UKOPA Project Enquiry

The Incidence of Curvature Features in UK Pipelines and Their Potential Significance

Onshore pipeline operators in the UK conduct regular on-line inspections of pipelines using magnetic flux leakage (MFL) vehicles. These inspection devices detect metal loss features, dents and other defects as well as providing a girth weld, bend and wall thickness tally along the pipeline. Other features are detected such as valves, offtakes, stopple tees, strain gauges and close metal objects.

With the development of the inertial mapping unit (IMU), inspection providers are now able to offer accurate pipeline location information. This is attractive to enhance pipeline records and to ease utilisation of GIS.

The IMU pipeline survey data can also be processed to identify longitudinal curvature features on a pipeline. On-line inspection service providers encourage operators to take advantage of this additional service.

Northern Gas Networks (NGN) has recent experience of a strain curvature assessment identifying a significant number of features on a pipeline. NGN is assessing these features in terms of their origin and significance for the structural integrity of the pipeline. The implications of finding curvature features include:

- Operating pressure restrictions.
- Pipeline field and remote surveys.
- Record searches.
- Enhanced inspection data analysis and review.
- Specialist technical consultancy.
- Potential pipeline field operations.
- Potential pipeline stress-relieving operations or selective replacement.

NGN has encountered some conflicting technical opinion on the probable origin, significance and evaluation of longitudinal curvature features. This may suggest that pipeline curvature features are poorly understood and that their recognition by IMU technology is now revealing inherent characteristics in pipelines rather than emerging external loading and ground movement threats.

NGN consider that a national perspective on curvature features in onshore pipelines, including guidelines on evaluation, may be useful to the industry as more operators face new survey information on their pipelines. Questions to address may include:

- Can national pipeline curvature data suggest any dominant influence from construction practice?
- Can construction related curvature features be characterised?
- Is there any evidence that older pipelines (due to increased exposure) exhibit more curvature features than younger pipelines?
- Is there any trend in terms of incidence according to pipe size?
- Can any link be identified between poor girth weld performance and curvature features?
- Can specific pipeline studies be pooled and reviewed to develop national guidelines for operators?
- Can an operator reasonably decline a curvature strain assessment if IMU data has been obtained?