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Flow Induced Corrosion Analysis: A Case Study on Pipeline Failure and its Effect on Agriculture

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ABSTRACT

Pipeline is one of the effective means of uninterrupted and steady supply of crude oil. This medium ensures smooth and adequate transition of the product to the consumers at the right time. This mode of transportation has existed for over a century, and helps to reduce accident, spillage, and environmental pollution

However, the loss of pipeline containments and large-scale releases of hazardous substances are still common accidents leading to severe consequences for human health, Agricultural products, environment and assets, both in developed and in developing Countries despite the advancement in technology.

The causes of pipeline failures can range from internal issues such as corrosion or material defects to external forces. Such external forces can include damage from natural hazards, such as earthquakes, or intentional destruction by humans. The impact of pipeline failure can be quite substantial. Such events can lead to completely shut down facilities for days, can cause multiple deaths and also make more than fifty percent of affected properties to be destroyed or suffer major damage, it can also render a productive farmland partially or completely useless. One of the internal issues of pipeline failure is a type of corrosion termed flow induced corrosion or erosion corrosion. Erosion corrosion Accelerated or increase in the rate of deterioration on a metal because of relative movement between corrosive fluid and metal surface. This phenomenon is of a great concern in flow assurance subject of discuss. This research is to make a pipeline undergo flow induced corrosion analysis, fundamentally, with keen attention to the effect of different turbulence model on corrosion rate in the pipeline and ultimately, the overall impact on the pipeline. The most suitable turbulence model for the particular geometry of pipeline would be recommended with regards to analysis result and standard validation. With this result, our pipeline would be designed to withstand these turbulence models in other to reduce or eradicate the failure of pipeline due to flow induced corrosion.

Keywords: Flow assurance, Corrosion, Turbulence model, Design, Pipeline