THE DCVG BUGGY ARRIVES 40 YEARS LATER

FROM Anode Engineering

The Original DCVG Historical Development

History

The original DCVG technique was a development undertaken jointly by John Mulvaney of GCPS and Wayne Burns of Wilson Walton International. The development was initiated in the early 1980's and was launched in Australian and USA markets in mid-1984.

Little change has occurred in the technique for the past 40+ years except that the test probes have migrated from a set of long copper sulphate cells to insulated metal probes with hardened metal spikes as contacts.

In 2024 Anode Engineering recognised the difficulties operators experienced both on field conditions as well as the personal fatigue resulting from the operators being required to walk many kilometres each day traversing the pipeline route/s in often uncomfortable weather conditions. Also, the windy conditions often resulted in restricted availability from testing due to effects from Dry and Windy conditions – leading to excessive static electricity problems for the technique.

The Manual field testing generally resulted in a rate of progress of 6 to 8 kilometres per day depending on the status of the pipeline coating systems being tested. Work hours commenced at 7.00am on site and are closed down by noon due to weather restraints (Static).

The DIGITAL DCVG BUGGY INITATIVE

After 40 Years - INNOVATION

The DCVG Digital Buggy Development - It might be asked why has it taken 40+ years to consider a change to the basic laborious technique. Well, the only answer to that can be that nobody showed any interest. The Anode Engineering team began a development in 2024 that would eliminate most of the manual walking, plus bring the analogue instrumentation into the 2025 digital technology era.

The Strategy – After 40 years of walking pipelines and reporting on various defect findings, we observed that most clients would only excavate a small number of larger defects.

However, with repeated surveys, data from subsequent surveys could compare the progression of defect growth with time.

Anode Engineering made an assessment of how intelligent pigging provides clients with data over the entire length of pipelines. Then repeated surveys provide records of progression of any deterioration of pipe coating conditions. A more cost effective DCVG survey technique could make more regular surveys more attractive to pipeline operators.

Increased Sensitivity - Initial survey information using the newly developed Digital DCVG Buggy revealed that the accuracy of The Buggy system was at least three times more sensitive than the traditional manual walking surveys. So, if we could locate defects more accurately it was possible to drive the ROW up to 2.5 meters from the ROW alignment and still detect defects that were located using the Manual data technique. It was therefore possible to drive the ROW and locate defects at a slight offset to the pipeline Alignment.

Recording the Data / Defects – it has always been a major issue when manually testing to confirm if adequate grounding of test probes is achieved. The DCVG digital instrumentation introduced a technique where the instrumentation can confirm both metal Buggy wheels are in contact with the earth below.

The Digital instrumentation – The digital instrumentation developed, enabled defects to be displayed and recorded both on the digital screen and recorded electronically for downloading to an electronic file. The instrument also plots the GPS conventional co-ordinates continuously. If GPS data is required to be more accurate than the standard 5 meters, the sub-meter GPS technology can be integrated into the digital interface.

HOW THE BUGGY WORKS – The buggy is a conventional box trailer with a wheel span of 1500mm – similar to the probe separation on a manual survey technique. The wheels are a pair fo solid Chariot like steel wheels that are fitted to standard Wheel Studs. The wheels are electrically isolated for the chassis of the trailer. The wheels are both fitted with sliprings and carbon brush sets. The signals from the wheels are sent to the digital instrument inside the tow vehicle.

Because of the increased ground contact area from the wheels plus the dead weight of the trailer, contact with the ground above the pipeline is greatly improved.

Electronic Issues – As with the manual methodology, static electrical interference was initially a major consideration for the instrumentation. This resulted in considerable electronic development to eliminate this issue whilst maintaining signal reception and accuracy. Refining this problem also resulted in an extension of the work time per day for The BUGGY, rather than restrictive test time for the manual survey due to static electrical interference from noon onwards.

What is Recorded - The DCVG Buggy development resulted in a continuous trace being displayed on the screen of the Digital instrument This allowed deviations due to the presence of any defects detected to be revealed as a trace similar to what is seen on an oscilloscope screen. As previously stated, this trace along with GPS co-ordinates becomes the permanent record that is then provided to the client as a digital historic picture of the trace as traversed along the pipeline.

IMPORTANT MESSAGE – It is important to recognise at this time, that the strategy for utilising the Digital Buggy is to traverse the pipeline at the edge of the pipeline alignment and record any defect signals – given the sensitivity is much greater than the manual survey that is normally conducted 1.5 meters for the pipeline alignment.

The Methodology After 40 years of DCVG surveys, we find most clients usually only excavate a small number of larger defects and do not excavate all defects. Thus, the DCVG Digital Buggy will locate and record all defects across a 1500mm span perpendicular to the pipeline. The technique is not intended to assess the total voltage gradient to remote earth as is often undertaken on manual surveys.

The DCVG Digital Buggy technique will also record the potential shift at each test point to provide additional calibration of the signal along the pipeline.

Distance Travelled per Day using the DCVG Digital Buggy – With normal cross-country conditions the DCVG Digital Buggy has undertaken surveys and traversed on average 40 kilometres per day. This is almost five times greater than a two-man manual survey team would achieve over a working day in similar site conditions. Apart from the reduction in fatigue for the field engineer now monitoring the signals from an air-conditioned cabin of a vehicle, the advances in reduction of interference from static electricity conditions greatly extend the daily work time that can be achieved.

Field Trials To Date - The DCVG Digital Buggy development has been successfully utilised in some very dry and dusty conditions in Central Australia as well as local cross-country pipelines in Queensland. The Anode Engineering development team have come a long way in 12 months of rigorous testing conditions. The development is well established, but we perceive that with additional field trials, the technique will become further expanded.

The development has not only addressed personnel health and safety issues. It has provided a digital platform where pipeline owners can annually or otherwise review any annual changes in coating deterioration circumstances. The reduction in field time on long cross-country pipelines also is a major cost saving benefit. Engineering staff time in the field can be reduced by up to 75%. Mobilisation and demobilisation times to and from work sites each day are also then greatly reduced.

Constraints of the DCVG Digital Buggy Technique – Our team recognise that the DCVG Digital Buggy is not an ideal tool in all terrain conditions such as metropolitan pipeline easements. In those locations where it is not practical to drive a ROW, the new Digital DCVG instrumentation will be able to also be utilised manually in the traditional methodology using the new digital instrumentation. Possibly the original Analogue Meter technology shall become a memory within a short time.

DCVG Digital Buggy also does DIGITAL CIPS Surveys – Whilst DCVG surveys are an ideal tool for locating discreet coating defects, if the pipeline coating has deteriorated significantly and DCVG detects just TOO MANY defects, the DCVG Digital system can also be used to undertake a CIPS Buggy Survey on the same basis that DCVG Digital Buggy technique has been explained.

The DCVG Digital Buggy innovation is just another step in the company's charter – Delivering **POSITIVE PREVENTION SOLUTIONS**.