

**Title**

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**Abstract**

A large portion of pipelines in the United States were installed prior to the enactment of federal regulations in 1970's. The girth welds of these pipelines were not 100% non-destructively inspected at the time of construction. These welds may contain flaws that could lead to occasional failures when additional stresses beyond those stresses under normal operation conditions are present. Recent accidents associated with vintage pipelines elevate the public attention and highlight the needs of integrity management of these pipelines. Due to the low frequency and high consequence of those failures, an effective management plan is necessary to direct the limited resources to the welds of the highest potential risk.

Assessment of vintage girth welds on the basis of fitness-for-service (FFS) principles is the best rational approach to develop integrity management practice. Although general procedures for the FFS assessment of welds are well established, enhancement to these procedures may be necessary to take into account the unique features of vintage girth welds. In addition, the values of necessary input parameters for the FFS assessment, such as applied stress, flaw size, and material properties are often not available. Elements necessary for the enhancement of FFS procedures are explored in this paper. Challenges of estimating input parameters are examined. The limits and potentials of various ILI tools in detecting and characterizing girth weld flaws are presented based on the fundamental principles of tools and published data.

**Keywords**

Pipeline, Integrity management, Vintage girth weld, Fitness-for-service, In-line inspection, ILI tools