status. After a period of time, the well was again scraped and as expected, some paraffin was found in the area where the tool was omitted, but no paraffin was found in the areas where tools were properly located. The accumulation of paraffin was not only considerably smaller in quantity than previous, but very soft and easily removable.

The operator, convinced of the successful operation of the initial tools, permitted installation of the remaining tool that was then located as previously designed.

The well continued to operate without any paraffin problems for several years.

Gulf of Mexico, Louisiana USA

This flowing well on a Gulf of Mexico platform required mechanical scraping several times every month. Tools were suspended within the tubing string for reasons similar to the Wyoming well. According to the operator they were very pleased with the performance of the tools and the continued production of the well.

Midland, Texas USA

A major US company in the Permian Basin of west Texas has a large number of these tools installed in both deep (11800') wells and shallower (4,200') wells with considerable success. Inline, full bore magnetic tools were installed in several wells requiring biannual paraffin squeezes costing \$50,000 to \$60,000 per year (their figures). Those wells have now been operating "squeeze free" for over three years.

Comodoro Rivadavia, Neuquen & Tierra del Fuego, Argentina

All major Argentine producers have installed tools of like design in wells with similar severe paraffin problems with notable success in every case.

Bakersfield, California USA

A major US company has installed the same tools in wells with considerable mineral scale problems. These wells have operated for many months with no more scaling problems.

Yangon, Myanmar

The national oil company of Burma has installed tools in a number of wells having severe paraffin problems with complete success & continues to purchase additional tools as needed. The end purpose is to eventually treat all their fields

Santa Fe Springs, CA USA

This operator uses inline, full bore tubing tools to control various mineral scales in a number of wells in the Long Beach area. They have further tested the same tools by returning a mineral-encrusted rod string into the well and, in a short period of time, discovered the magnetic tools could and had completely removed all existing mineral scale buildup and left the rods in a "like-new" condition.

Successful MagniFlo completions continue in the above locations. Most oil producing states in the USA have many successful completions with added units being installed all the time. Successful installations have been & are being made in Argentina, Malaysia, Sarawak, Assam, India, Indonesia, Germany, Russia, Turkmenistan, Uzbekistan, Peru, Austria & elsewhere around the world.

CONCLUSION

Slowly but surely, progressive production companies are realizing they can either continue to conclude that all magnetic designs are "gadgets" and "black boxes", or they can after due consideration come to another conclusion that times have once again changed. Something definitely is occurring in those wells highlighted above. You & I may not understand it fully or even partially yet, but something happening. MHD is working.

Can we explain exactly what is happening? Possibly. Possibly not. Can we continue to laugh it off as black magic? That would be very imprudent.

Because we do not completely understand MHD, should we just ignore it? Should we continue to pour money into our wells through the use of those "proven methods" of paraffin and mineral scale control? Fair questions. Ones that require fair answers.