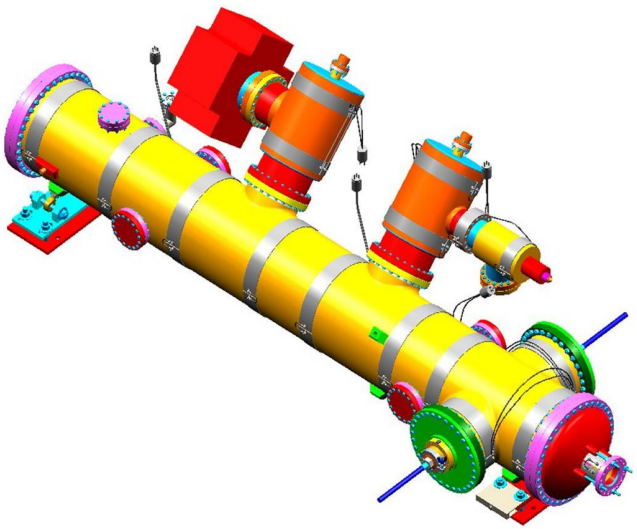
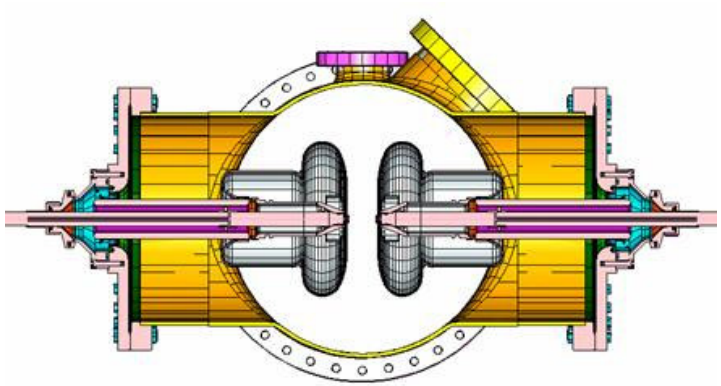
Conditioning tests at MP-9

- Tevatron Separator breakdown history
- Conditioning test facility at MP-9
- Separator R@D:
  - conditioning tests up to 180kV
  - hand/electro polish stainless steel plates
  - titanium plates
- Plans

TeV Separator Spark history



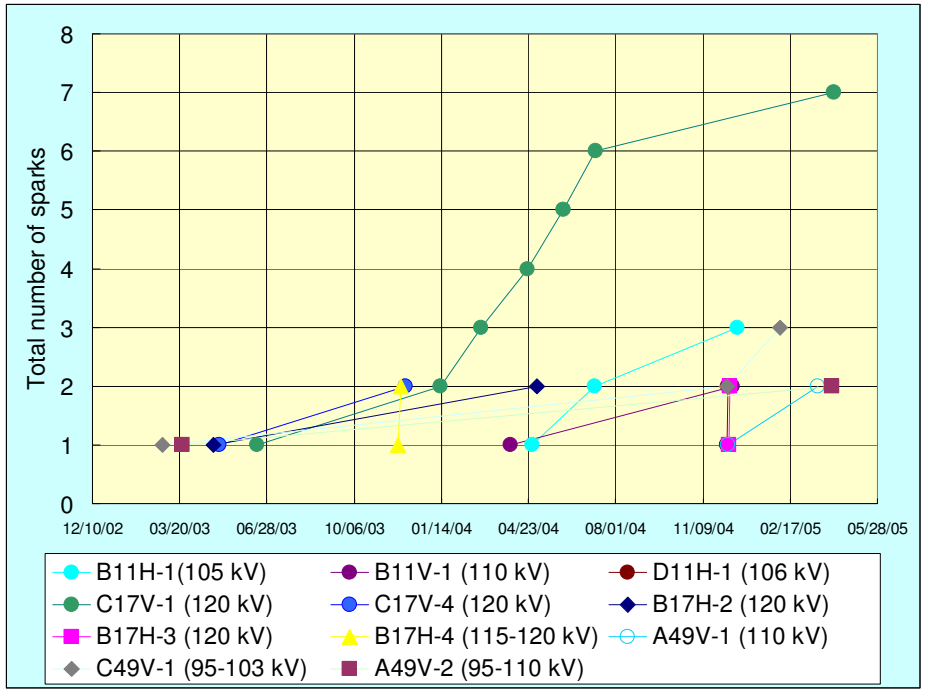


Electrode length – 101.25”
Electrode gap – 50 mm
Maximum voltages – up to 120 kV / plate)

There are 22 beam separators in the Tevatron main ring

Fermi news:

… Tev separator sparked and kicked out the last bunch…
… C17 separator started sparking…
… TeV vertical separator sparked 3 times…
…. store 4078 quenched due to separator spark…
…. separator sparks caused loss of luminosity and then…

