YIELDPOINT INC.

WHITE PAPER: YIELDPOINT INSTRUMENTS AND COMMUNICATION SYSTEMS ARE IMPERVIOUS TO WATER INTRUSION & LEAD WIRE DAMAGE

A video posted at http://www.youtube.com/watch?v=qVkpYbvRcQY shows how a stripped instrument cable immersed in water will not affect in any way the readings displayed on YieldPoint's *d*READER readout unit.

- The 4 wires inside the instrument lead wire are totally stripped over 12mm (1/2") where it attaches to a connector, to simulate both a very badly damaged cable and a flooded connector. The copper is fully exposed.

- A dGMM Ground Movement Monitor is used. The instrument is secured in a fixed position so that no displacement will occur. The reading is, as shown above, 67.18mm, a resolution of 10 micrometers.

- The damaged cable and the connector are submerged underwater and left there for as long as one wants to run the test.

- The stripped section of cable is situated at 10cm (4") under the waterline, so both the 4 exposed copper wires and the connector are fully submerged and in direct contact with water. Saline water is used.

- The reading obtained repeatedly during immersion is strictly the same as in dry air, to the 10 micrometers.

There is absolutely no effect of full underwater immersion and lead wire damage on YieldPoint instruments' performance.

COMPARISON WITH ANALOG INSTRUMENTS AS EXEMPLIFIED BY MDT EXTENSOMETERS AND CABLES

Analog instruments tend to be very sensitive to water ingress, either inside the cables, connectors or the sensors themselves. Quoting Tod and Lausch (2003):

> "*Occasionally, water or moisture is introduced into the system, usually by damage to the instrument head, or a nick in the lead wire. Water problems are characterized by unstable readings using the handheld readout unit. Typically the reading will start much higher or lower than previous readings, and will be unstable. The reading will either rapidly decay, or rapidly rise. Check the instrument connector to make sure there is no moisture or condensation there*".

As we showed on Page 1, YieldPoint's instruments and cables/connectors will continue to give fully reliable readings in the same and more extreme circumstances.

> "*If necessary, use a contact spray to dry the connector. If that doesn't solve the problem, check the length of lead wire, and try to identify any points of damage, such as nicks in the lead wire, that may permit moisture to enter the system*".

Nicks in lead wires will have no effect on readings given by YieldPoint's instruments.

> "*Often the heat generated from the low-voltage in the wires is enough to drive the moisture out of the system.*

At YieldPoint our view is that battery power is best used to generate accurate readings and rich data rather than evaporating water. To this end we design reliable solutions immune to water intrusion.

> *Damaged lead wires: It is possible to strip the wires and twist them back together, but this may not yield good results as any vibration during the reading process can affect the readings*".

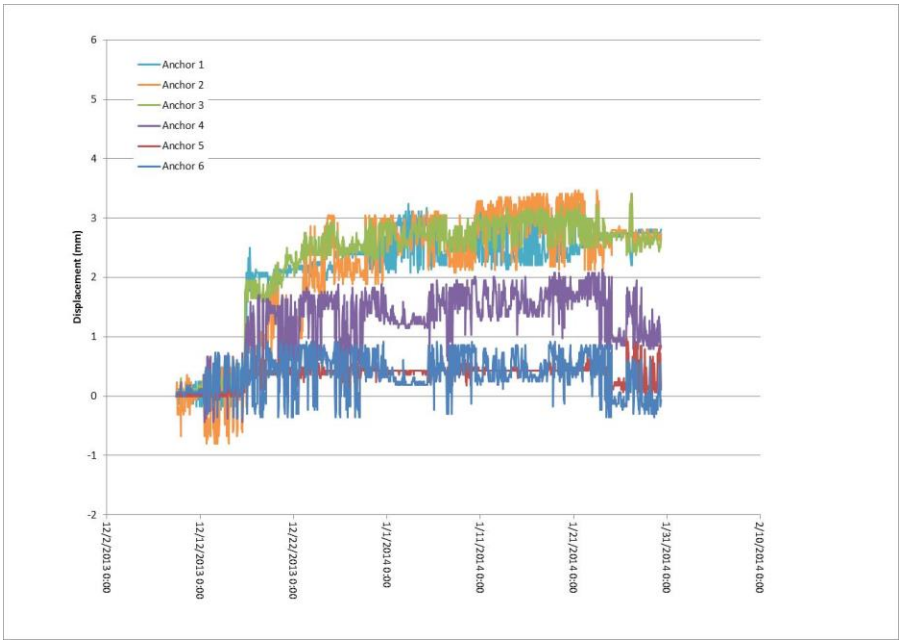
Tod and Lausch (2003) http://www.mdt.ca/sites/default/files/smart_instrumentation-paper.pdf

Stripping and twisting broken wires together will not affect the readings given by YieldPoint's instruments.

