

## Well Decommissioning: Investigation into Leakage of Abandoned Wells in The Netherlands

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In the Netherlands, a total of approximately 4000 oil and gas exploration and exploitation wells have been drilled. Approximately 2500 of these wells have been drilled onshore. A total of approximately 1300 onshore wells have been abandoned and there are no known incidents with leaking abandoned wells. However, the absence of incidents does not necessarily mean that none of the abandoned wells could leak. To investigate the risk of leaking abandoned wells, SSM has had methane measurements taken in the air at abandoned gas wells in 2016 and 2017. The measurements were performed by Energieonderzoek Centrum Nederland (ECN) with a Quantum Cascade Laserspectrometer. This device can detect methane with a resolution of 5 ppb in the air and is truck mounted. While driving this truck around the location of an abandoned well, it will detect any methane gas that goes up in an air plume from the abandoned well. In cases where a methane concentration was actually picked up in air, detailed measurements were carried out using a sort of extraction box directly on the covered soil above the 'suspect' closed abandoned well.

An increased methane content was measured at two abandoned well locations. However, detailed measurements showed that the methane gas did not originate from the abandoned gas well. In one case, the methane came from a leaking sewer pipe and in the other case, from a leaking gas transport pipeline in the local gas transport grid. In total, measurements were carried out at 185 abandoned wells in this way. This is 14% of the total quantity of abandoned gas wells. The conclusion was that no methane has been detected in the air above abandoned onshore wells in the Netherlands. The report <sup>1</sup> is only available in Dutch.

### Research into methane leaks underground

In the summer of 2017, researchers from the Utrecht University carried out methane measurements in the soil at around thirty closed abandoned wells in the Netherlands. At one well, the former location of the Nederlandse Aardolie Maatschappij (NAM) in the village Monster, a very low gas flow was found in the soil. At this location no increased concentrations were observed above ground by the researchers from the University, nor by the ECN measurements during the prior measuring campaign on behalf of SSM.

The NAM, as the former operator at this location, then excavated this abandoned well to where it was cut off, and found that there was indeed a leak of 1 to 2 liters of thermogenic methane gas per day. The fact that the gas is from thermogenic origin and not from biogenic origin (swampgas) proves that the gas originates from a deeper gas reservoir. While drilling the well in 1982 gas shows were observed, but no commercial producible amounts of oil or gas were found. So, after drilling the well, it was directly abandoned with cement plugs as a “dry hole”. NAM examines under supervision of SSM how this abandoned well can be repaired or secured.

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<sup>1</sup> <https://www.sodm.nl/documenten/rapporten/2018/06/05/methaan-emissiemetingen-aan-buiten-gebruik-gestelde-olie--en-gaswinningsputten>

Under the denominator of the Knowledge Program for Effective Mining (KEM), SSM is conducting further research at independent authoritative knowledge institutes to increase the understanding of risks and the related uncertainties of closed abandoned wells. In addition, SSM explores the question of the implications for the use of the soil above an abandoned gas well.

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