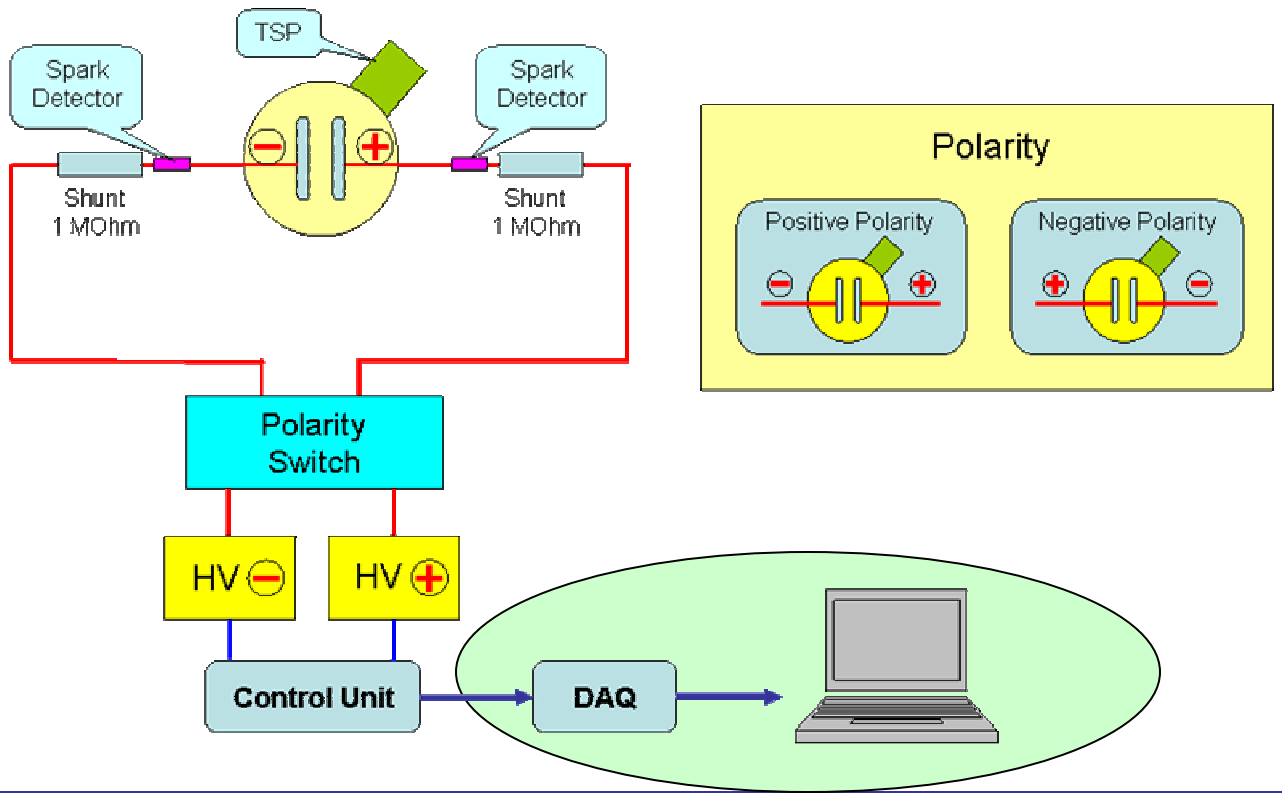


Conditioning Test Facility at MP-9

New factory (clean room, baking oven, conditioning cave) was constructed at MP-9 for building beam separators (BTeV project).

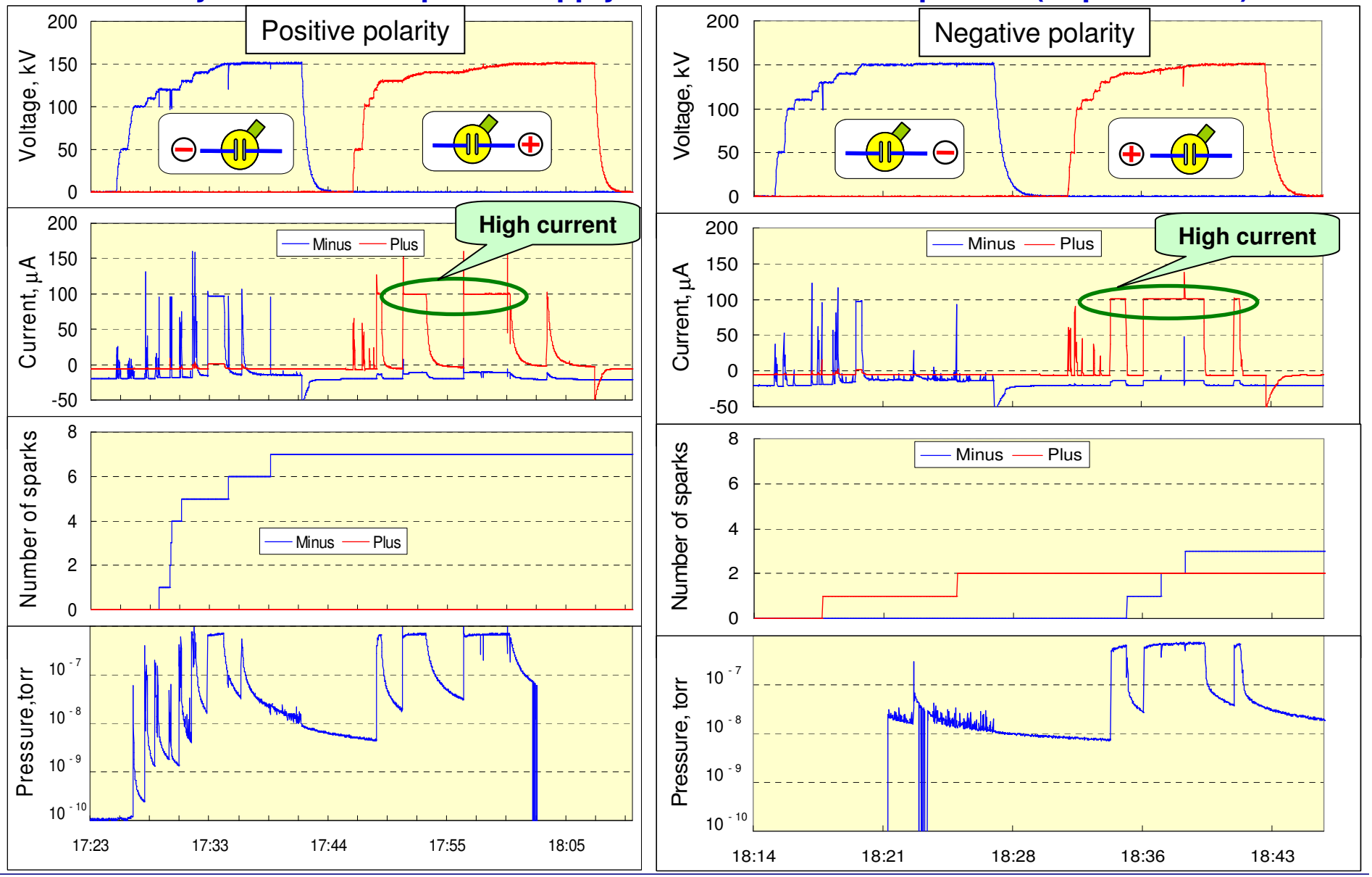
R&D is being done to improve separator performance and reliability.
Tests new electrode materials, conditioning procedure
Goals: 1 spark/year at 150 kV/plate (60 kV/cm)

