

Minimizing Conductivity Variation in Bleached Stock to Paper Machine

Spring 2019 PAPTAC Bleach Committee Meeting
Guy Normandeau, Michael Doucet

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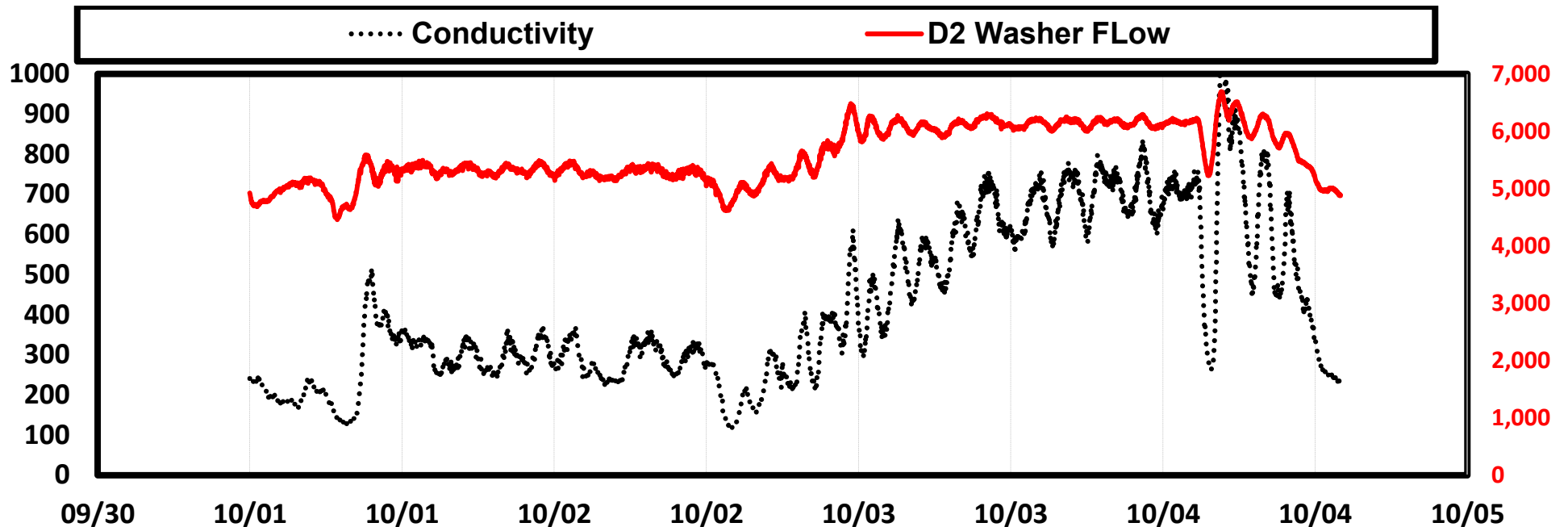
Agenda

- Problem/Trial
- MPC Control
- Constant Production Comparison
- Rate Change Comparison
- Uptime
- DCS/MACS Comparison

Problem

Conductivity swings were causing issues with white water chemistry and increasing the instability of additive addition.

- We noticed that it was related to the variation in flow rate to their D2 washer

