Battery Life Cycle Testing

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Yardney Technical Products Inc.

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Overview

- ***Battery Configuration***
- ***Life Cycle testing***
  - **LEO Test Profile**
  - **12Ah and 43 Ah cells**
  - **Low Voltage Batteries**
  - **High Voltage Batteries**
- ***Milestone testing***
  - **Capacity and Internal Resistance Profiles**
  - **12Ah and 43 Ah cells**
  - **Low Voltage Batteries**
  - **High Voltage Batteries**

Life Cycle Batteries-Overview

- ***2-Low Voltage 28V, 43Ah Batteries***

  LV005 and LV006

  - 8-43Ah Lithium-ion cells in series configuration
  - Equipped with charge control and equalization electronics
  - Space qualified battery design

- ***1-High Voltage 147V, 12Ah Battery***

  HV003

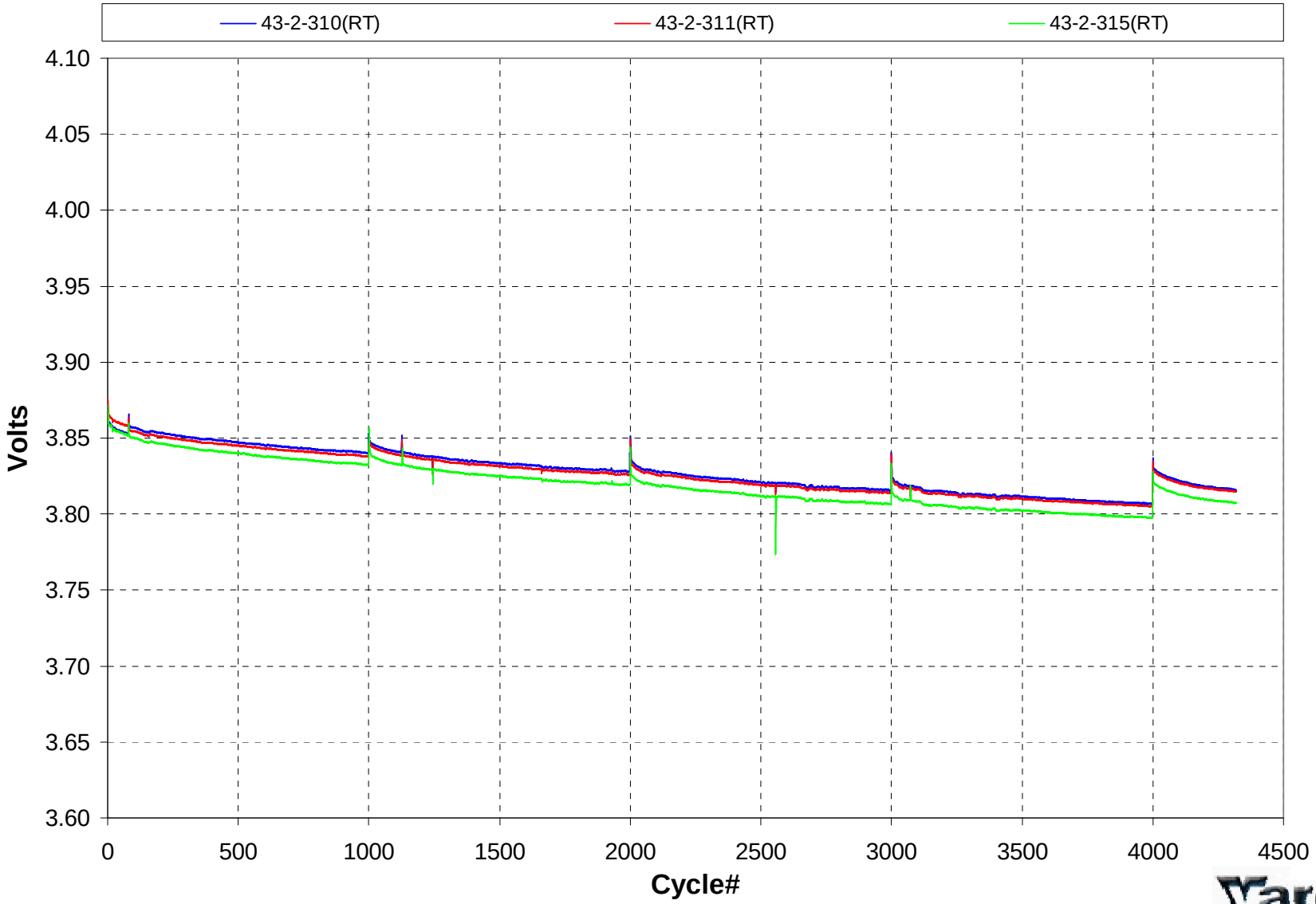
  - 42-12Ah Lithium-ion cells in series configuration
  - Equipped charge control electronics.
  - Space qualified design

LEO Cycling Profile

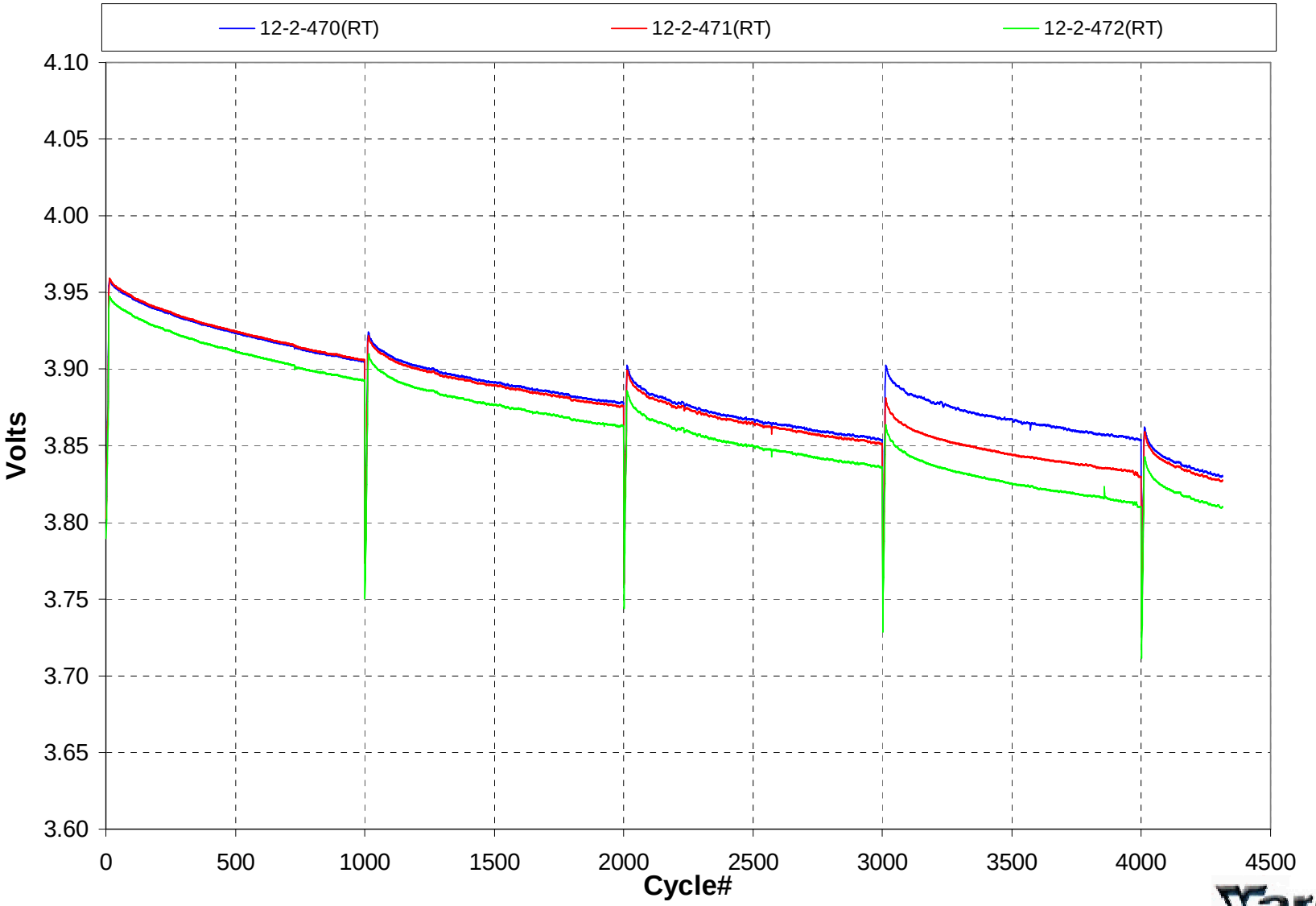
- ***43Ah Cells and Low Voltage Batteries***
  - Discharge at 14 Amps for 36.7 minutes.
  - Charge at 11 Amps to 32.8 Volts for 53.3 minutes.

