

1.7.1. ACOUSTIC EMISSION LEAK DETECTION OF BURIED OIL PIPELINES, RIVER AND ROAD CROSSINGS

Kourousis D., Bollas K., Anastasopoulos A., Tsimogiannis A.,
Envirocoustics ABEE, Metamorphosis, Athens, Greece

Leaking buried pipelines pose a very serious problem to the pipeline owners for many reasons. Financially, due to the waste of valuable product, environmentally because the product may leak into surrounding soil and contaminate the ground, and safety-wise, particularly if the leak is inside industrial facilities, when the product is flammable. Occasionally, there are indications of a leak e.g. when pressure is dropping for no other obvious reason or when product is visible in nearby valve wells, pipe ground exit points, sea-water, on the ground itself etc. Even then, it is generally difficult to reliably locate the exact position of the leak so as to take corrective measures. In the worst case, a leak may go on unnoticed, such as in some cases of complex networks, or when it is not large enough to become visible.

Acoustic Emission offers a very effective solution to this problem and has been widely used for detecting and locating known or suspect leaks in buried pipelines. Access to the pipeline is required only every about 100 – 200 m for mounting AE sensors. Pipeline is pressurized in 500 – 1,000 m sections at a time, while the AE sensors detect the turbulent flow at the leak orifice, and with the use of digital AE systems and specialized data acquisition and analysis software, provide the position of the leak. The method has been proven effective, fast and accurate in detecting and locating leaks, and it is now being used also as a preventive leak control tool for long underground transfer pipes or short, buried pipe sections, such as dikes and road crossings.

The present paper deals with the technical description and the physics of the AE leak detection technique for buried pipelines, presents the advantages, limitations and requirements of the method, describes the necessary modern AE equipment for performing such a task, and, reports on specific case-studies of successful buried pipeline leak detection and location. The paper also presents results from the application of the novel concept of preventive leak detection which has been applied in numerous buried pipeline short sections, dikes and road crossings within industrial facilities, as well as in long distribution pipelines.