

Modern Tools for Indirect Inspections for DA and beyond by Jim Walton



Typical Tools

Alternating Current Current Attenuation (ACCA)

Normally utilized as a pipe locator for accurate location and depth measurements.
Also utilized for identifying the circuit and larger coating problems and shorts.

Close Interval Survey (CIS)

Normally an interrupted On/Off survey categorizing the Cathodic Protection state of the pipeline at that time.

Direct Current Voltage Gradient (DCVG)

Normally utilized to pinpoint and categorize coating holidays.

Alternating Current Voltage Gradient (ACVG)

Normally utilized to pinpoint and categorize coating holidays. Less set up time, can be combined with ACCA. More sensitive.

Soil Resistance

Normally utilized to categorize the general corrosive nature of the soils.
Most use it during direct examination.

New competitor to the PCM

PIPELINE DEFECT MAPPER - PDM

Manufactured by Vivax-Metrotech



Modern Tools

- STRAY CURRENT MAPPER/ DIRECT CURRENT MAPPER
- SWAIN CLAMP
- CATHODIC PROTECTION CURRENT MEASUREMENT (CPCM PIG)
- PRECISION PIPELINE LOCATOR

Some Tools Currently Available

Smart Probe – manufactured by Radiodetection



Stray Current Mapper/ Direct Current Mapper



Swain Clamp – DC measurement



CPCM – Baker Hughes – Measures voltage drop from inside the pipeline which allows for the calculation And therefore measurements of all direct currents.



Precision Pipeline Locator – utilized in areas of AC interference for location, depth, current measurement and current direction.



Methodology

- Measuring your cathodic protection current, stray current or other sources of direct current allows more information to be collected that will improve your knowledge of your system.

- Voltage measurements alone do not tell the whole story!

What causes corrosion? Voltage potentials? **NO** Current? **YES**

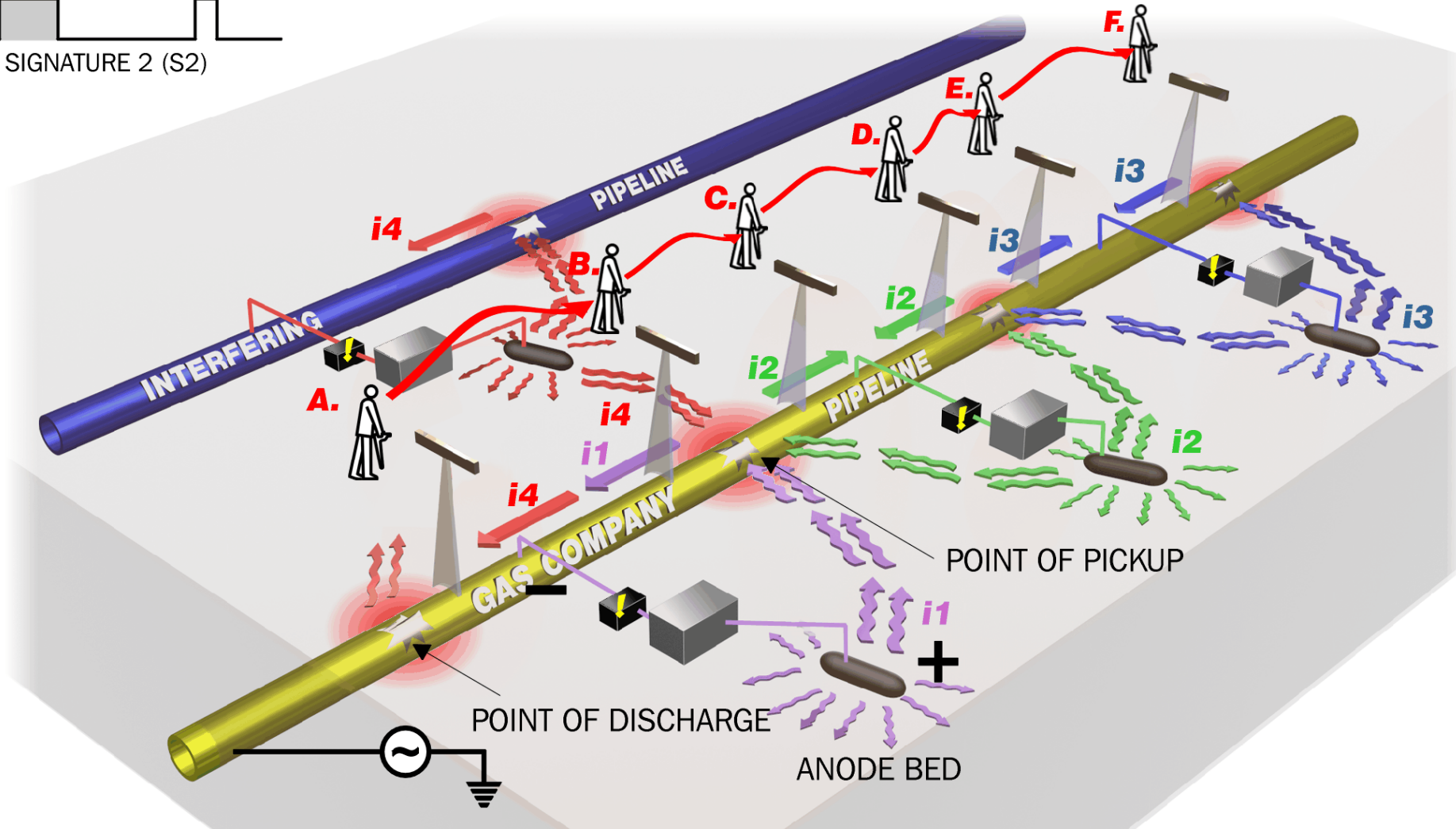
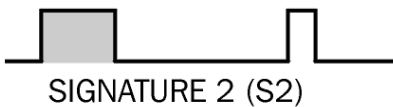
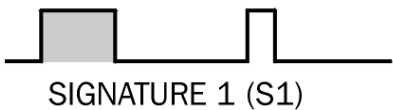
- Use a current attenuation tool that does not require ground contact and can filter out AC interference. This will allow for the regular collection of position, depth and current attenuation data. This data can now be utilized in a normal ECDA program.