- ***12Ah Cells and High Voltage Battery***
  - Discharge at 13 Amps for 4.5 minutes.
  - Open circuit for 30.5 minutes
  - Charge at 1.3 Amps to 172.2 Volts for 55 minutes.

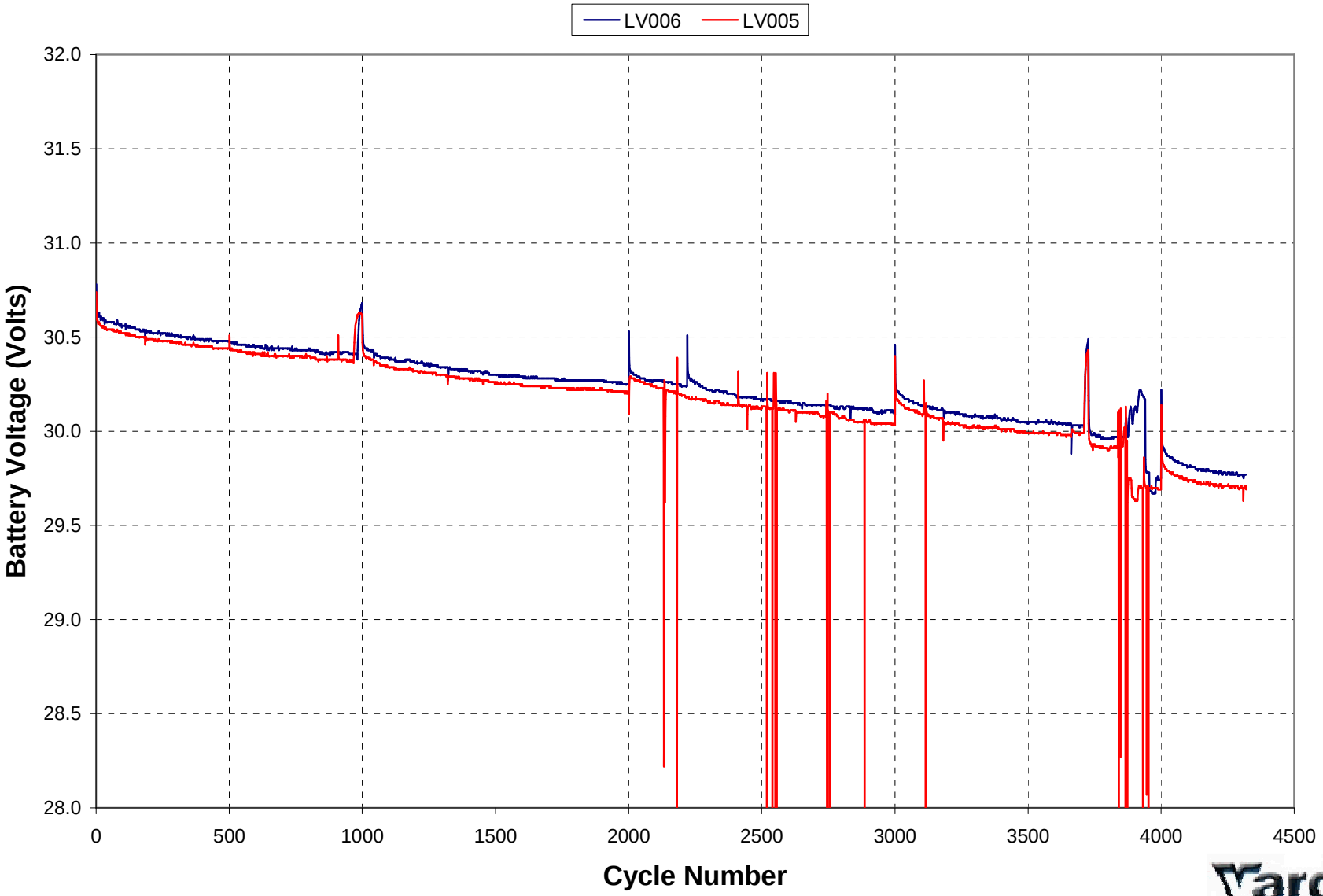
