



Of the tools mentioned in NACE ECDA 0502-2008 Table 2 only two techniques are available to assess the Cathodic Protection, the CIPS (CIS) Technique and DCVG. Both use the pipelines CP directly. CIPS is a pipe to soil potential measuring technique not a coating fault locating technique. Also included in this comment are all variations of the CIPS technique despite the erroneous term used by North American companies, (Combined DCVG/CIPS) for what is in fact Lateral CIPS which in Europe is known as the Intensive Method. Research work on the subject over the last 30 years has demonstrated that on a scale of 0 to 100% the CIPS technique and its variations do not identify the smallest 30 to 40 % Severity coating faults which for most pipelines represent not identifying about 60 to 70% of all identifiable coating faults. The **Analogue** DCVG is not a pipe to soil potential measuring technique but is a very accurate coating fault locating technique even for small severity faults. Not often realized is that when using the DCVG technique it is also possible to establish and quantify the direction of current flow to or from a coating fault which is one of the 6 original NACE Criteria for protection and provides a very powerful contribution to any decision of what to repair.

In the procedure to run two surveys the first is use to **Analogue** DCVG to locate the coating faults and 50 metres behind, CIPS to measure the pipe to soil potential at 1 to 1.5 metre spacing along the pipeline route and also record coating fault epicentre pipe to soil potentials which are typically the least protected locations on a buried pipeline. To run the two surveys at the same time you need both independent techniques to be operated at the same CP ON/OFF switching sequence and also to use Satellite Interrupters with the CIPS Data Logger also synchronized with the Interrupters. The



suggested ON/OFF is 0.45 ON/0.8 OFF seconds or its reverse. Longer ON/OFF sequence has the **Analogue** DCVG Surveyor waiting on the pulse so the survey progress is slow. For CIPS the ON/OFF must be matched to the surveyor walking pace. If ON/OFF readings are required at 1 to 1.5 metres then to match a normal walking pace the ON/OFF sequence must be 0.45/0.8 seconds. Any longer ON/OFF sequence means the CIPS operator has to stop for each reading. This slows survey progress. If the ON/OFF sequence is shorter than 0.45/0.8 seconds problems occur. With the

**Analogue** DCVG if the pulse is too fast, separating the pulse ON from OFF makes it difficult for the surveyor to be certain of the meter indications. In the case of CIPS and DCVG if the pulse times are too short then interference is seen from the Anodic and Cathodic spikes that occur when a rectifier is switched ON/OFF. Any observations that include potential measurements that were taken and include part of the spikes will contain an error. Readings for CIPS if taken too long after switching the rectifier OFF will also contain an error that would be due to the decay of the OFF potential which is attributed



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to the depolarization of the pipeline, the rate of decay depending on the corrosivity of the soil. For most soils the 0.45/0.8 ON/OFF or reverse pulse sequence does not cause any decay. All electrical measurements for DCVG as well as CIPS are recorded by a suitable Data Logger such as the DCVG Ltd Quantum CIPS equipment. A digital voltmeter is not suitable. At every coating fault located and flagged by the epicentre to remote earth DCVG signal amplitude (Overline to Remote Earth (O/RE)) is recorded for the application. At every coating fault epicentre the CIPS Pipe/Soil ON and OFF potentials are also recorded. Ideally the ON and OFF CIPS measurements should be taken whilst the pipeline CP is operating at its normal operating current. If the current output of any of the CP power sources being interrupted is altered from its normal settings, then the accuracy and authenticity of the data recorded for both techniques is less representative of normal CP operating conditions.

At every coating fault epicentre the DCVG Anodic/Cathodic Corrosion Characteristics of the coating fault are recorded by the Data Logger and can be interpreted from the ON and OFF readings from fault epicentre to remote earth. The distance of each pipeline feature and coating fault from a known starting point or location should for reasons of accuracy and convenience be recorded using sub-metre DGPS.