Measuring scheme

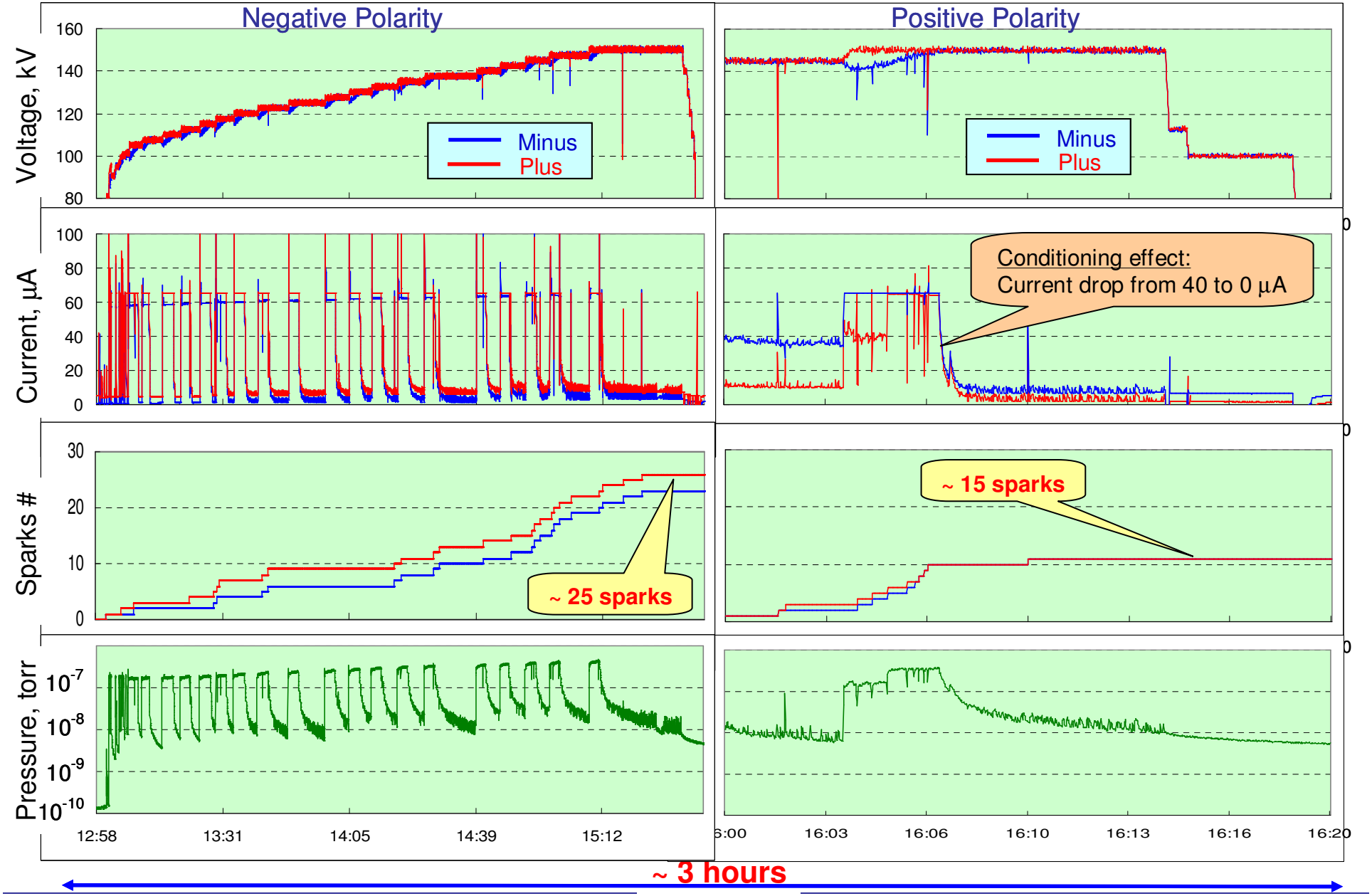


DAQ System for Conditioning Tests

Only one + or - HV power supply connected to the separator (Separator # 8)

