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An effort has been undertaken in order to develop a concept for evaluation of the risk of hydrogen-assisted cracking in cathodically protected gas transmission pipelines. The effort was divided into the following subtasks: A. Establish a correlation between the fracture mechanical properties of high-strength pipeline steel and the concentration of hydrogen present in the steel. B. Determine the degree hydrogen absorption by cathodically protected steel exposed in natural soil sediment, which include activity of sulphate-reducing bacteria (SRB). C. Compare the above points with fracture mechanical considerations on the level of stress intensity actually present in pipelines during normal operational conditions. The results were used for a discussion - based on well established fracture mechanical relations - on which set of conditions (CP-level and operating pipeline pressure) could give crack propagation. This resulted in threshold curves that can be used for assessment of the risk of hydrogen-assisted cracking as a function of operating pressure and hydrogen content - having the flaw size as discrete parameter. The results are to be used mainly on a conceptual basis, but it was indicated that the requirements for crack propagation include an overprotective CP-condition, a severe sulphate-reducing environment, as well as a large flaw (8 mm or a leak in the present case). A 1 mm flaw (which may be the maximum realistic flaw size) is believed to be unable to provoke crack propagation in this steel.

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