43-2
EOD Voltage vs. Cycle



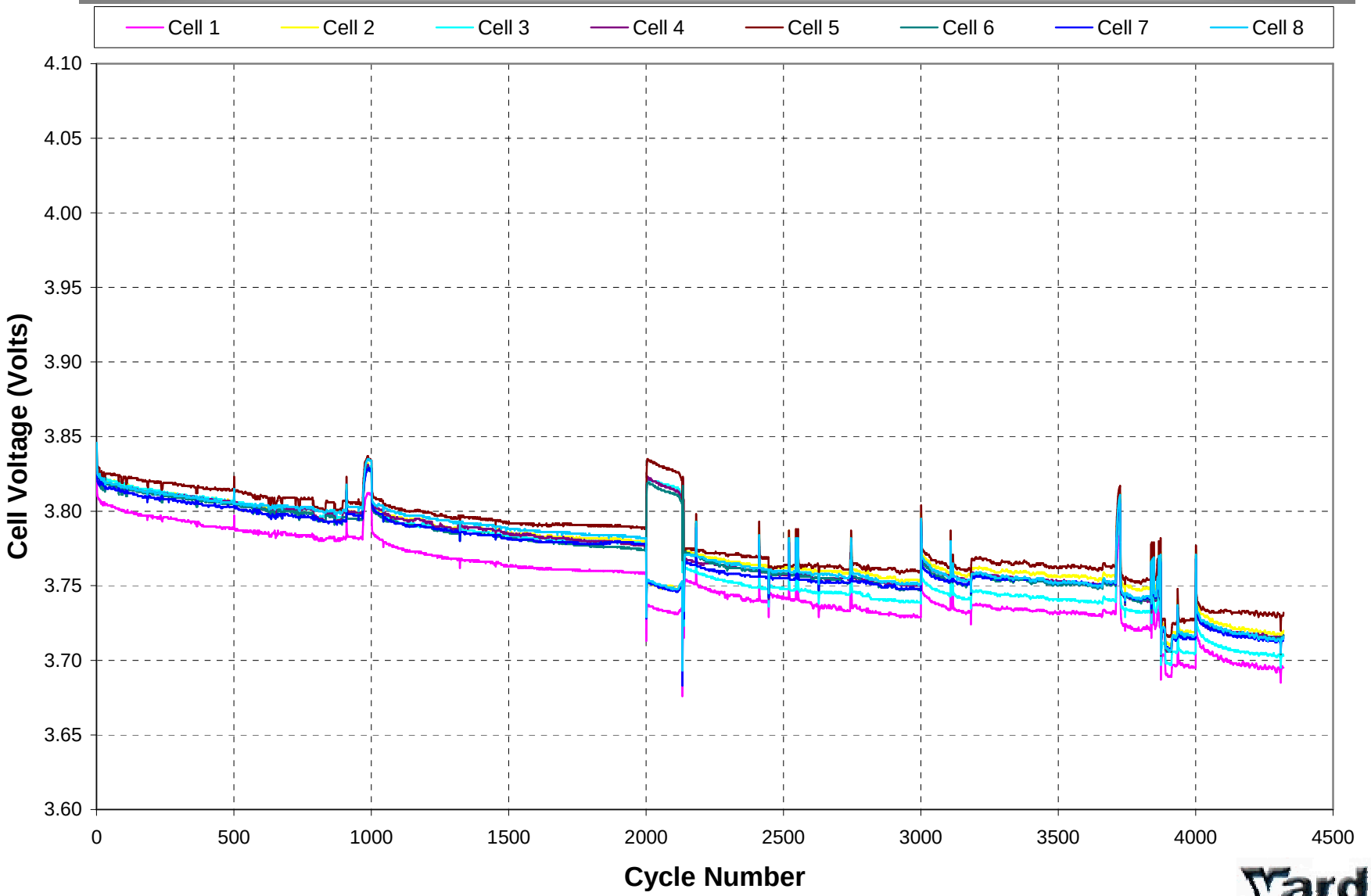
12-2
EOD Voltage vs. Cycle



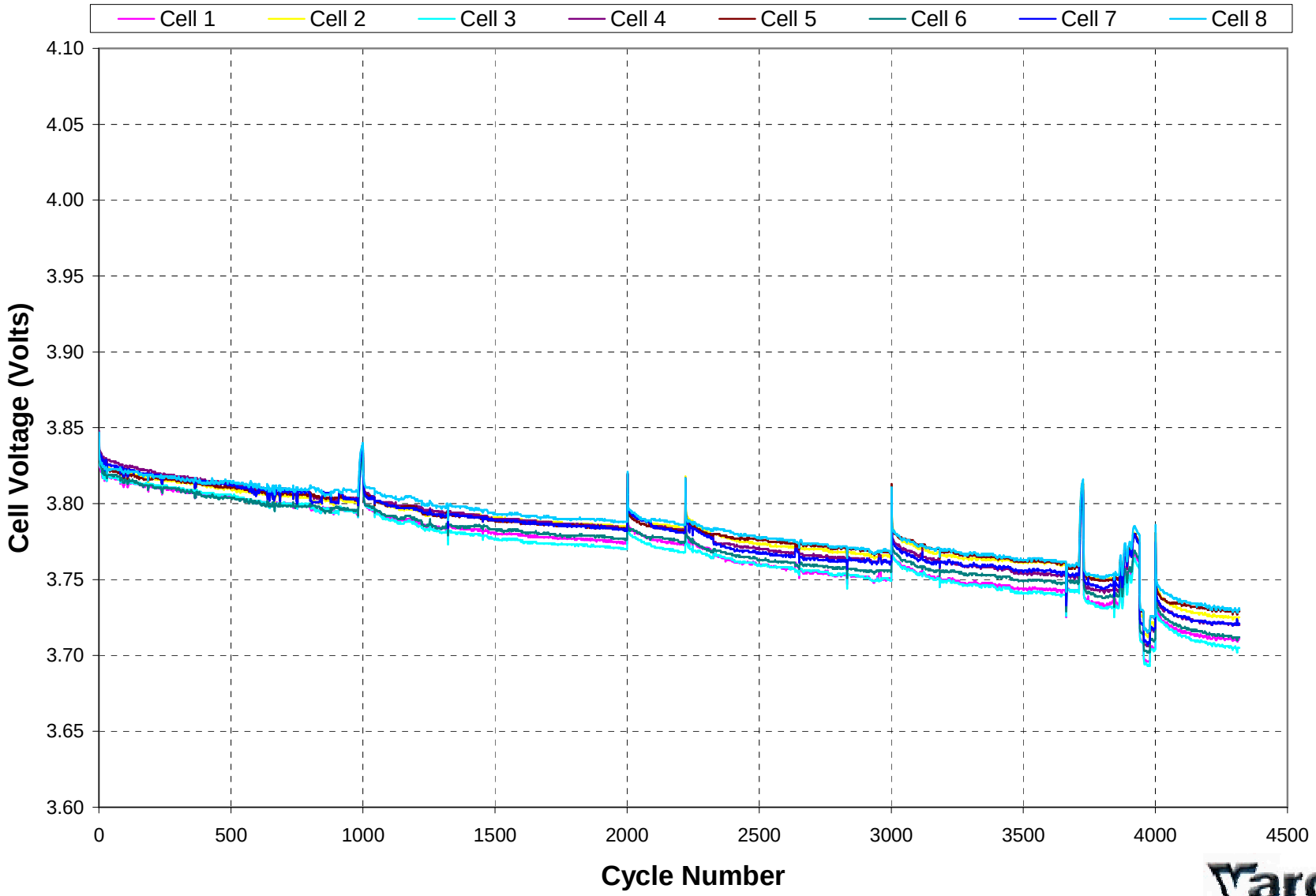
LV005 and LV006
EOD Battery Voltage vs. Cycle