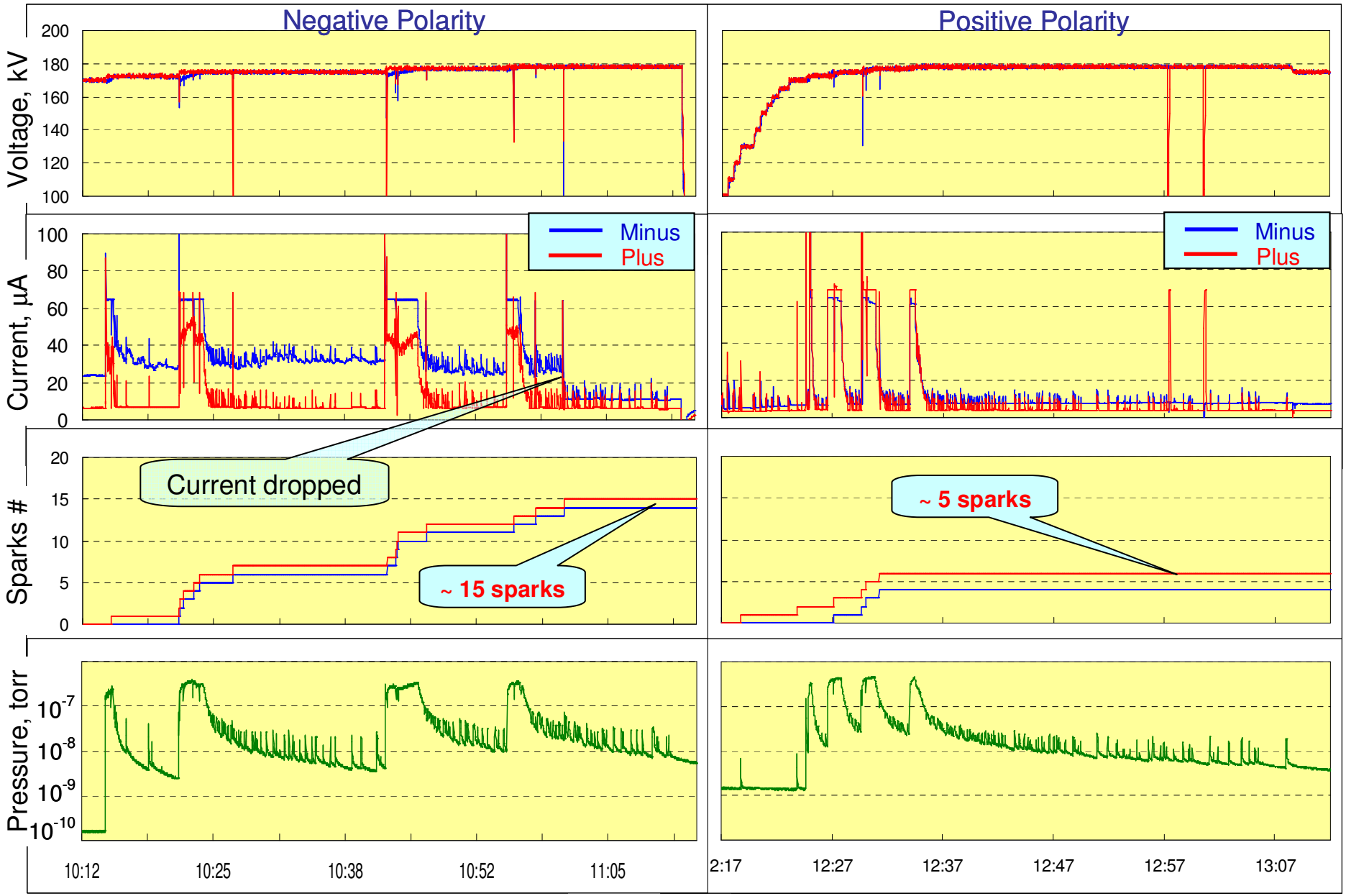


Separator # 28: Conditioning up to 150 kV



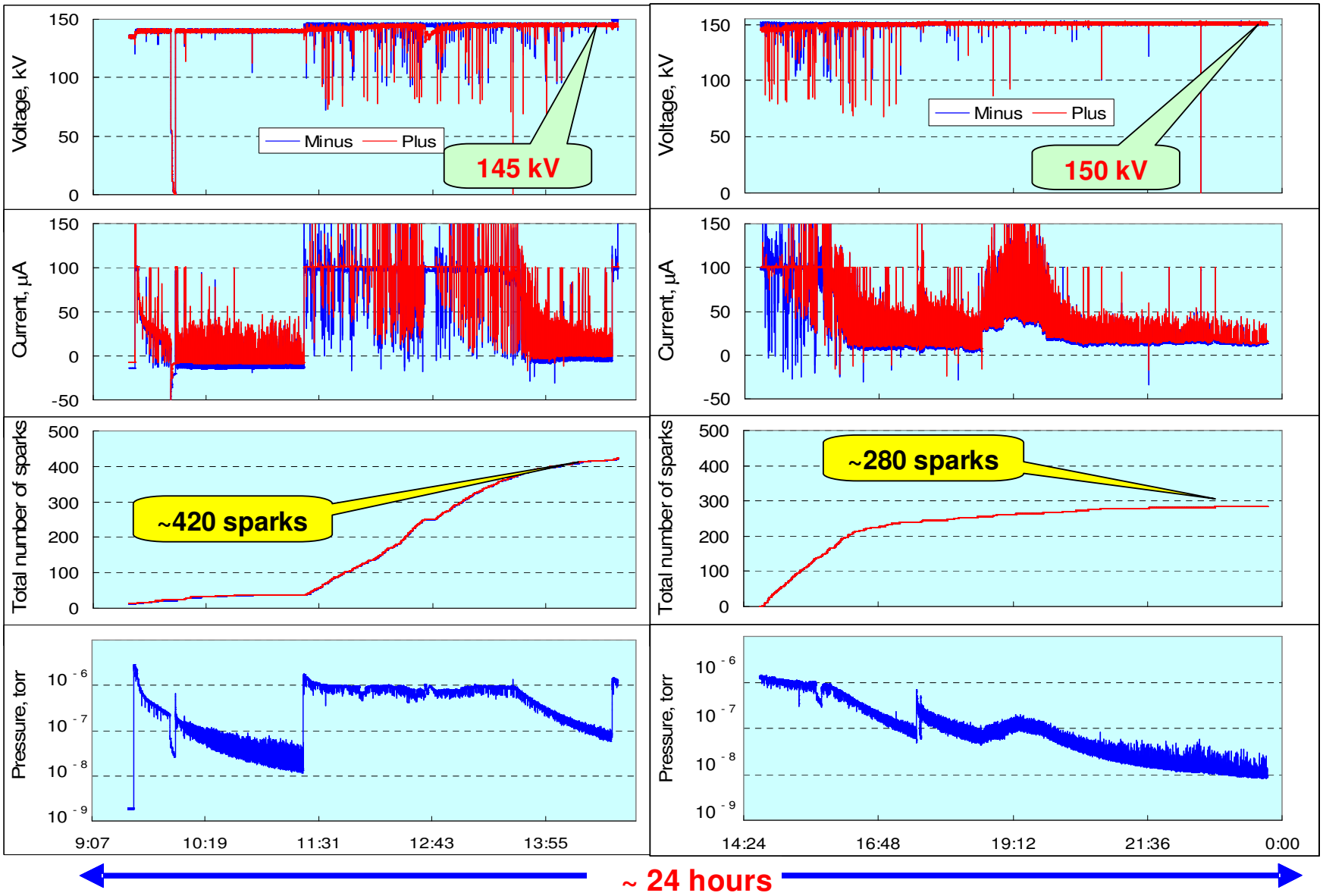
~ 3 hours

Conditioning at 171- 178 kV (Positive Polarity)