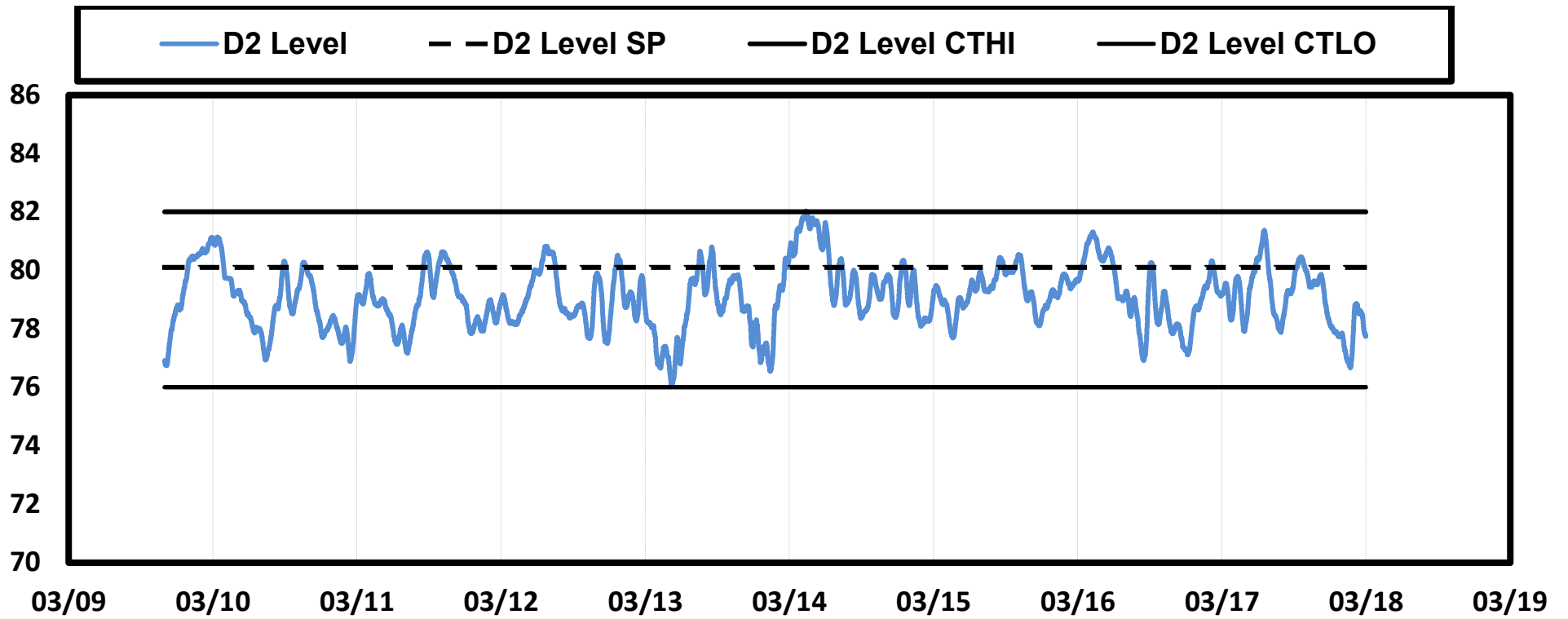


Trial

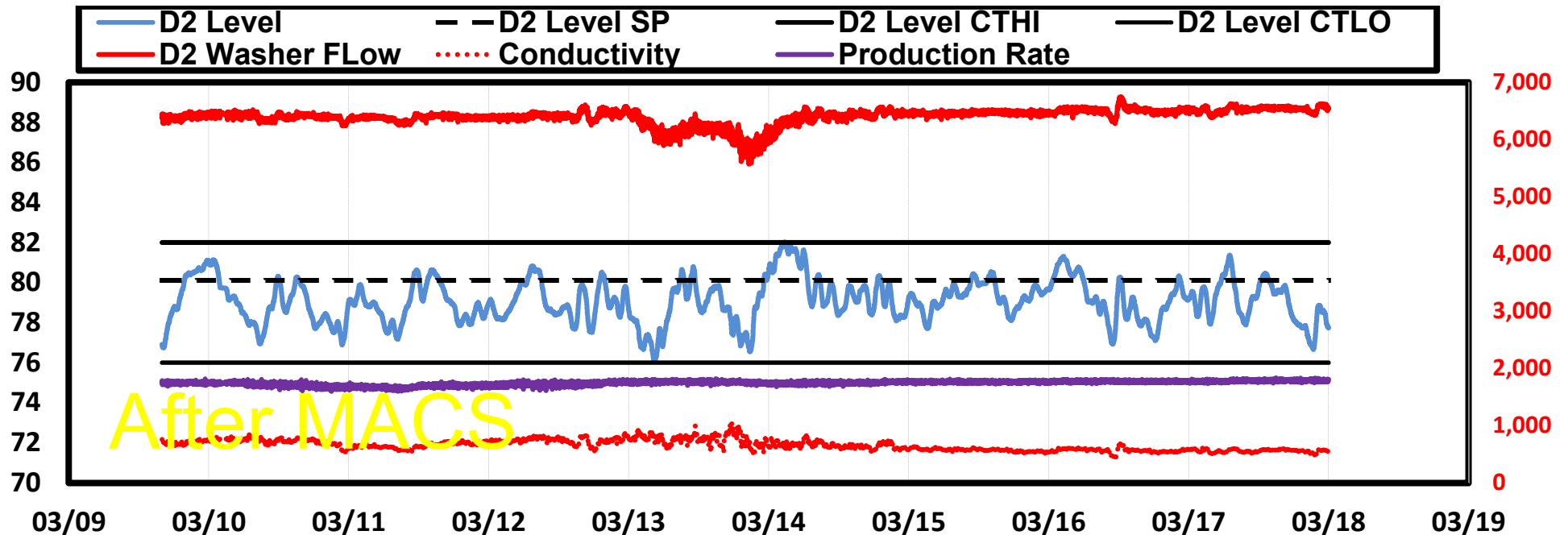
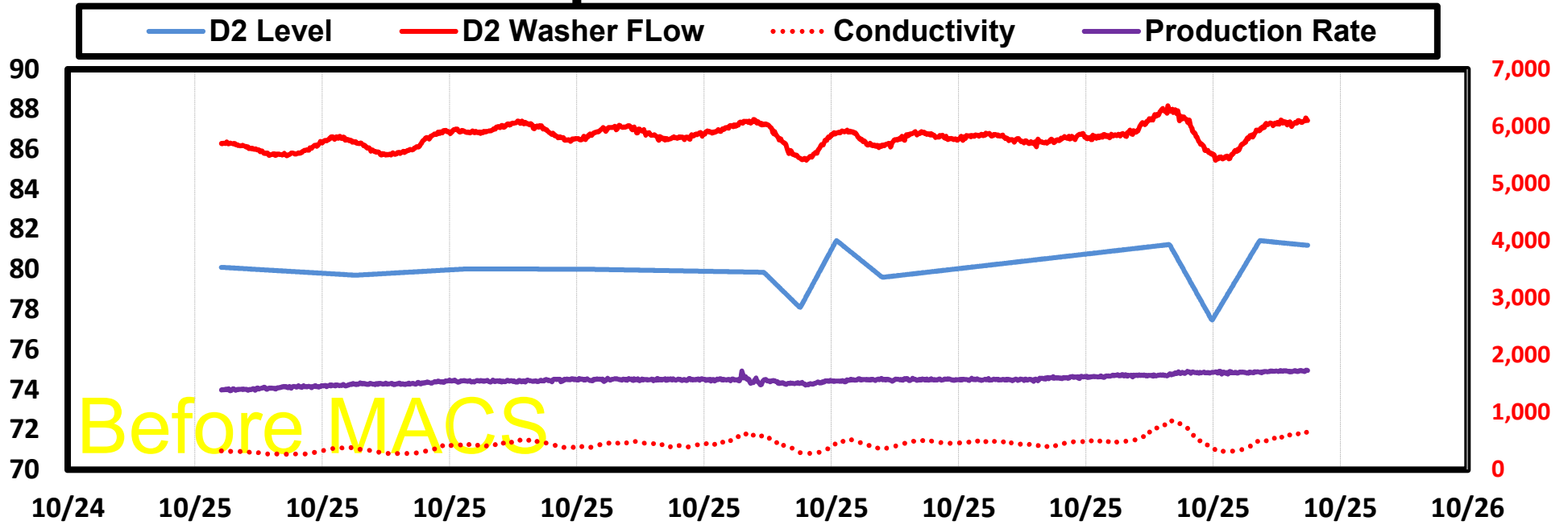
Stabilize D2 flow rate to reduce conductivity variation