- Use ACVG to pinpoint indications of coating holidays.

- After indications are confirmed, use a direct current attenuation tool to assess the current pickup or discharge across this location.

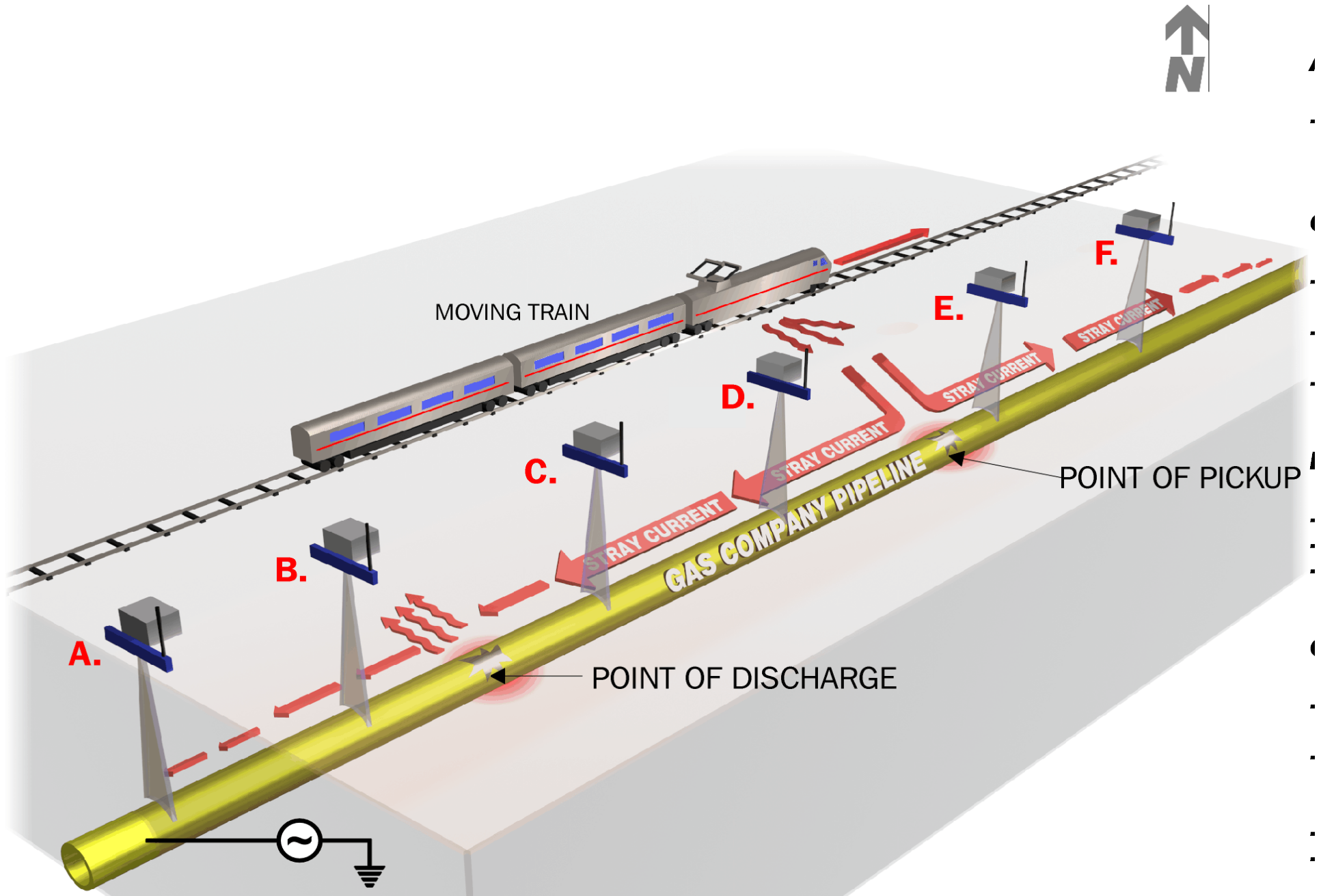
Case 2

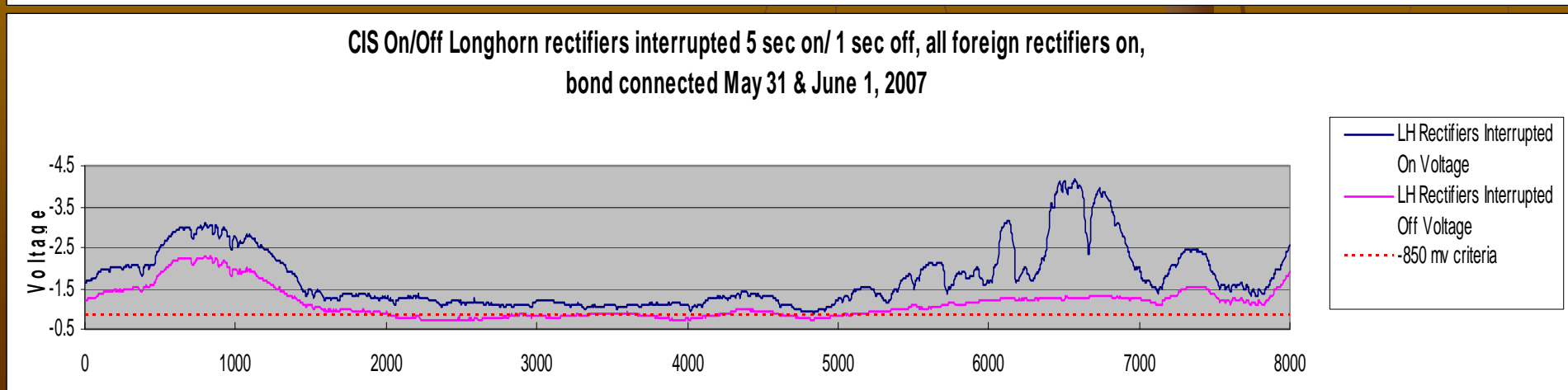
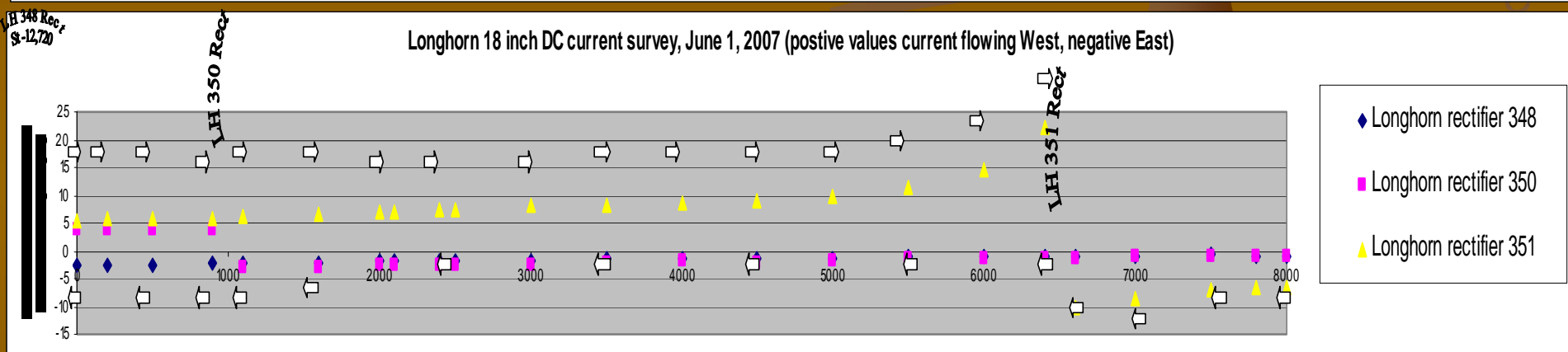
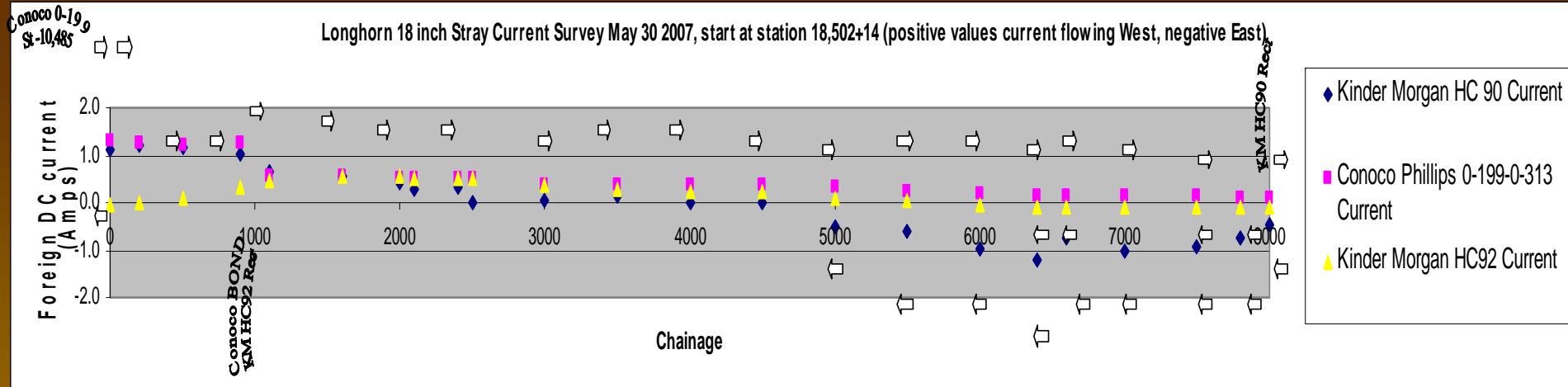
Identifying Current Contributions from Multiple Rectifiers