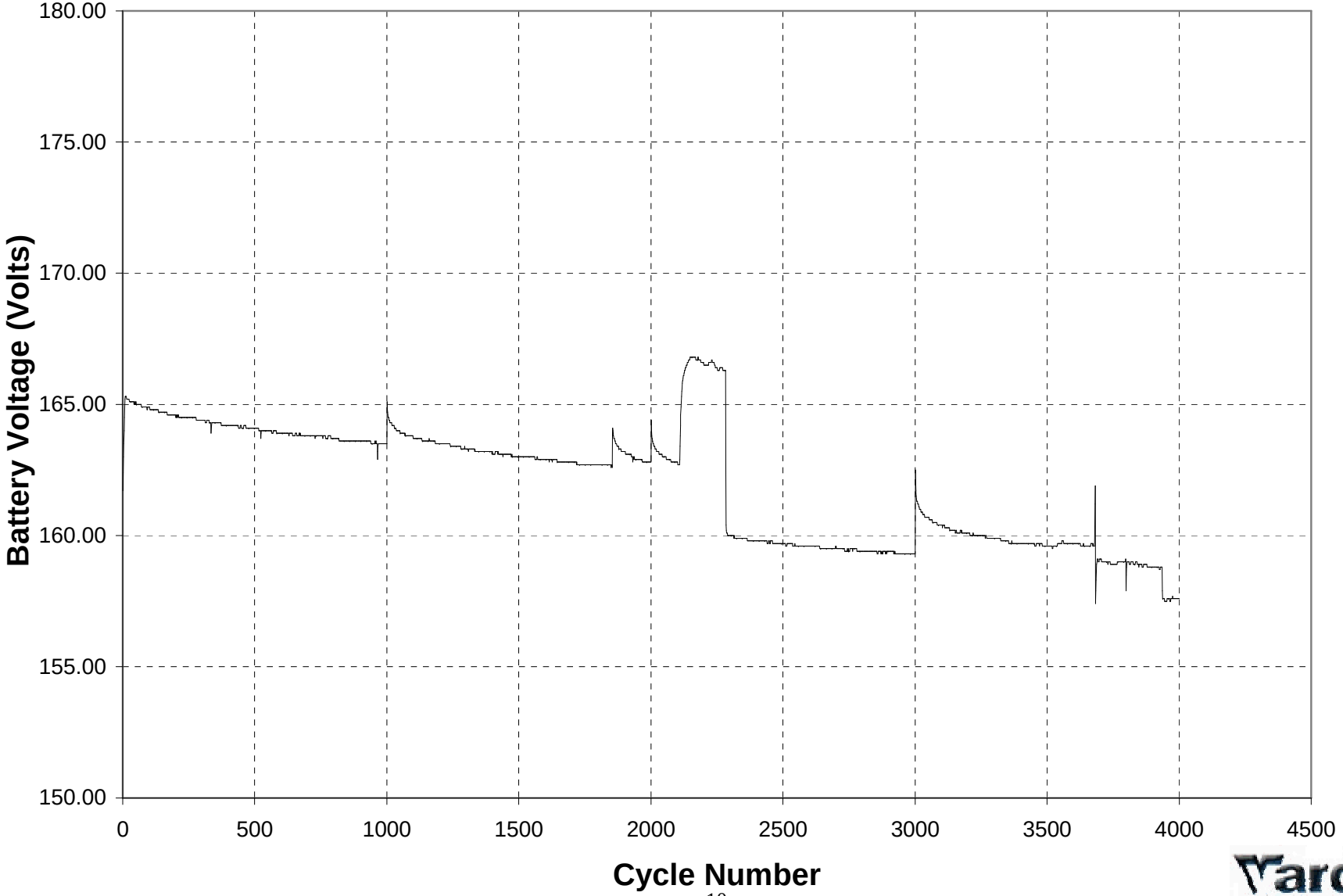
LV005
EOD Cell Voltage vs. Cycle



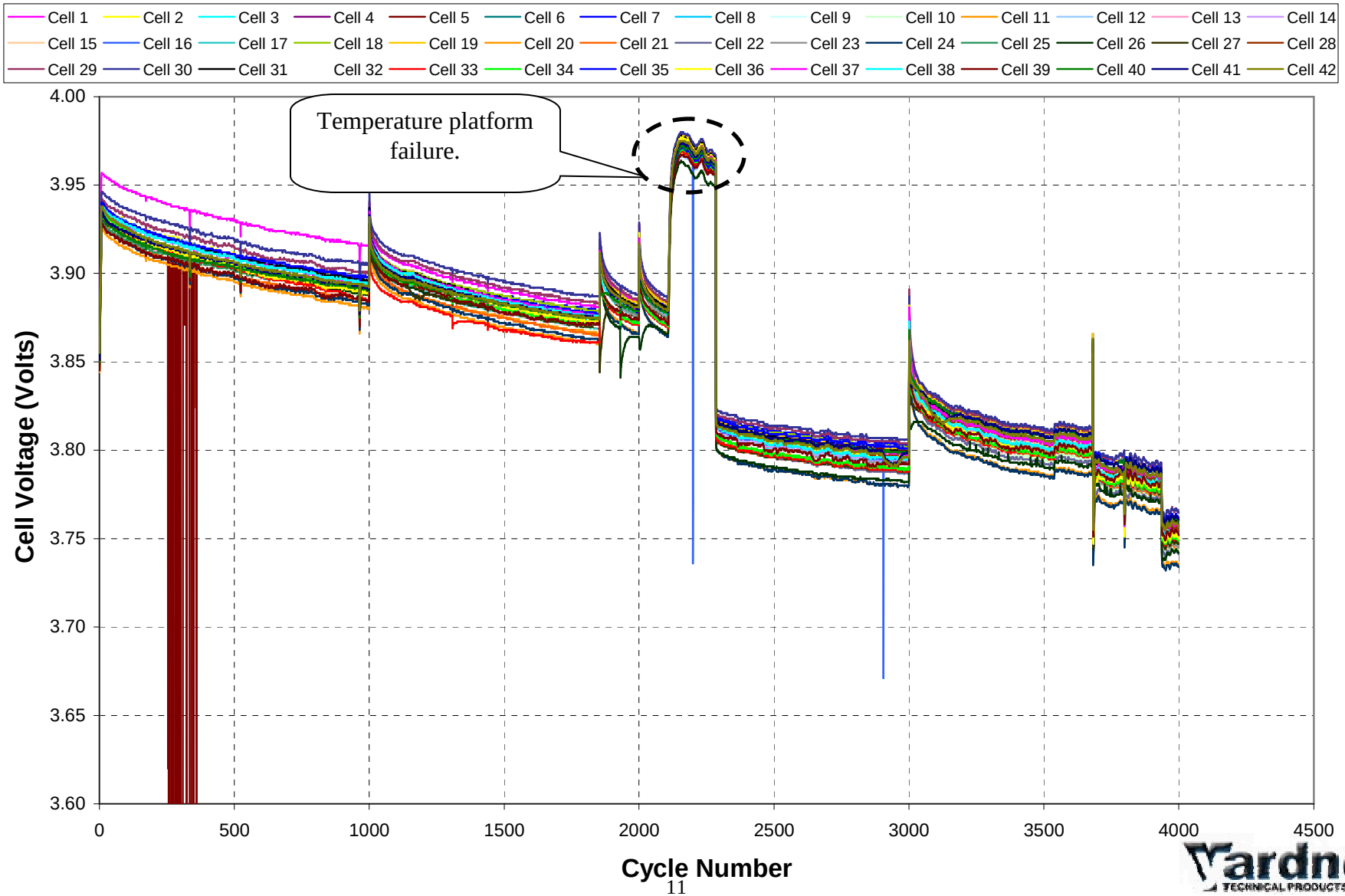
LV006
EOD Cell Voltage vs. Cycle



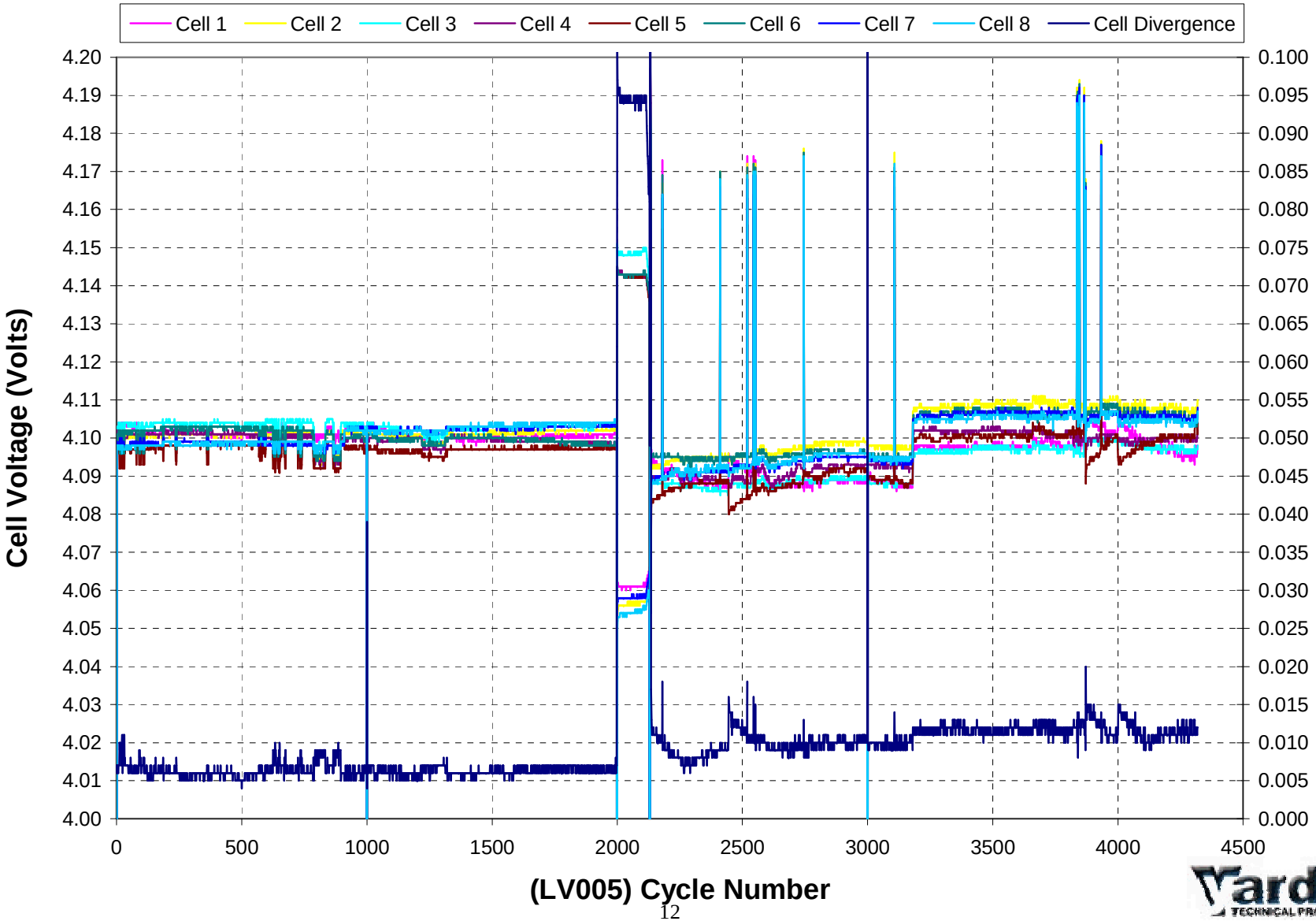
HV003
EOD Battery Voltage vs. Cycle



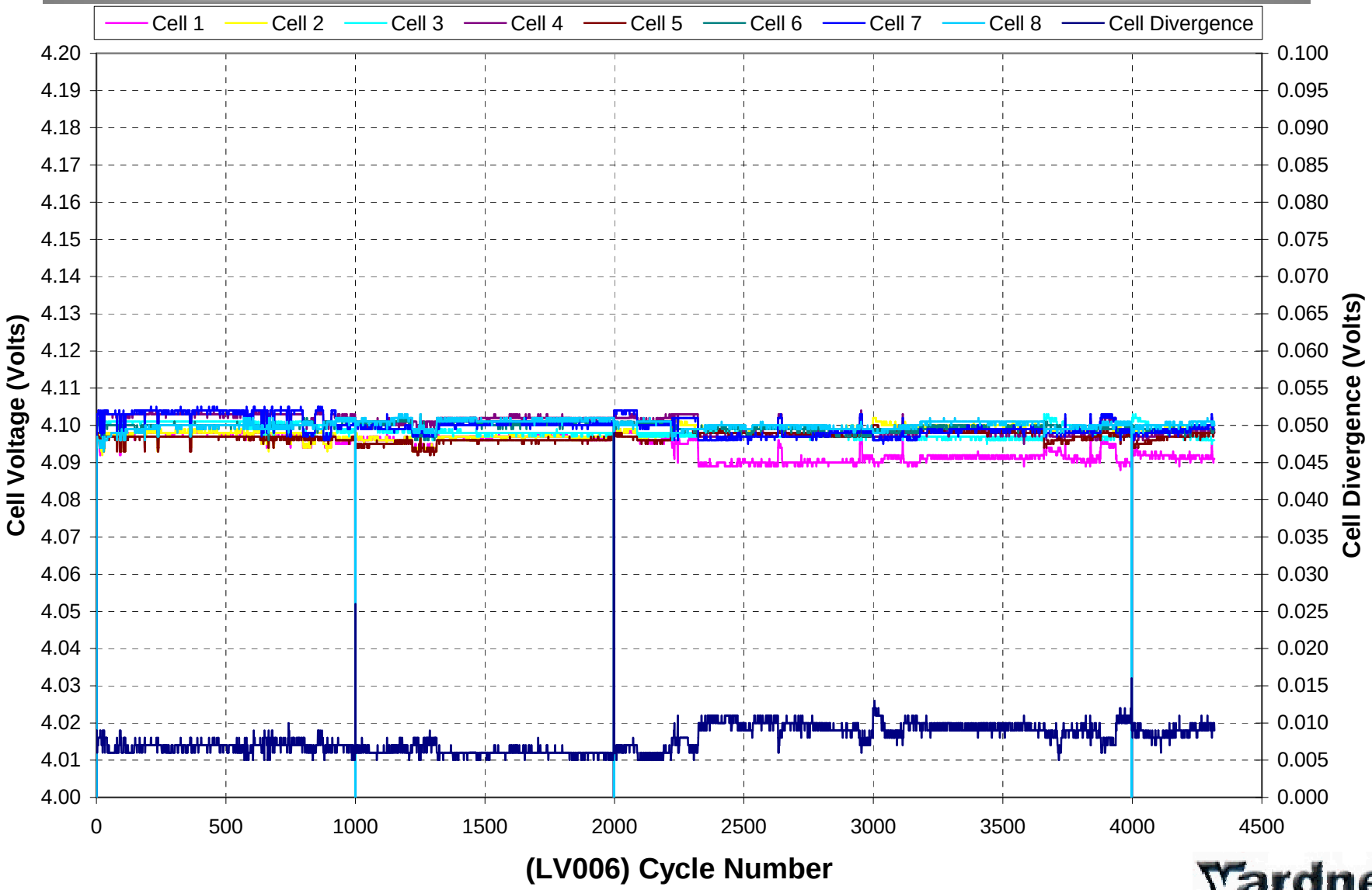
HV003
