

Casing Wise project
Field Trip Report: Cymric Oil field Feb 18-21 rst

Objective of Test

The objective of this field test is to validate several technologies for non-invasive well integrity assessment using existing wells with a known completion. The tests were made at the Cymric oil field, which is a steam flood operation. The wells therefore undergo similar downhole conditions as geothermal wells.

The Cymric field is mainly a cyclic steam operation where wells are 1000-1500 ft in depth and the reservoir occupies the bottom 400 ft. The maximum temperatures can exceed 500° F and the well spacing is very close, often less than 50m.

The field plan consisted of applying the Time Domain Reflectometry (TDR) method to the wells



Figure 1. One of the wellhead we measured.

TDR Measurements:

TDR measurements were made on the final morning in well T015-5, using T015-6 as a return electrode. We sent various high-frequency pulses into the wellhead and measure the return (reflected) signal. The return time and the waveform indicate the distance and the property (such as resistance) of the reflector. The measurements were conducted with the highest frequency from 500 kHz to 4500 kHz. The input voltage was set as 70 V. Figure 4 shows the TDR responses at

frequencies of 450 kHz, 2500 kHz, and 4500 kHz. Due the complicate structure of the wellhead and casing, including different joints, the return signals have strong ringing effect. At the lower frequency, the ringing effect is weaker, whereas higher frequency renders stronger ringing effect. We can set a TDR return at 1.8 – 2 μ s, which is the reflection at about 738 — 862 ft deep. The shape of the TDR return indicates this is an open termination. Based on our knowledge of the well structure, this return is from the end of the production string.

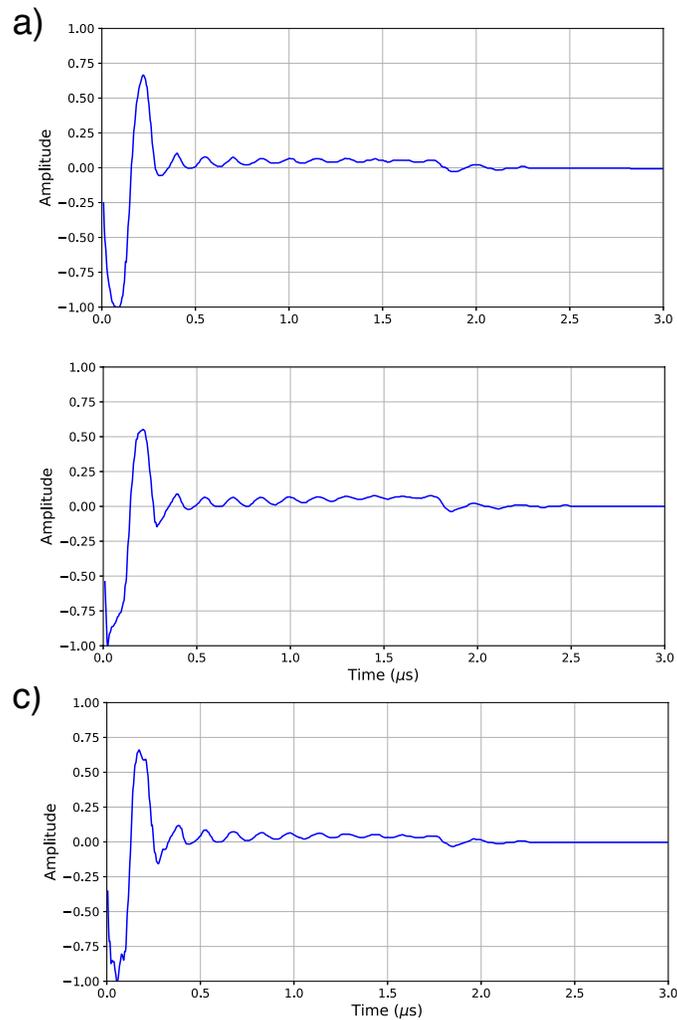


Figure 2. TDR responses of T015-5 well. a): The input pulse frequency is 450 kHz. b): The input pulse frequency is 2500 kHz. c): The input pulse frequency is 4500 kHz.