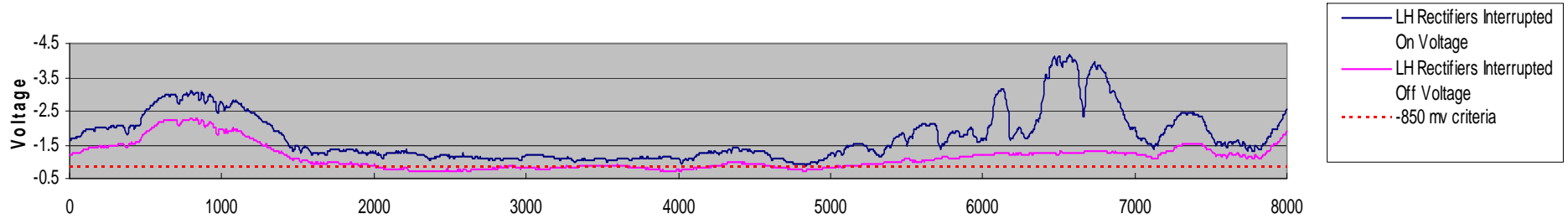
CASE 5

Interference from Rail System- Parallel

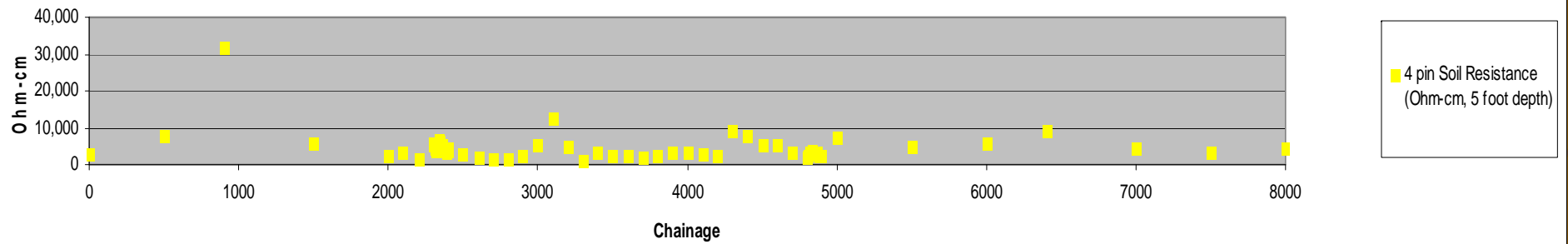




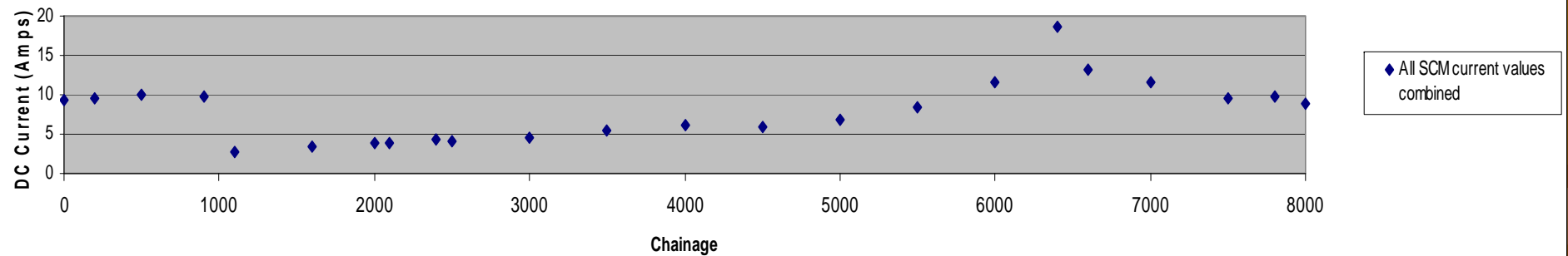
CIS On/Off Longhorn rectifiers interrupted 5 sec on/ 1 sec off, all foreign rectifiers on,
bond connected May 31 & June 1, 2007



Longhorn 18 inch Pipeline 4 pin Soil Resistance (Ohm-cm, 5 foot depth), June 5, 2007



Longhorn 18 Inch all Rectifiers combined Net current flow, June 2, 2007



Trace Properties

File View Configuration Trace Help



C:\JW'S PIPELINE INTEGRITY SERVICES, LLC\A

Log Comment
"current. scm59. by valve after it tracks ds from valve 30".