EOD Cell Voltage vs. Cycle



LV005
EOC Cell Voltage vs. Cycle

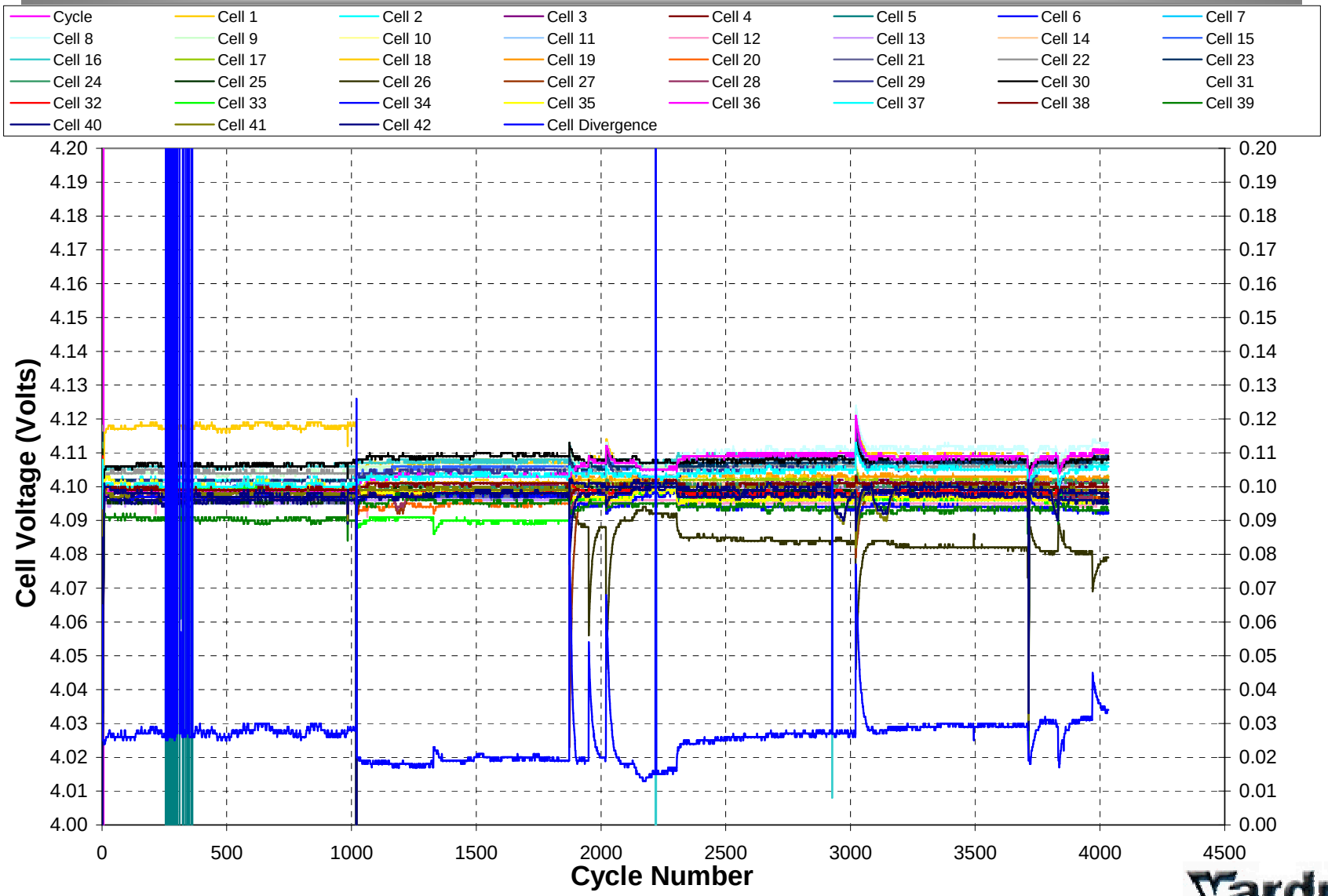


LV006
EOC Cell Voltage vs. Cycle



HV003

EOC Cell Voltage vs. Cycle

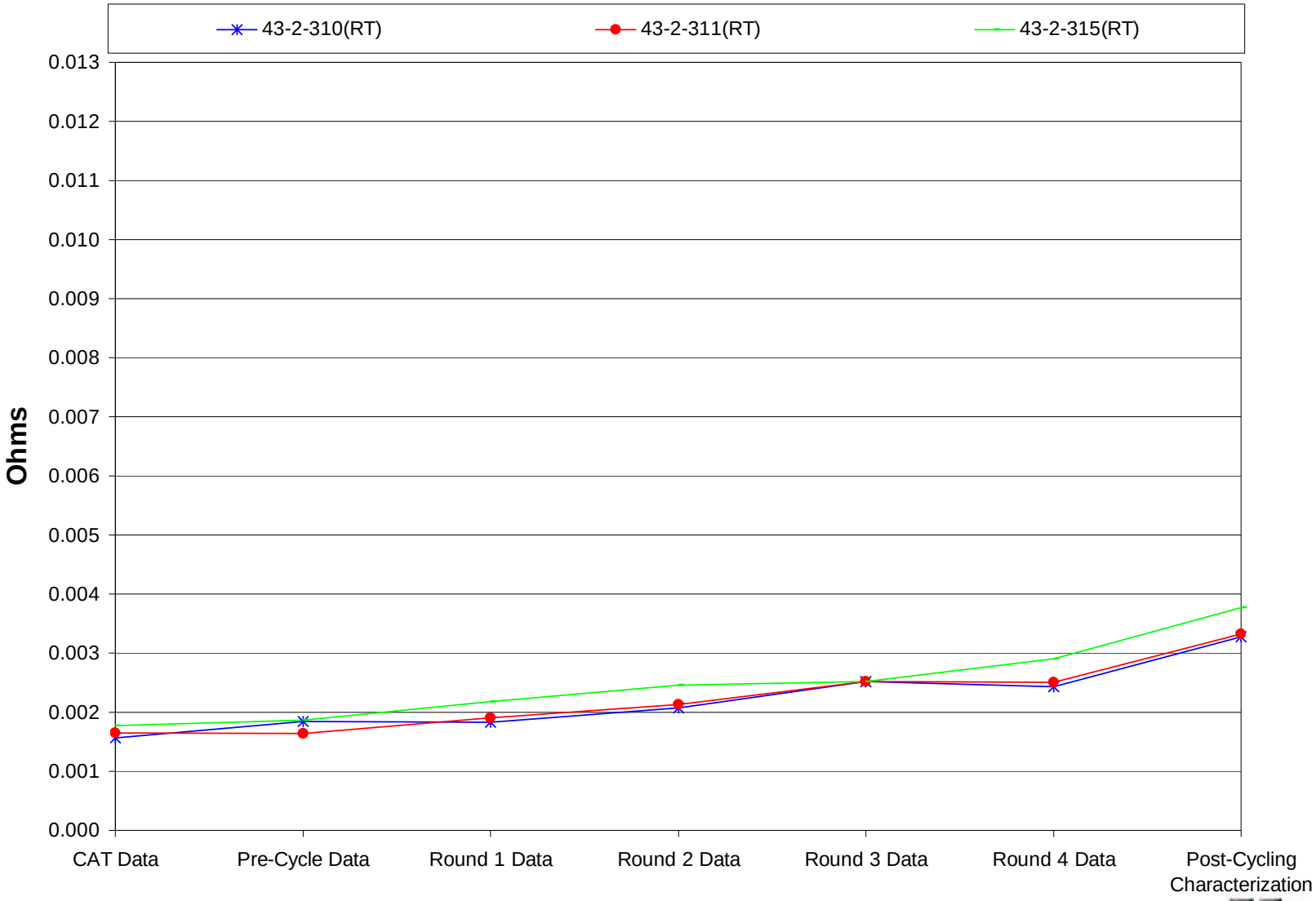


Milestone Checks

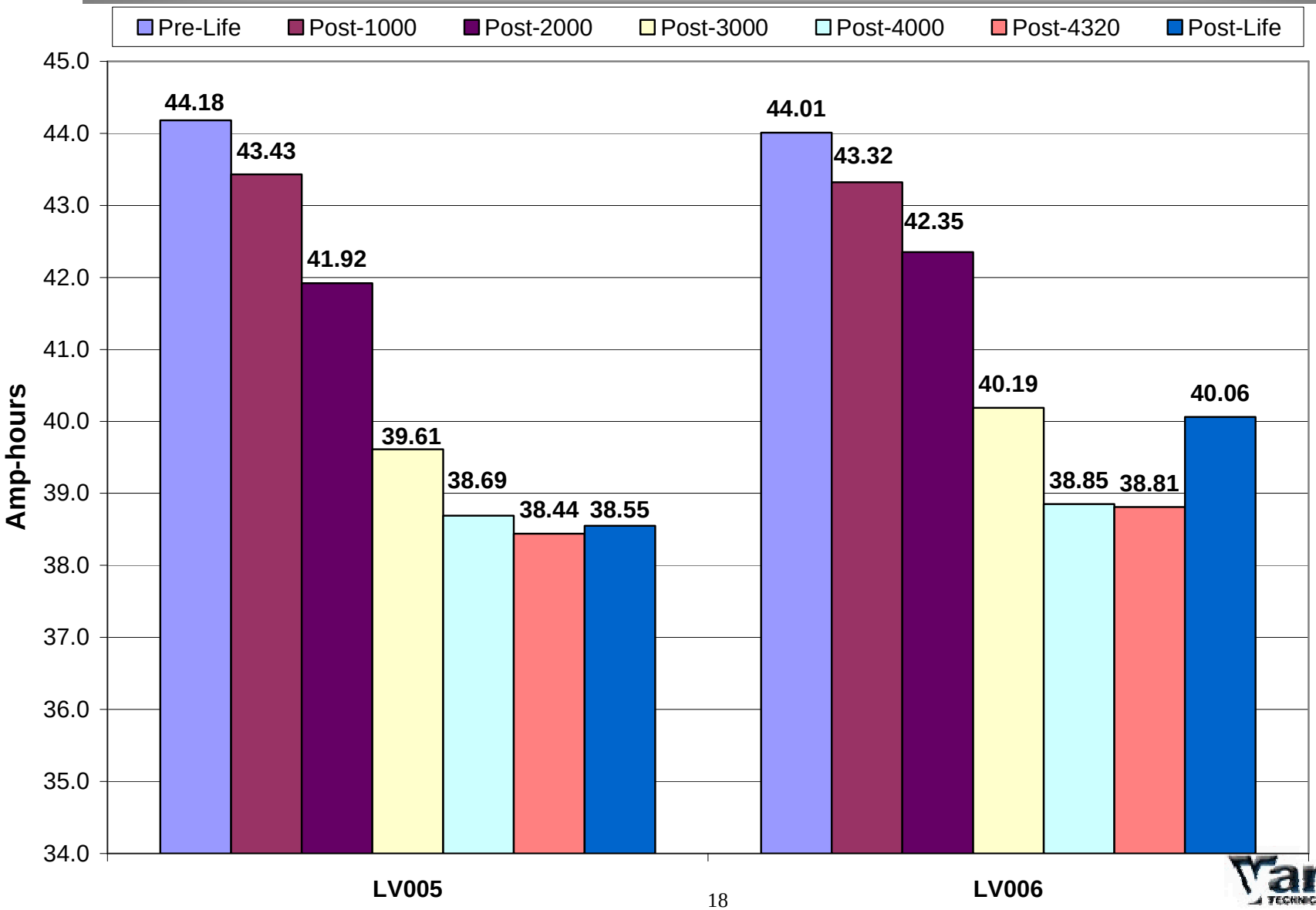
- *Every 1000 cycles batteries perform*
  - Capacity Check at 25°C
    - Low Battery Voltage Profile
      - Charge at 8.6 amps to 32.8 volts
      - Discharge at 21.5 amps to 24 volts
    - High Battery Voltage Profile
      - Charge at 8.6 amps to 32.8 volts
      - Discharge at 21.5 amps to 24 volts

