Liquid Level Recorder for Oil Production Measurement

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ABSTRACT

The liquid level recorder saves time and labor and insures more accurate data. A general utility recorder, it is simple to operate, inexpensive, yet extremely sensitive and accurate.

It is used in the oil field for the primary purpose of recording the production of oil and/or water into the test tank or stock tank. During the life of an oil well it may be called upon to do the following: detect loss of circulating mud during drilling; measure load oil and formation oil during swabbing and initial testing; record the potential test; record fluids produced on a productivity index test and; determine the producing cycle of a gas lift or pumping operation.

NEED FOR DEPENDABLE RECORDER

Possibly the most important factor in any field of research or study is accuracy.

Once a well is drilled in as a producer and placed under the supervision of the production engineer it is not unlike the patient of a physician. Some of the tests taken are even synonymous, such as, temperatures and "blood" pressures. In all cases, accuracy is the watchword.

For a number of years productivity index tests have been made in which actual reocrds were obtained mechanically for the reservoir pressure, the casing and tubing pressures, and the gas volume, but not for the fluids produced. The latter determination was made by the use of the hand gauge line. This measurement was made at regular intervals, "more or less", and with a similar degree of accuracy. This need for accuracy more than any thing else, mothered the adaptation of the liquid level recorder to oil field use.

While this instrument is a general utility recorder, it is extremely simple to operate, inexpensive to own, and yet offers a high degree of sensitivity and accuracy. The horizontally supported chart drum is turned by a float proportional to the changes in liquid levels. The inking type pen traverses the chart at a constant speed controlled by a clock. These combined movements produce a graphic reocrd of oil and/or water levels against time. The instrument is constructed of non-corrodible metals and is fitted with a carrying handle, making it conveniently portable (weight approximately eighteen pounds).

The first use of the liquid level recorder in the life of a well occurs when the drilling operation begins. It is often desirable to keep tab on the circulating fluid by keeping a close check on the mud pit for losses in the hole.

When the well is completed and the operator is ready to swab, the recorder is placed on the test tank where it gives a full account of the ability of the new well as well as the performance of the swabbing crew. This leaves the attending engineer free for other duties or sleep.

After completion, the potential test is permanently recorded and may be followed by the packer leakage test, in the case of dual completions, and the productivity index tests mentioned above.

Helps in Many Ways

As time goes on, periodic tests are made. During the later life of the well it is decided that an artificial lift must be employed. Again the liquid level recorder is invaluable in determining the producing time cycles, whether it be gas lift or some form of pump.

If the artificial lift employed is gas lift, the amount of fluid produced during each injection cycle can be determined. If the method of lift employed is a rod pump, then the tank gauger is an aid in determining when the well pumps off if it is a stripper well. When electric power is available, the cycle can be set to shut the pump down just prior to pumping off to prevent unnecessary wear on the rods, pump and surface equipment.

When electric power is not available, the fluid recorder may be used in determining the speed that the pumping unit must be run in order to withdraw the oil at the same rate it comes into the well bore to prevent the well pumping off, thus creating a fluid pound which causes excessive equipment wear.

For remote areas where wells are not checked daily, a 72 hour or 96 hour gear train may be put on the recorder which will give a good indication of the production and well performance at a glance. With several wells in one battery, a sudden drop in production will indicate that one or more wells are off production. Of course this can also be determined with a gauge line but would require more diligence and some calculating, while the change in fluid produced and the exact time would be immediately apparent on the recorder chart.

Simultaneous records of oil and water production can be made by installing a second instrument on the thief hatch. The float of the second recorder may be an ordinary one quart can filled with stock tank oil. This float obviously will follow the oil water contact thereby giving an accurate record of the water production.

Many engineers and production men recognizing the watchdog quality of this instrument are able to obtain more accurate data with less effort and save their companies untold dollars.