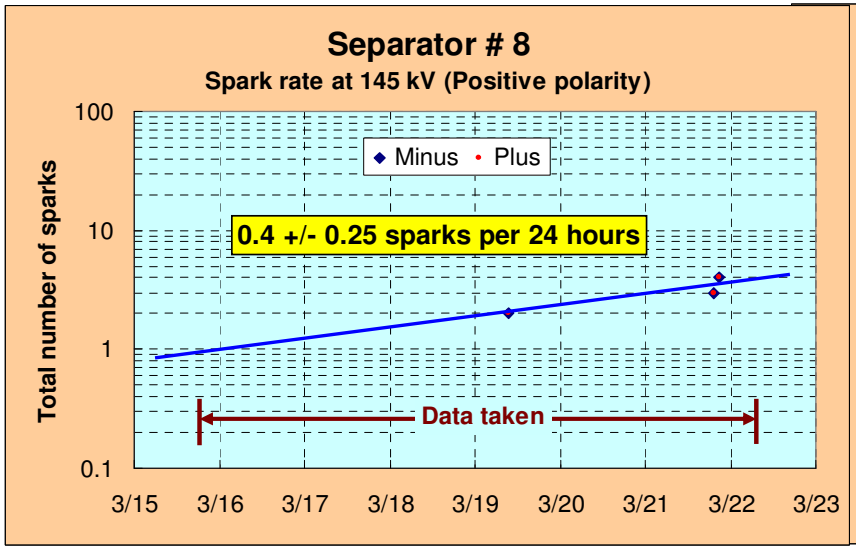


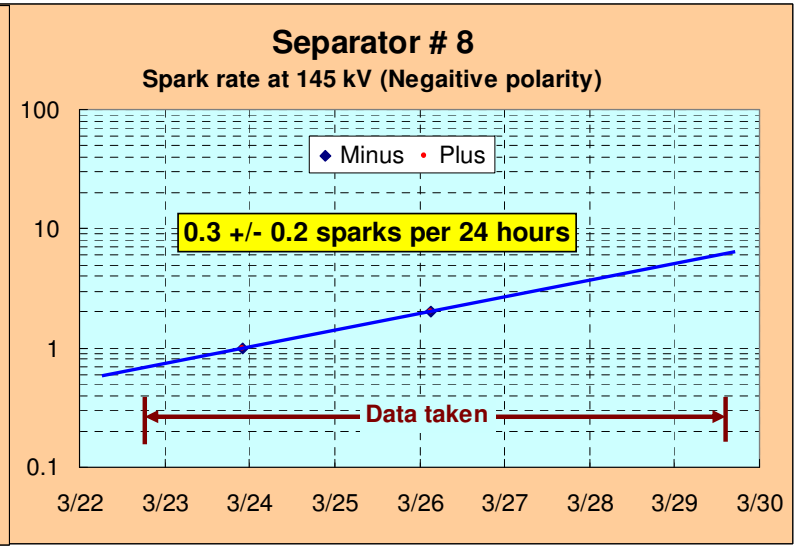
~ 2 hours

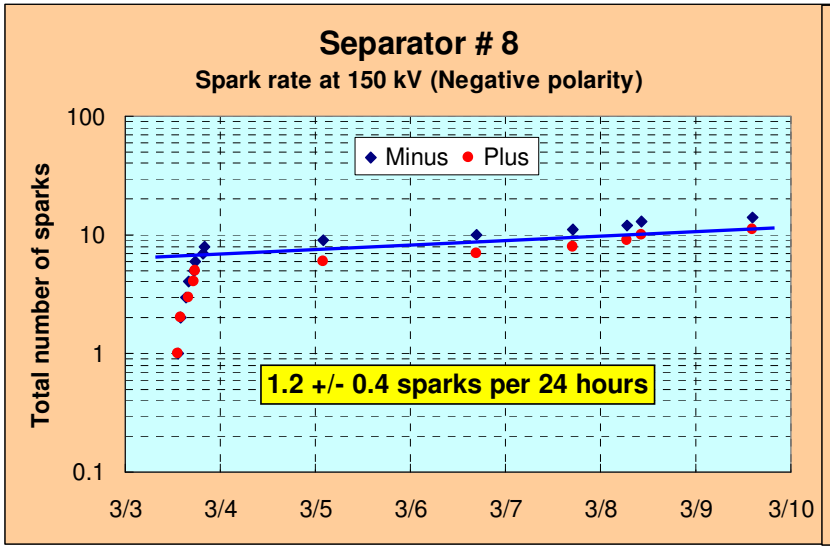
Separator # 8 Conditioning at 135-150 kV