43-2 Cell-level Capacity Check

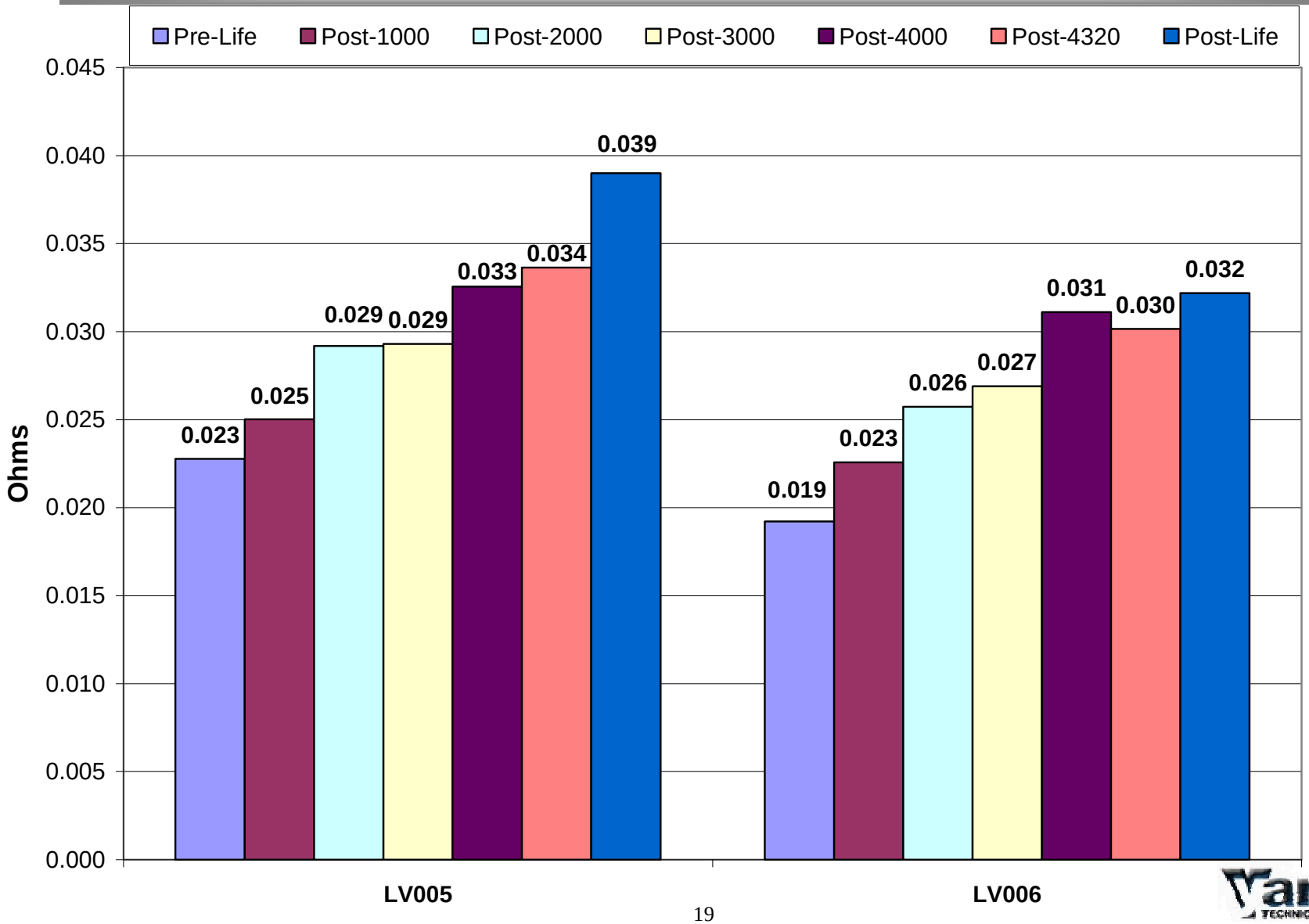
43-2 Cell Level DC Resistance



LV Capacity Check

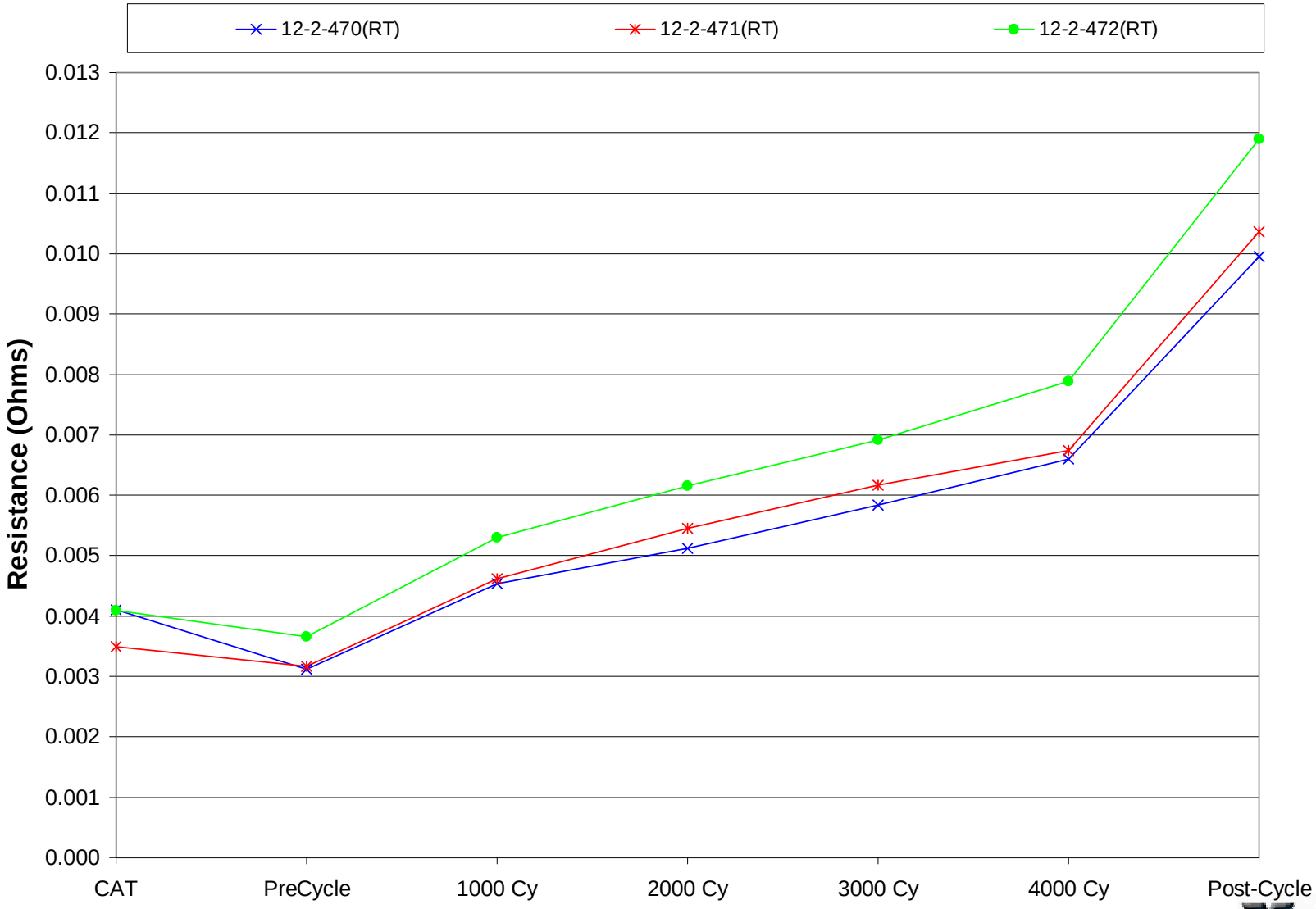


LV DC Resistance

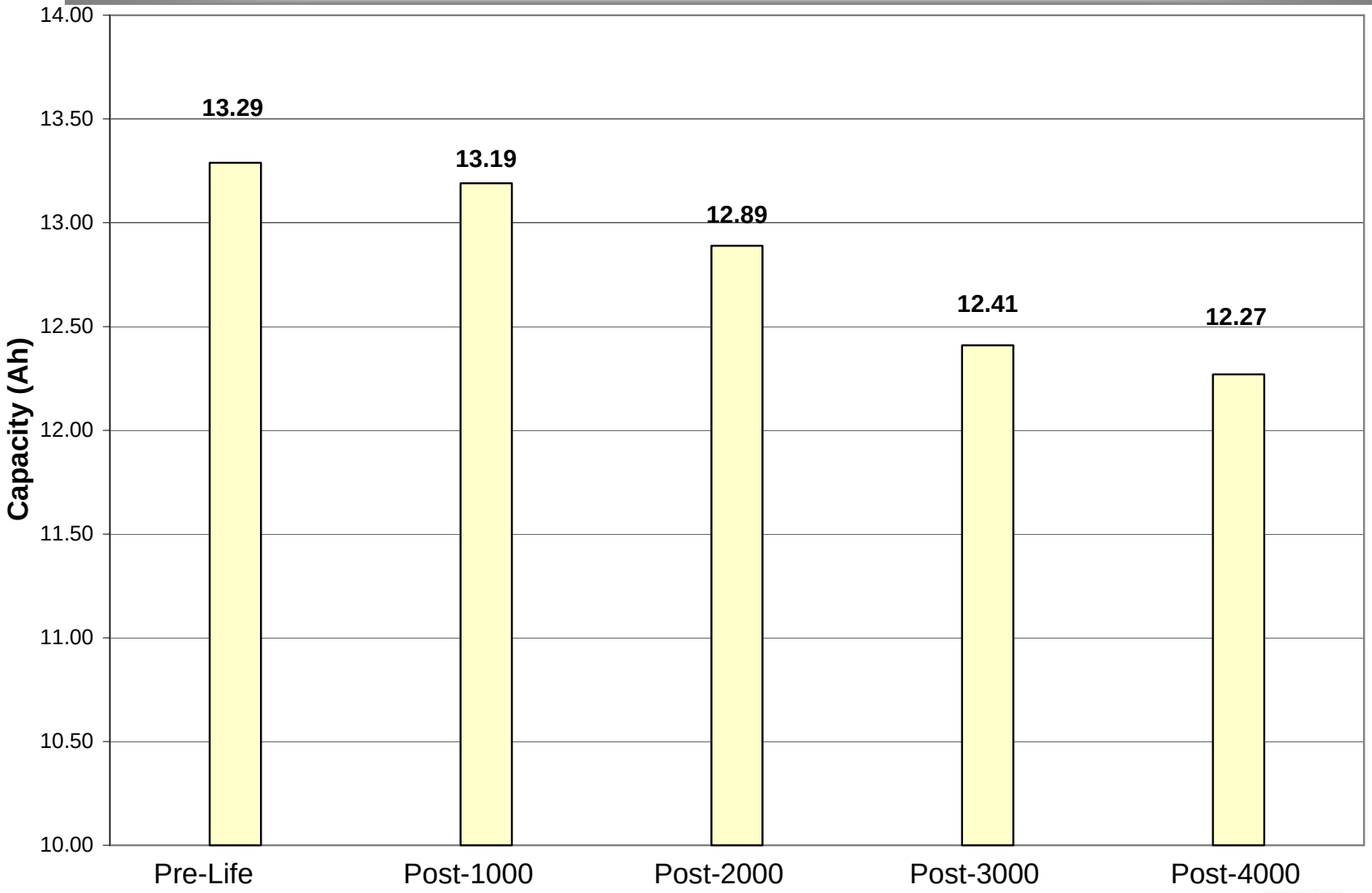


12-2 Cell-Level Capacity Check

