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Fiber Optic based Pipeline Oil and Gas Leak and Intruder Detection System with Security Intervention Plan

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Abstract

The accurate and timely localization of the vandalization and leak point on an oil pipeline provides operators with information to aid with the development of robust security response and intervention plans. These plans have the potential of reducing the impact of leaks on the environment by enabling operators to take actions to mitigate their effect. A major challenge with current leak and vandalization detection systems is the generation of spurious signals which in time slows down the response to these alerts. This paper presents results of the field trial of a Fiber Optic Cable based Oil/ Gas leak and intruder detection system. Oil and Gas leaks were simulated on a pipeline section buried in a swamp location with 1mm and 2mm Orifices located at the 0o, 90o and 180o positions on the pipe with a section of the pipe exposed for third party intruder detection tests. The orifices were connected to compressed air and water used in place of Oil and gas. The fiber optic cable was buried on both sides of the pipeline and hooked up to the Helios Integrator. The system was able to detect and localize leaks from the orifices with the signal intensity proportional to the leak intensity. It was able to detect third party activities such as cutting and the use of hammers on the pipeline and also walking near the pipeline. The results coupled with the security intervention plan which is developed to provide varying levels of response will eliminate response to spurious signals thus providing a robust response and intervention plan to oil and gas leak and intruder detection.

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Some of the OnePetro partner societies have developed subject- specific wikis that may help.