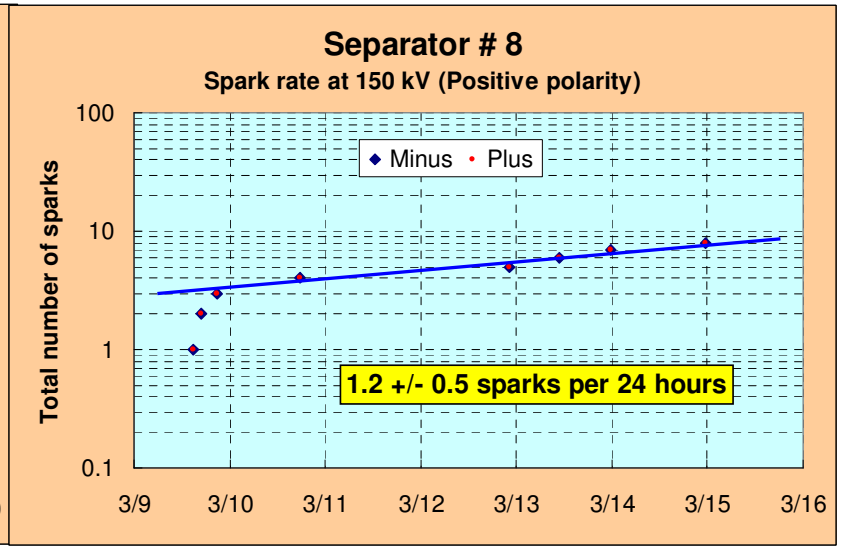


Spark Rate for Separator # 8





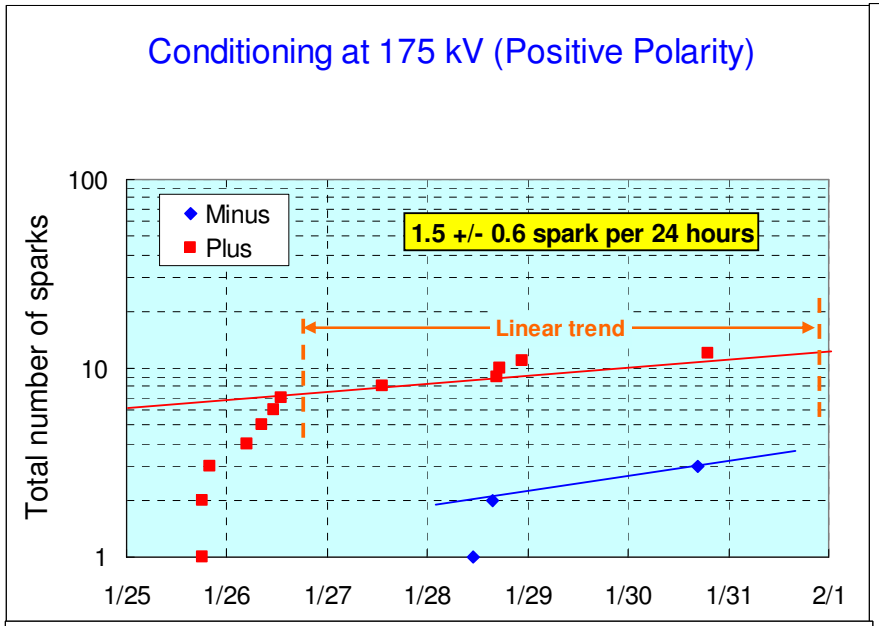


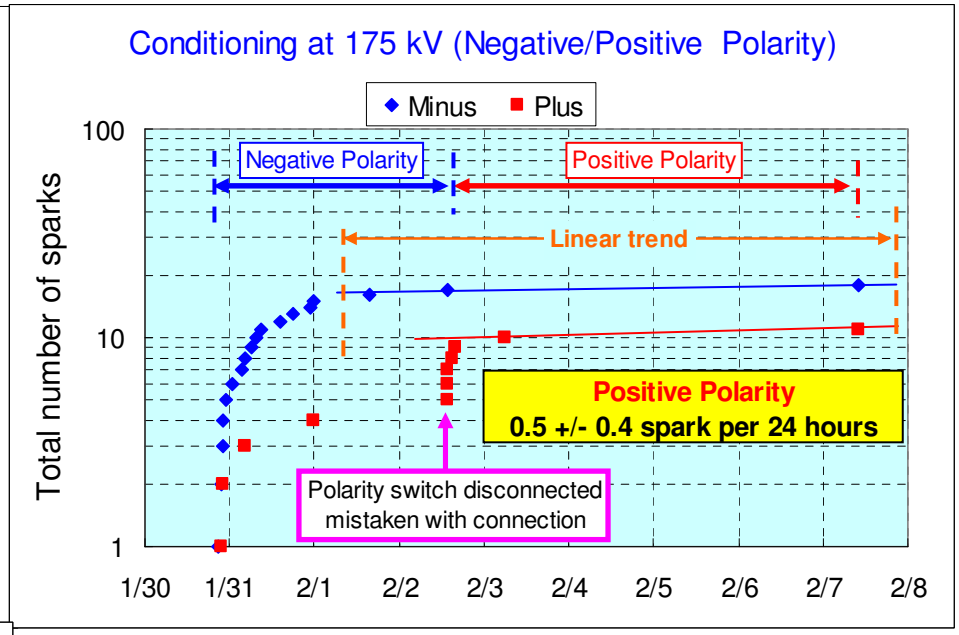


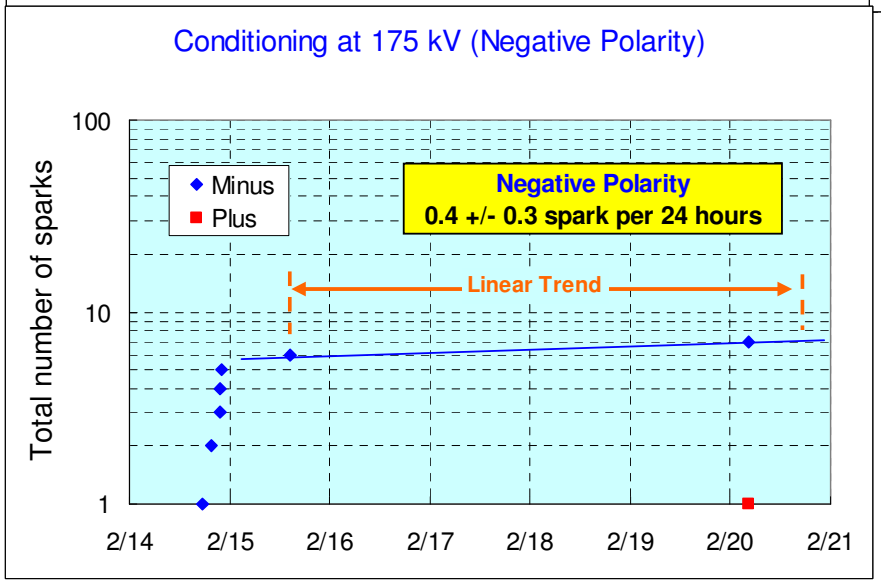
Spark rate:

- 0.3 spark/ 24 hour at 145kV
- 1.2 spark/ 24 hour at 150 kV

Spark Rate for Separator # 28







Spark rate at 175 kV:

Positive Polarity:

- **0.4 +/- 0.3 sparks/ 24 hours**

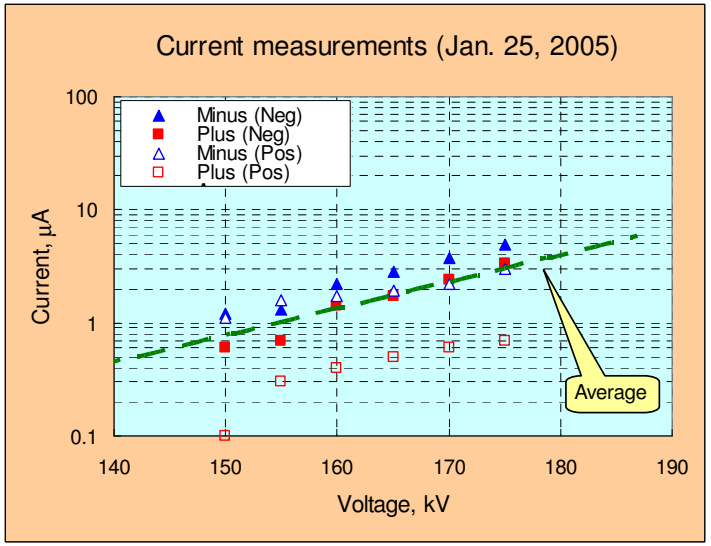
Negative Polarity:

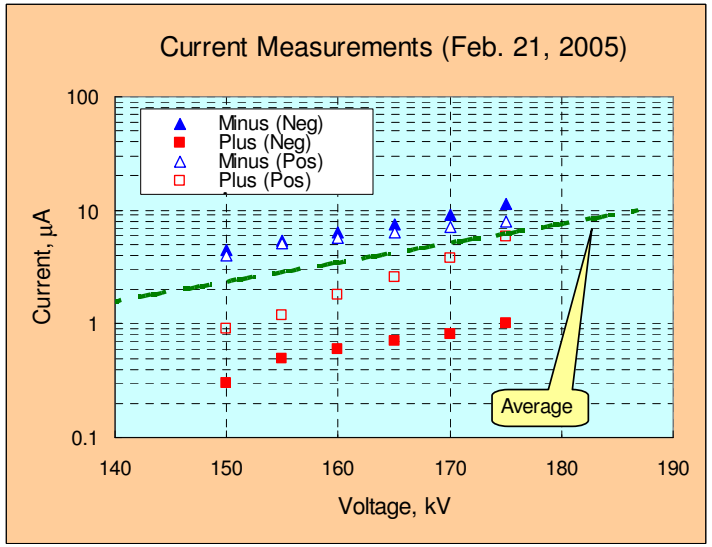
- **0.3 +/- 0.2 sparks /24 hours**

No sparks were detected at 170kV (positive polarity) for 7 days measurements

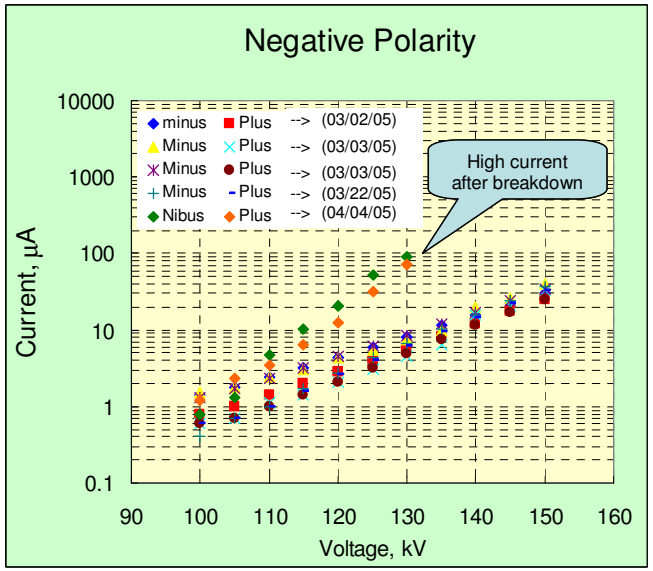
Separator Dark current

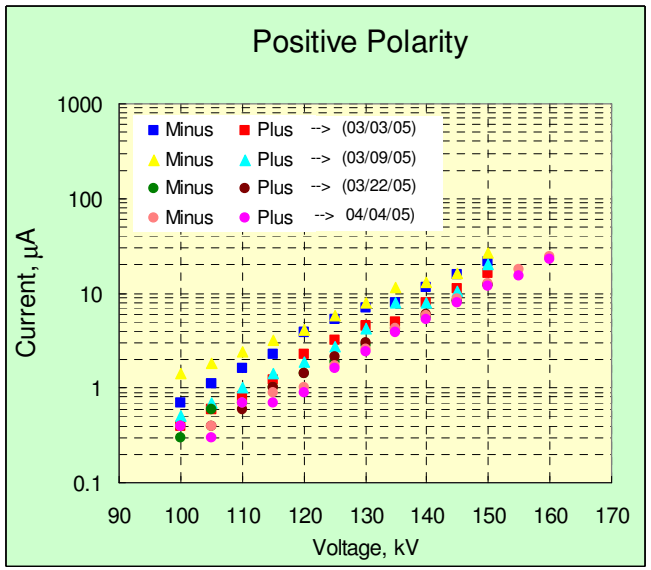
Separator # 28



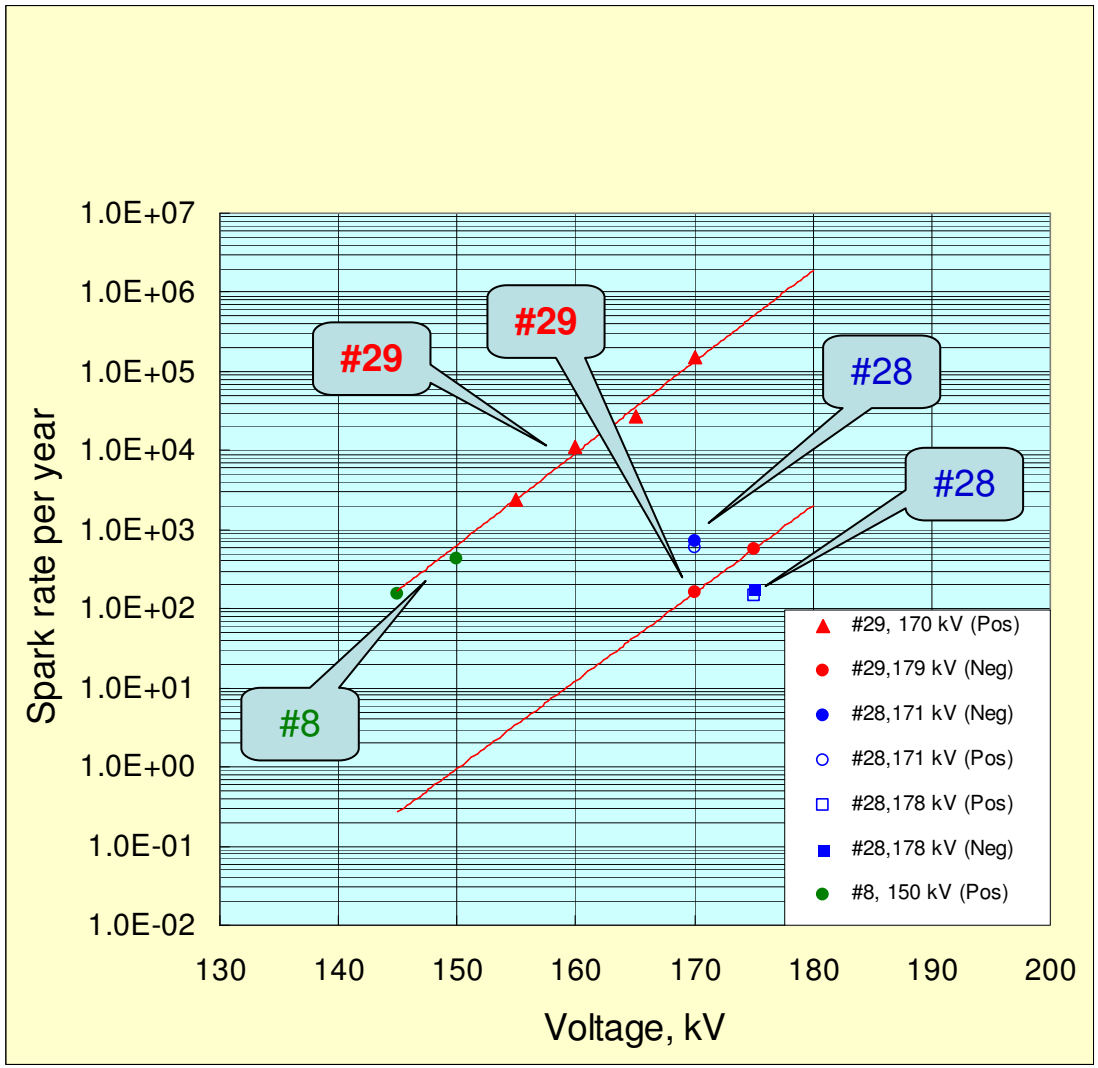


Separator # 8



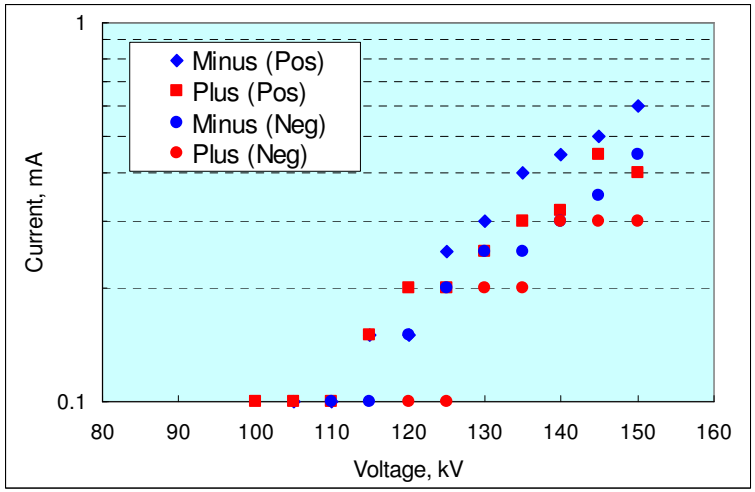


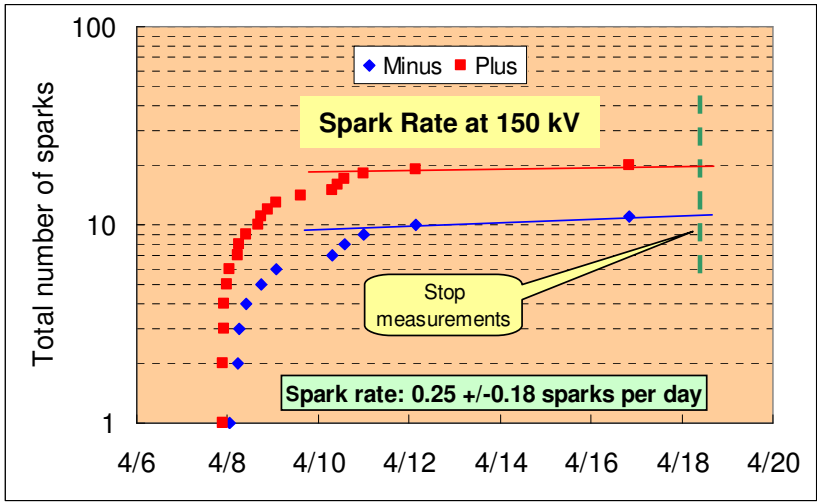
Spark Rate Summary



New Materials for Electrodes

Separator # 6 with Electro Polish Plates