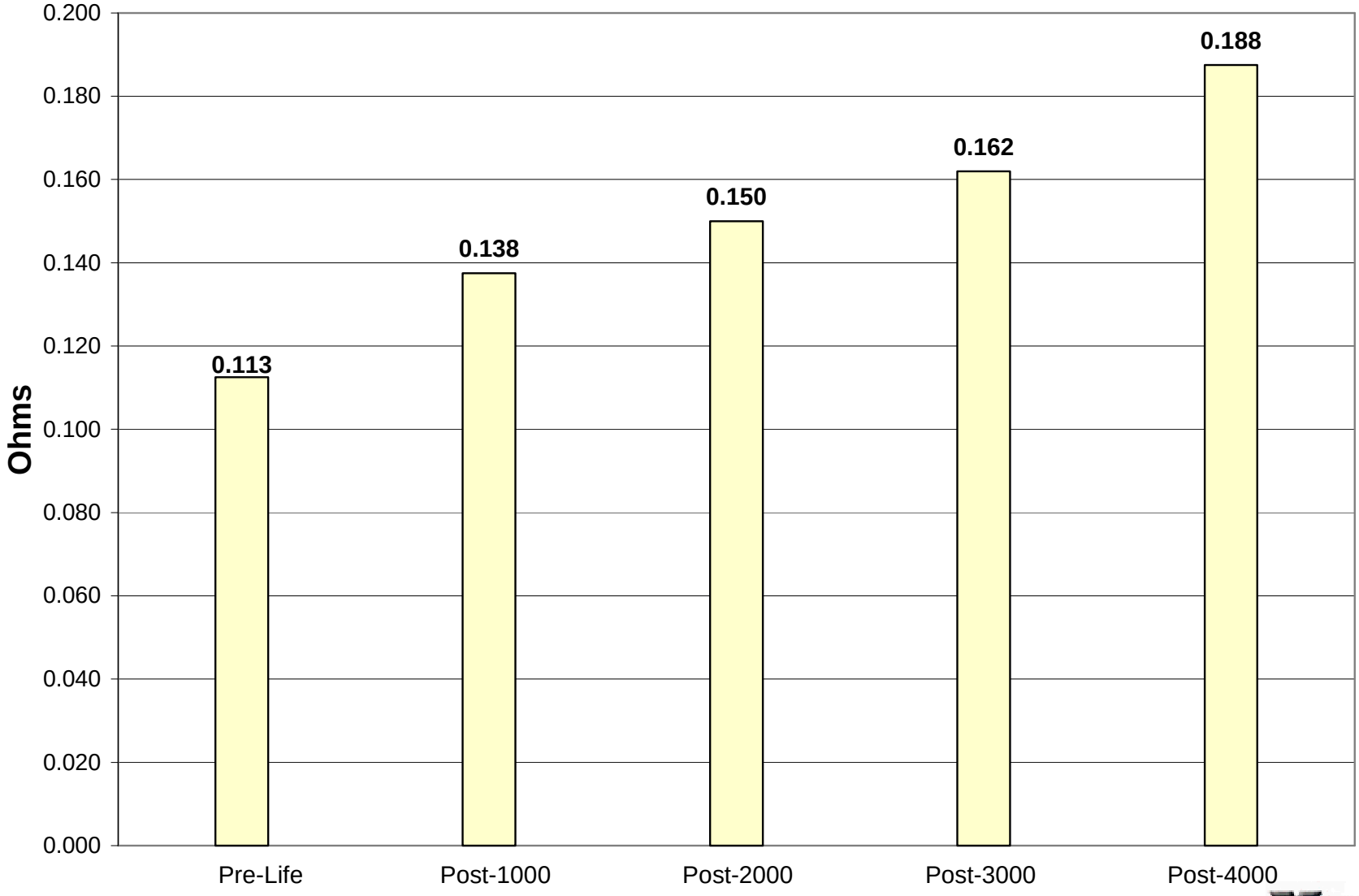
12-2 Cell-level DC Resistance



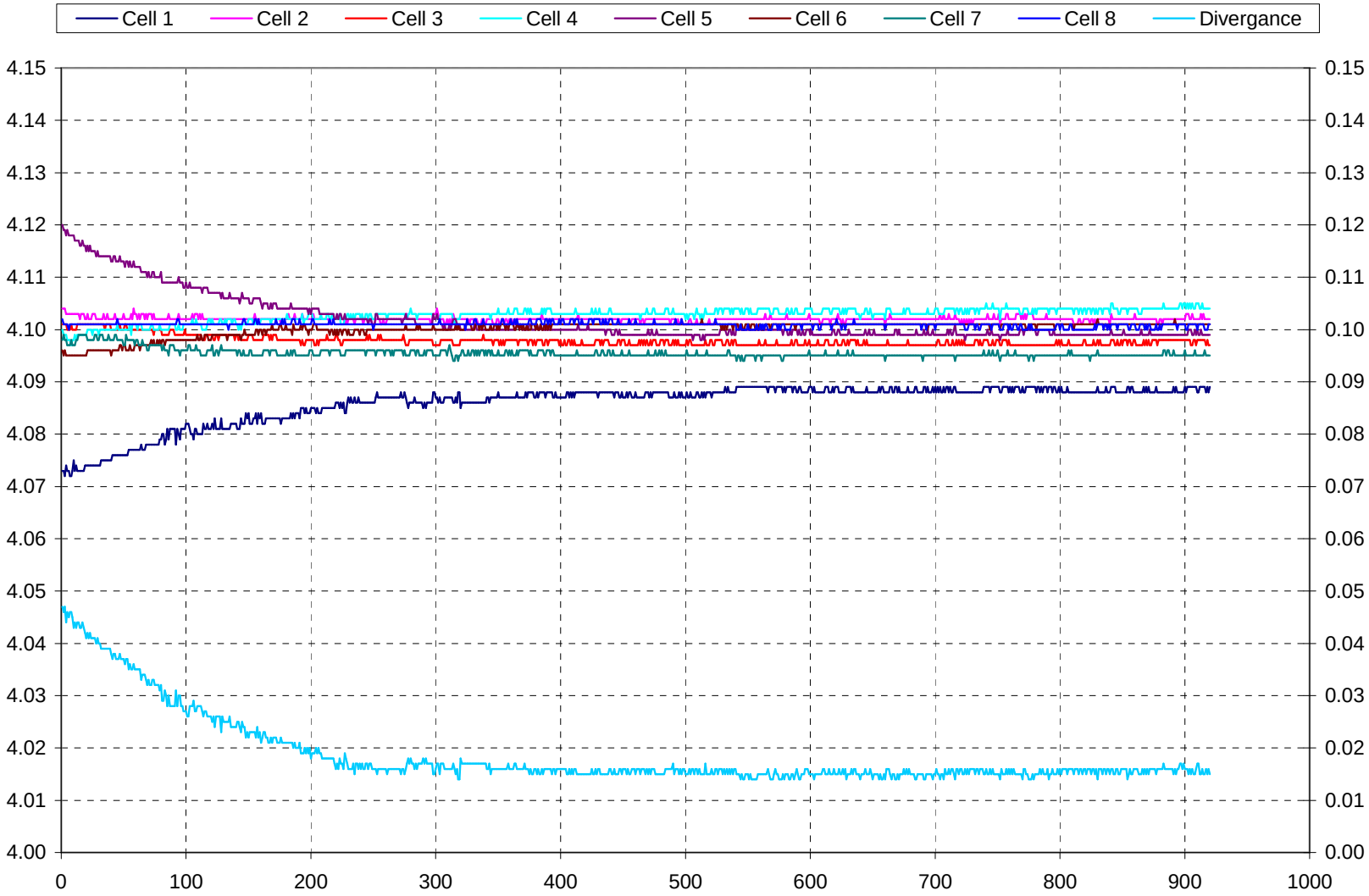
HV003 Post-4000 Cycle Capacity Check



HV003 Post-4000 Cycle DC Resistance



LV005 Divergence Testing



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The END

Thank you,