Paraffin Control By Plastic Coating

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The accumulation of paraffin in both pumping and flowing wells has been a major problem to the production of crude oil since the very beginning of the petroleum industry. During recent years much progress has been made in methods of removing paraffin from these wells, some of the methods noted are chemical solvents, hot oil treatment, steaming and et cetera. These methods usually involve wells shut down, lost time, extra labor, special equipment and much expense to the operator. Therefore, the search for a more economical method has been continued and in almost every case plastic coating has been the answer to these problems. In the special cases where plastic will not perform to expectation are pumping wells, due to the abrasive wear from rods, even in these cases plastic will benefit the operator to a certain degree.

In order to understand how plastic coating in tubing and flow lines control the paraffin problem, let us examine the properties of paraffin. It is a waxy material and many times contains foreign deposits such as asphalt, silt, sand and gums. It usually is black or brown in color. It is affected by the temperature change in the oil. When the temperature is lowered paraffin begins to solidify. Also, lifting pressures caused by gas, leaves a noticeable deposit of paraffin when the gas falls away from the flow of oil. The deposit build-up usually spreads over a several months period and almost always becomes very hard and dense. The collection of paraffin in tubing will take place at varied levels up and down the string, some wells start at 3000 feet and continue up. others at 1500 feet and others from top to bottom. In the major portion of the Permian Basin the use of plastic coating has eliminated the paraffin problem completely and in other areas it is performing at the present to prove it's self as a worthy product.

The coating of tubing and flow lines with plastic before they are placed in the wells will invaribly stop the collection of paraffin deposits. The smooth surface formed by the plastic coating prevents the paraffin from taking hold of the sides of the pipe. The porosity is practically nil. The paraffin is pushed along with the oil and does not have an opportunity to clog the lines.

One of the greatest advantages of plastic coating pipe is release from the constant vigilance for clogged lines, the flow of oil will remain constant even in the coldest winter months.

There are several systems of coating, but the most economical and feasible method is the vinyl air-dried system in the prevention of paraffin build-up. To list a few of the various coatings, vinyl air-dried, hot spray, baked-on, epons, copons and many others. The vinyl air-dried is the most common in this area and to the operator has proven the most practicable. It is the least expensive and it's performance is comparable to the rest. In the vinyl air-dried system, the coating method used is two coat primer and four coat finish. This system will produce adequate protection against any paraffin that might be encountered. There is much to be said for the application of plastic coating and it should be stressed that the success of the coating depends on the efficiency of the applicator. Plastic manufacturers will verify this fact that a successful coating operation is from 80 percent to 85 percent dependent upon the application and from 15 percent to 20 percent on the performance of their plastic. Surface preparation and the way the material is applied to the metal is the whole secret of whether the job is a success or failure.

Preparing the metal for plastic coating is all important. The metal must be completely free of all foreign matter such as rust, scale, dirt, oil and et cetera. The best method to clean metal is by sandblasting. A medium grade of sand should be used, the anchor pattern must be uniform. The ultimate protection offered by plastic coating is dependent on the amount of plastic which covers the peak of a surface anchor. The use of abrasives and blasting techniques which produce a coarse anchor pattern should be avoided. For a 6 mil coverage, the anchor pattern should not exceed 2 mils. By using 30 to 50 mesh sand with approximately a hundred pounds of pressure, will produce an anchor pattern of 1 1/2 mil depth.

Two coats of primer are applied, adhering to the necessary drying time between coats, which is from two to three hours, depending on weather conditions. The primer bonds to the metal and in effect becomes a part of the metal. Four finish coats are applied to build up a thickness of 5 to 6 mils. For internal pipe coating a special spray nozzle, giving a perfect 360 degree spray action is used, to distribute the liquid plastic evenly over the surface of the pipe. A minimum of twenty-four hours drying time is recommended before the coated pipe is placed in service.

Plastic coating of flow lines and tubing to control paraffin should be examined cost-wise, and compared with other methods of paraffin control. For example, in the New Mexico State C Lease, a 2,000 foot line of used 2 1/2 inch tubing collected paraffin build-up at such a rate, the line had to be hot oiled on an average of every six weeks through out the entire year. The average cost per job for the hot oil system is approximately $35.00. This would mean over a period of one year this line was hot oiled 8 or 9 times at a cost of $315.00. This same 2000 feet of 2 1/2 inch tubing was coated with plastic, February 1955 and to-date the pressure gauge has registered no pressure build-up, indicating paraffin collection. This line was plastic coated at a cost of $420.00. It has been in operation 13 months. In May of this year, the plastic application will have paid for it's self, leaving at least two more years of operation for free. This comparison is worth noting. This operator felt if he could get three years service from this coated pipe, the plastic coating job would more than warrant his time, money and effort.

Also, approximately 700 feet of 3 inch line pipe was plastic coated for paraffin control, November 1948 at a cost of $170.00, on the J. E. Parker Lease, Ector County, Texas. Prior to the time the line was coated with plastic the operator was steaming the line to keep it open, on an average of once a month for the year, at a cost of $20.00 for each steaming operation. A good comparison of expense would be to start in December of 1948 and continue up to the end of February 1956, it would have cost the operator $1,740.00 to keep this line open. Now substracting the original cost of coating—$170.00, we find the method of plastic coating has saved $1,570.00. Operating expense has been nil on this line as far as paraffin collection is concerned.

If corrosion is prevalent, which is usually the case, plastic coating serves a two-fold purpose, stopping paraffin collection and protecting the pipe against the corrosive elements.

To summarize, plastic coating is a definite answer to the paraffin problem. It is economical in application. It releases the operator from constant vigilance over his tubing and flow lines, assuring him of a continuous flow of oil even in the coldest winter months, when paraffin is the hardest to control. Stress should be placed on the correct method of applying plastic coatings. A poor application will result in failure. The coating should be applied with the job it is expected to accomplish, in mind. Never for convenience sake or ease of application, but for the sake of performance. A job should never be short-changed on the amount of material needed to produce a 5 to 6 mil thickness, or should the importance of the preparation of the metal be under estimated.

Pertaining to heat on the plastic, it might be necessary to mention that some plastic will withstand temperatures up to 160 degrees others will go even higher. If plastic has been applied to tubing or flow lines and these lines are steamed for any reason, the plastic will lose it's effectiveness by turning lose from the metal and settle into a crusty curling effect. When pressure caused by the flowing of oil meets this stage the plastic is in, it will free it's self from the metal and flow with the oil.

Plastic is applied to the complete interior of a joint of pipe, including the threads, but it can be backed off from the threads to allow each joint to be made up properly. In a flow line there are times that a space of

two threads are left bare and will collect a paraffin build-up. This will not cause damage to the line since the remainder of the joint will be free of paraffin and will allow a continuous flow and this pressure will take the build-up on the small spacing of the two threads on out the line.

This method of avoiding a paraffin build-up in flow lines is a big saving to the operator who has to bury his line. Once treated with plastic the line will remain in place without the expense of digging up and treating, the flow of oil will remain consistent.

Plastics, at the same time, are effective in the following: ASTM salt spray, sea water, 10 percent nitric acid, 10 percent hydrochloric acid, 25 percent hydroloric acid, 10 percent sulphuric acid, 50 percent sulphuric acid, bleach solution, 10 percent sodium hydroxide, 20 percent sodium hydroxide, ethyl alcohol, hi test gasoline, photograhphic developer sol., hypo solution, sour crude and alkali. The film stretch at the breaking point is 180 to 200 percent, and the film strength is 1400 p.s.i.