



**Repair and casing leakage in well STG-1 at
Stadur (Staður)**

**Lúðvík S. Georgsson, Sverrir Þórhallsson, Benedikt
Steingrímsson**

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REPAIR OF CASING LEAKAGE IN WELL STG-1 AT STADUR.

Production history: Well STG-1 at Stadur near Grindavík was drilled in the summer 1985 and has been in production since late that year. In the beginning 30-40 l/s of 38°C warm seawater were pumped from the well. In December 1986 cooling of the production fluid was observed and by the end of January the temperature had decreased to less than 30°C. The 22nd of January the pump was pulled out of the well for 2 days due to reparations. During this stop the well was temperature logged in order to locate the cause for the cooling. The temperature log showed clearly that the cooling occurred in the cased part of the well, but it was not possible to pinpoint where on the casing the leakage was. A possible location was thought to be the top of an inner liner extending from 113 m down to 488 m depth. It was concluded that a drilling rig was required to repair the well. The National Energy Authority prepared a detailed written report describing the procedures to be followed for the investigation of the leakage and for the repair.

The repair: The drilling rig arrived on the 27th of February. Injection tests with a packer showed no leakage at the top of the liner but when the packer was placed at the lower end of the liner the casing itself was found to be leaking. To detect at what depth the leakage was occurring, hot water was trucked in and slowly admitted to the well. The temperature front was logged continuously and thus the leak was located at 290 m depth. The casing record and the casing collar locator (CCL) indicates a welded joint at this depth. Therefore a crack or corrosion of the welding is the most likely cause for the leak. Then the well was logged with a cement bond logging tool (CBL). This showed that the liner was uncemented above 300 m. Having located the leak and determined the condition of the well it was decided to place a cement plug near the bottom of the liner and squeeze cement through the hole after the plug had hardened. Fourteen tons of dry Portland cement were used. After the cement had hardened pressure was applied and the hole was found to be sealed. Cement bond logging confirmed that the casing annulus was filled with cement from the leaking point almost up to the top of the inner liner. After this the cement plug was drilled out and it could be concluded that the operation had been carried out successfully. The drilling rig left the well the 18th of Mars after 11 workdays.

Status in April: Production from the well after the repair shows significant changes in its production capacity. The well yields now roughly 20 l/s of 35°C warm seawater with the water-level at 100 m depth, which

can be compared with 30-40 l/s of 38°C seawater at the start of production with the water-level at 60-80 m depth. This is a serious decrease in productivity and a significant in temperature. The change in productivity can, at least partially, be explained by the plugging of the leakage, which may have been active all the time. The 3°C decrease in temperature may indicate that cold seawater penetrates into the production zone. This can hardly be helped and the temperature may continue to decline in the future. However this trend has not been established in detail and thus no definite conclusions can be drawn at this time. A detailed monitoring of the production and the temperature of the production fluid is advised during the next months.