DC Level

-59848.9

Time Alignment

Hours 0

Mins 0

Secs 0

Remove DC

Trace Visible

Change Trace Colour



Depth 1.397000

Offset 0.000000

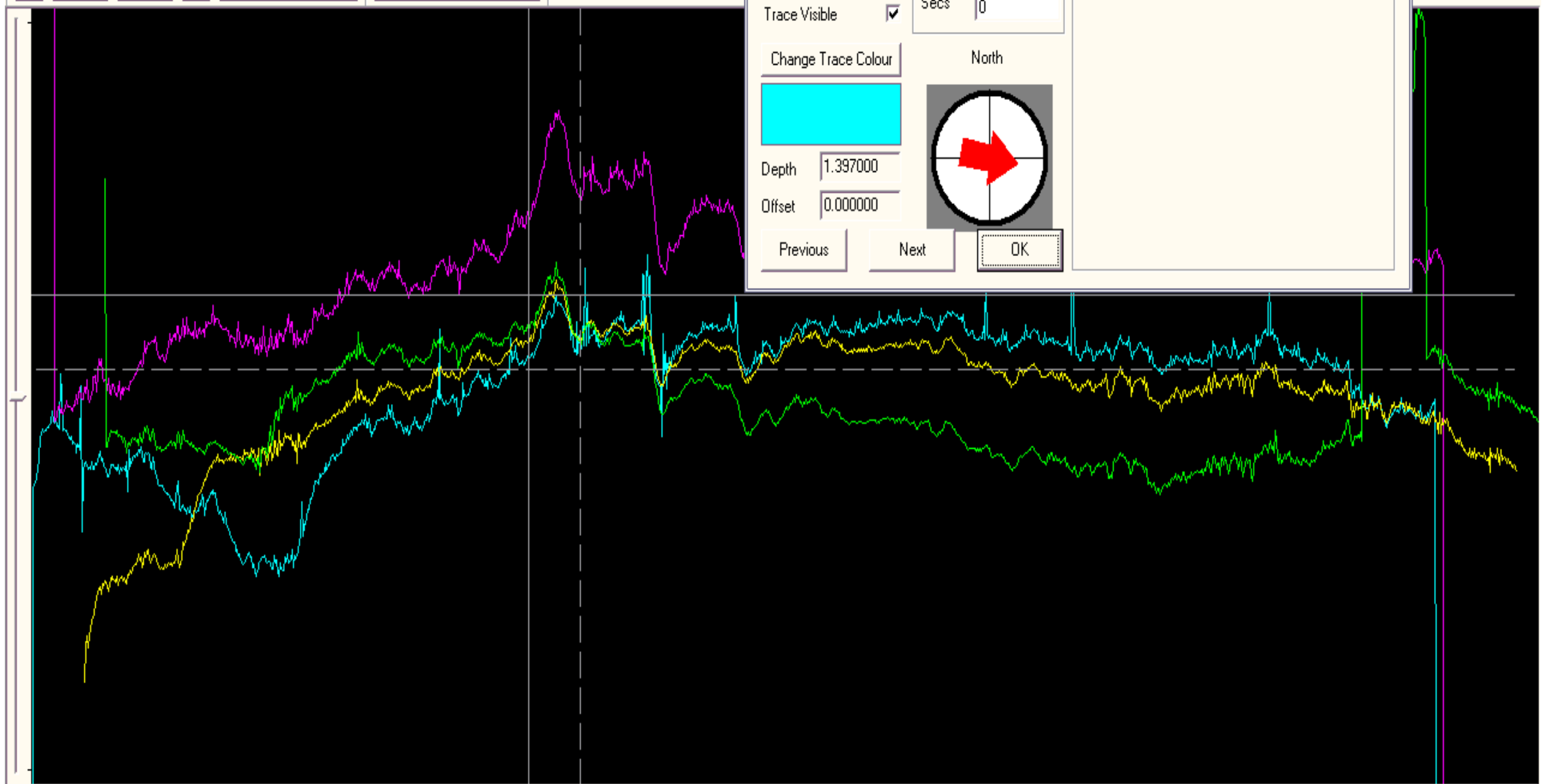
North



Previous

Next

OK



Start Time: 02/12/2005 11:15:58

End Time: 03/12/2005 12:30:58

+ 02/12/2005 19:36:32.791 value = -189.297A

⚡ 02/12/2005 20:27:12.457 value = -189.632A

△ 31/12 18:50:39.666 delta = 335mA



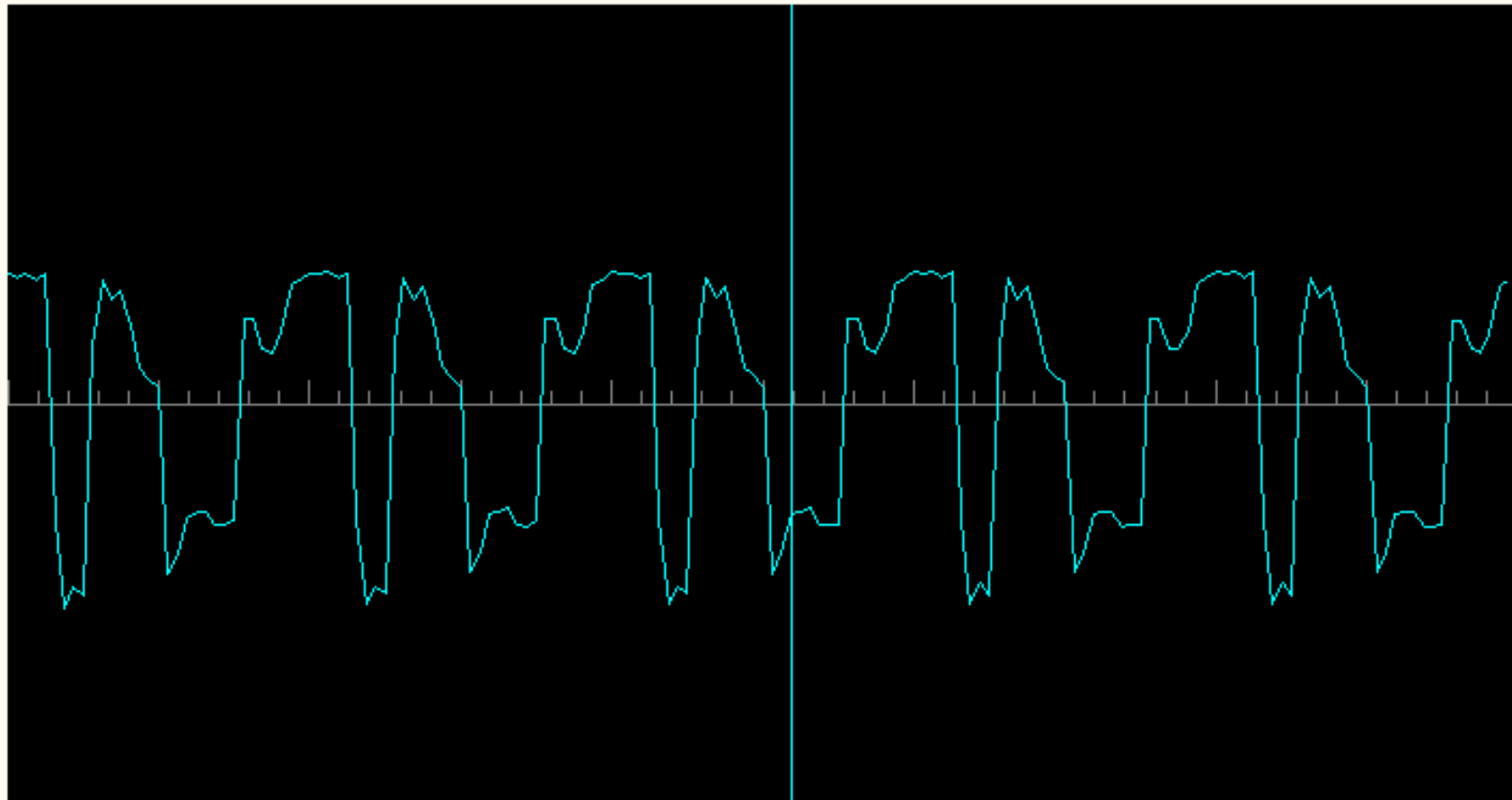
Ready

Comms Link  **Comms Link OK!**

Read Now


RTC:

20/11/2005 10:03:16




y
388.2 mA


Δy

 **y**

Gain
- +

DC
- +
Zero

 Ruler

 Grid

Locate Info

Depth 2' 9"
Signal 390.0 mA
Offset 0' 4"

Log Time 00:00

Battery status



Dir



Compass

North



Time Base Control

 0.5

- +

Volume

0

- +

Interrupter ID

1

- +

Re-start Locate

Close

Other applications

- Casings – Identify the conditions of the carrier pipe inside the casings by identifying whether there is electrolytic contact or metallic contact between the carrier pipe and the casings. Wires at the ends of the casing are not needed if ACCA, CA and ACVG are utilized.
- Recoat projects – Identify areas where the most CP is being consumed. It will reduce the areas that need recoating and therefore hundreds of thousands of dollars are saved.
- Shorts/Bonds – Find the shorts quicker, easier and more effectively. Find any unknown bonds.
- Rectifier influence – Find out where the CP current is going.
- Water crossings – Take measurements before and after the water crossing without the need to be on the water.

Summary

- Measuring actual Direct Current provided valuable insight into the cathodic protection current issues without contact to the pipe.
- Measuring actual DC provides less measurement errors. (less reliance on voltage and resistance measurements).
- Measuring actual DC allows for more productivity.
- Measuring actual DC allows many more areas on the pipeline that can be surveyed easily.
- More informed and accurate decisions are made because of these techniques.
- A Direct Current measuring tool should be a part of every stray current program which equals less costs on unnecessary maintenance.

QUESTIONS?

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