InVista™ Intelligent Pigging Inspection Technology and the Nuclear Industry

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New regulatory mandates relating to the inspection of buried piping in nuclear power plants is an important topic throughout the industry. Most plants have already risk-ranked their piping systems and initiated inspection of both safety and non-safety related piping systems. Although indirect inspection approaches are being applied in several cases, direct inspections are required in order to comply with the regulatory mandates. The first deadline of June 30, 2013 is quickly approaching for many nuclear plants. InVista, an ultrasonic-based intelligent pigging inspection technology developed by Quest Integrity Group, is considered a direct technology, thus it complies with regulatory requirements. Invista provides a comprehensive inspection solution for piping systems buried below grade or encased within concrete, which are otherwise inaccessible for external NDT/NDE inspection.

In 2011, Quest Integrity began working closely with EPRI in an effort to assess InVista and its applicability within the nuclear industry. A formal technology assessment report summarizing the test results was generated by EPRI and is available to member companies. In parallel with the technology evaluation, Quest Integrity has been working closely with several utility companies with immediate inspection needs. Piping ranging from 3” - 24” (76mm - 609mm) diameter is the immediate focus; however larger piping diameters are also under consideration. A few of the piping systems being considered for direct inspection utilizing InVista are diesel fuel lines, reactor make-up lines, condensate piping circuits, sump/drain lines, etc. The current piping systems contain a variety of materials such as carbon steel and stainless steel.

In order to detect the anticipated damage mechanisms in nuclear piping, InVista provides 100% inspection coverage of the interior and exterior piping surfaces (see Figure 1). The tool contains between 48 and 366 discrete ultrasonic sensors, ensuring high-resolution test results. InVista travels through piping at speeds of two ft/second (0.609 m/second.), while providing 100% inspection coverage. Many nuclear facility piping systems have limited internal access points, thus requiring bi-directional travel from the inspection tool. A bi-directional tool can be launched and retrieved at the same point, eliminating the need to cut piping at both ends. It is not uncommon for piping systems to look like a “bowl of spaghetti,” as these systems contain numerous short radius bends (e.g. 45°, 90° and 180°) throughout. InVista easily navigates challenging and complex piping configurations and negotiates unlimited short radius bends (as tight as 1.0D) including welded back-to-back bends (see Figure 2). Internal weld backing strips (chiller rings) commonly located at each circumferential weld do not present a challenge for InVista.

Downtime for any nuclear facility is costly. InVista reduces such costs by eliminating unnecessary excavations, which can range from USD $100k to $1M. In addition, excavation inspection approaches are limited in terms of overall pipe length coverage. InVista provides nuclear plants with a cost-effective, regulatory compliant solution by providing inspection coverage for the entire piping length.