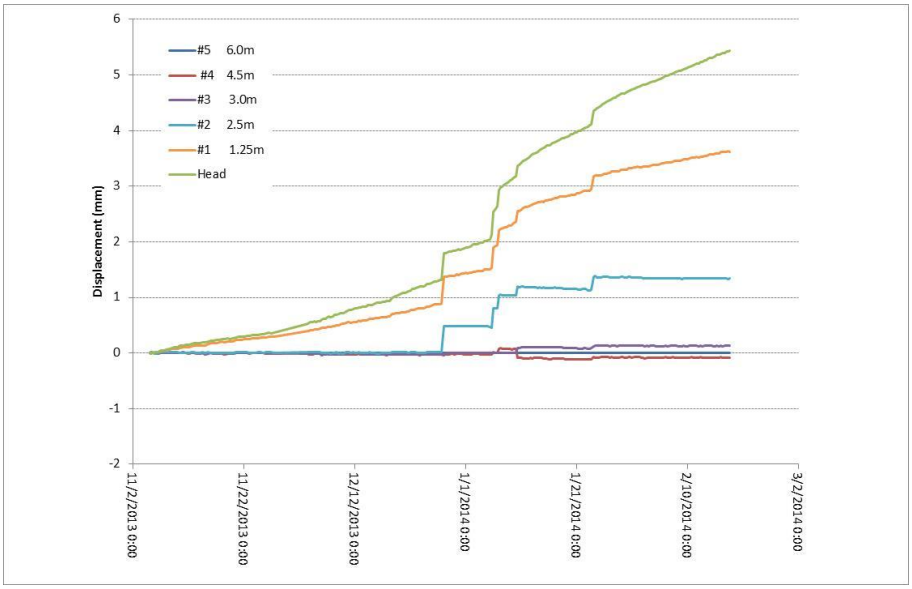
> "*Instrument Node Problems: if you are reading zero on only one anchor node, (…) it may be possible that there is a defect in the potentiometer. Occasionally, the potentiometers used in the SMART instruments have a "dead zone", or area where the reading is zero. (…) Occasionally these defects are missed, and the problem occurs in the field.*

Where the Rubber hits the Road

The graphs below show actual data recorded from (a) an analog (SMART instrument) instrument and (b) a digital instrument (YieldPoint d[6]EXTO) over the same period.



(a) Analog Instrument (above) compromised by moisture.



(b) Digital instrument

The scale for both instruments is the same.

The analog instrument has noise which almost completely obscures the effect of blasting and time dependent movement. In contrast the effect of every small blast is detected from the digital instrument.

Note that if the two instruments were measured manually at a much lower frequency, these effects would not be apparent. The information available would be incomplete and deceiving. However since both were collected with data-loggers any problems become immediately obvious.

A primary disadvantage of analog signals is noise and its amplification during any processing, transmission, amplification. Another is susceptibility to water and humidity.

In contrast, digital technology applied to sensing and data processing offers the following:

- Data processing right at the site of the measurement.
- Low-level noise called quantization noise floor created by A-to-D conversion does not increase with further manipulations.
- Readings directly in real life unit: tons and millimeters. No need for risky conversions.
- Individual instrument ID for easy deployment without any configuration.
- No reconfiguration after changes and repairs to system.
- Individual instrument ID always associated to data files.
- Individually calibrated instruments for optimized performance.0
- Solid digital data strings for transmission in harsh environments.
- Seamless communications with d-MESH telemetry, Wi-Fi, Ethernet.

In an era where digital technologies have imposed their superiority in all aspects of life, the mining industry is no exception. Computing and modelling could not be without digitization and sensing, monitoring, control, voice transmission, data transmission have all seen huge leaps forward by leaving behind the outdated analog technologies and embracing modernity.