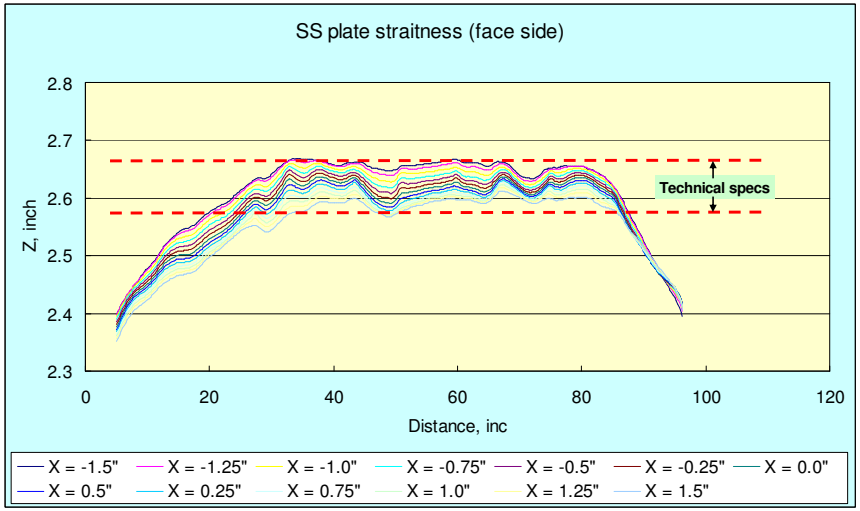




Current at 150 kV is about 0.5 μA at both polarities

Low spark rate ~ 0.25 spark/24 hours

Titanium Plates



Summary

Separator conditioning test status:

- # 28 passed test, conditioning up to 180 kV
- # 8 and # 29 failed (breakdown problems)
- # 6 under conditioning tests

Plans:

- # 29 reassembled and ready for conditioning
- # 8 will be reassembled with new electro polish plates
- # 4 and # 27 – reconditioning at higher HV

Conditioning tests is planning to complete in Sept-Oct. 2005