A PRIMER OF OILWELL DRILLING

A Basic Text of Oil and Gas Drilling

Fifth Edition
(Revised)

by Ron Baker

published by

PETROLEUM EXTENSION SERVICE
Division of Continuing Education
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RUNNING TUBING AND INSTALLING THE CHRISTMAS TREE

After the well is perforated, oil and gas can flow into the casing or liner. Usually, however, the operator does not produce the well by allowing hydrocarbons to flow up the casing or liner. Instead, the completion rig crew places small-diameter pipe called *tubing* inside the cased well. In fact, the operator sometimes runs tubing into the well before perforating it. In such cases, the perforating gun is lowered through the tubing to the required depth.

Tubing that meets API specifications has an outside diameter that ranges from 1.050 inches (26.7 millimetres) to 4½ inches (114.3 millimetres). Seven sizes in between the two extremes are also available. Manufacturers provide joints of tubing in two range lengths: range 1 tubing joints are 20 to 24 feet (6.1 to 7.3 metres) long; range 2 tubing joints are 28 to 32 feet (8.5 to 9.8 metres) long. As it does with casing, the crew commonly uses couplings to join tubing, although an integral-joint tubing is available that allows the crew to make up joints without using couplings.

Manufacturers also supply coiled tubing. Coiled tubing is a continuous length—it does not have joints—of flexible steel pipe that comes rolled on a large reel. Operators have completed wells over 20,000 feet (6,000 metres) deep with coiled tubing. Special equipment placed at the top of the well allows crew members to insert, or inject, the tubing into the well as they unwind it from the reel (fig. 167). The main advantage of coiled tubing is that crew members do not have to connect several single joints of tubing when installing the string. As a result, coiled tubing takes considerably less time to run.

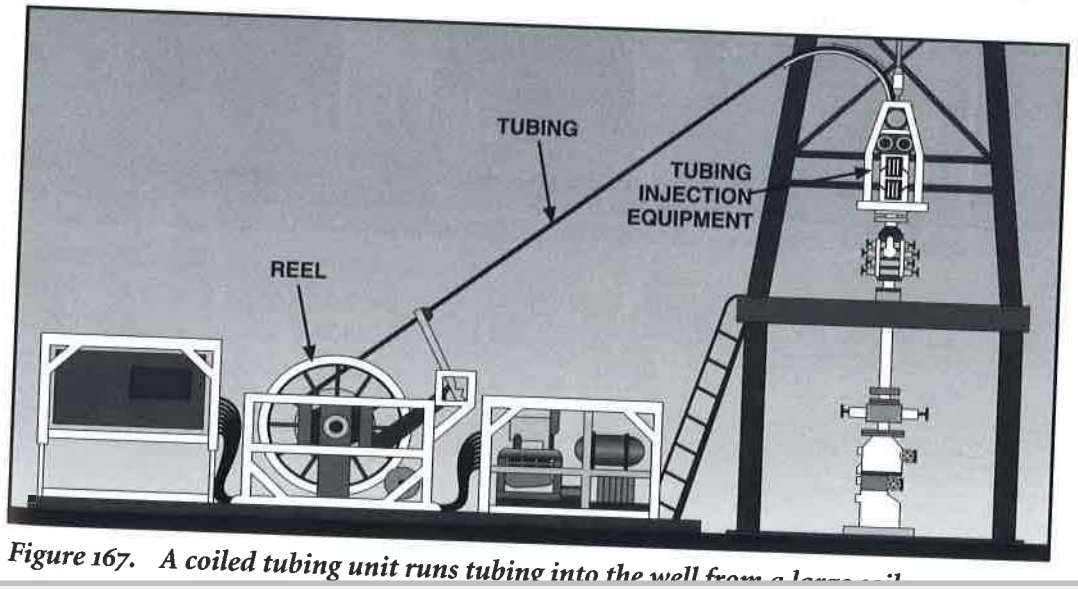

Figure 167. A coiled tubing unit runs tubing into the well from a large coil

Whether using jointed or coiled tubing, the operator usually produces a well through a tubing string rather than through the casing for several reasons. For one thing, the crew does not cement a tubing string in the well. As a result, when a joint of tubing fails, as it almost inevitably will over the life of a well, the operator can easily replace the failed joint or joints or, in the case of coiled tubing, remove and repair or replace the failed area. Since casing is cemented, it is very difficult to replace.

For another thing, tubing allows the operator to control the well's production by placing special tools and devices in or on the tubing string. These devices allow the operator to produce the well efficiently. In some cases, the operator can produce the well only by utilizing a tubing string. Casing does not provide a place to install any tools or devices that may be required for production. In addition, the operator installs safety valves in the tubing string. These valves automatically stop the flow of fluids from the well if damage occurs at the surface.

Finally, tubing protects the casing from the corrosive and erosive effects of produced fluids. Over the life of a well, reservoir fluids tend to corrode metals with which they are in contact. By producing fluids through the tubing, which the operator can easily replace, the casing, which is not so easy to repair or replace, is preserved.

Crew members usually run tubing into the well with a sealing device called a packer. They install the packer on the tubing string and place it at a depth slightly above the casing perforations. The end of the tubing is left open or is perforated and extends to a point opposite the perforations in the casing. The packer expands and grips the wall of the production casing or liner. When expanded, the packer seals the annular space between the tubing and the casing above the perforations. The produced fluids flow through the perforations and into the tubing string. The packer prevents them from entering the annular space, where they could eventually corrode the casing.