Consequence Modeling for Hydrocarbon Pipeline using a Geographic Information System (GIS)

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Abstract

The Corporate Integrity Program of Ecopetrol S.A. aims to mitigate and control operational risks in order to ensure safe and reliable operation of the oil pipeline systems and the lowest impact on the objectives and goals of the company.

Under the Integrity Program are working on the strategy, identifying High Consequence Areas (HCA) and the areas affected, with emphasis on the analysis of indirect impacts, directing the efforts of the interdisciplinary group at the protection of the Colombian population and environmental conservation. This process seeks to identify pipeline segments that could affect high consequence areas considering parameters such as population, water bodies, extremely sensitive areas, highways and waterways. Additionally, consequence modeling is performed by specialist software to estimate the physical effect and impact radio on the environment and population toward to identify sensitive areas which could be impacted by an undesired incident.

To sum up, this study seeks to present a methodology of risk analysis for hazards related to hydrocarbon pipelines. It includes the determination of pipe segments that affect high consequence areas directly and indirectly to establish assertive action plans that will keep the risk at acceptable levels. Likewise, it take account of geographic information of the pipeline system, the implementation of non-conventional criteria based on international standards and industry best practices, consequence modeling, and finally, oil spill trajectory model.