- MPC solution allows more movement in D2 tower level to reduce variation in washer feed flow
 - Control Variable: D2 Tower Level
 - Constraint Variable: D2 Tower Level
 - Manipulated Variable: D2 Flow Rate

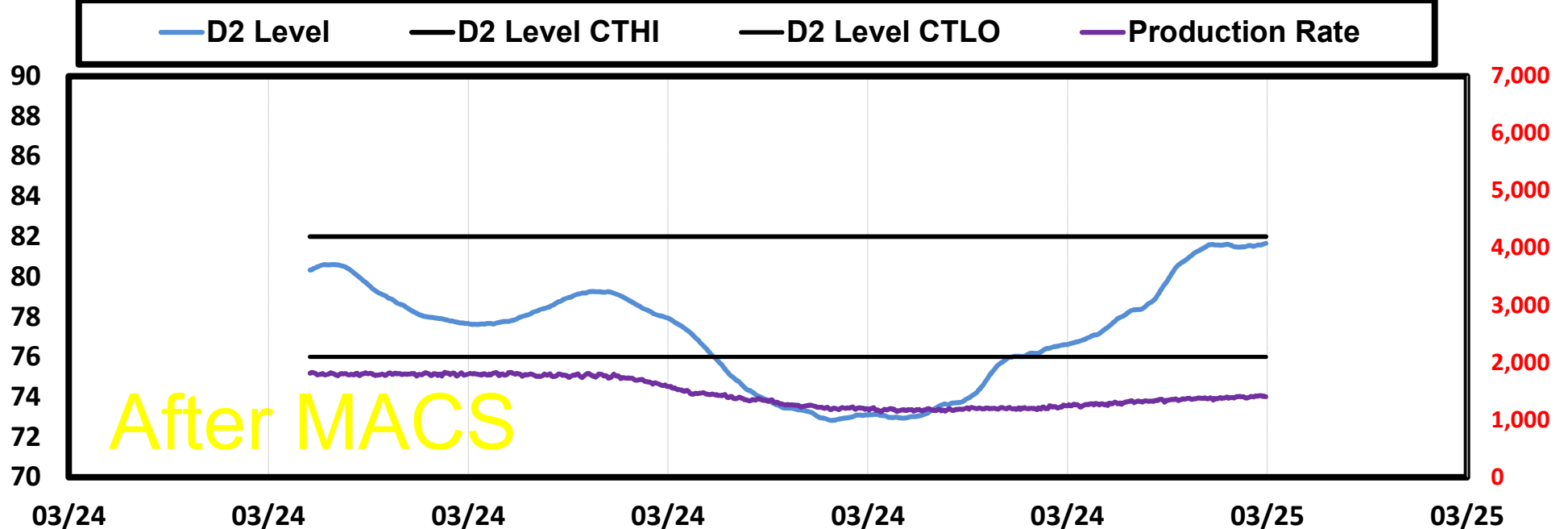
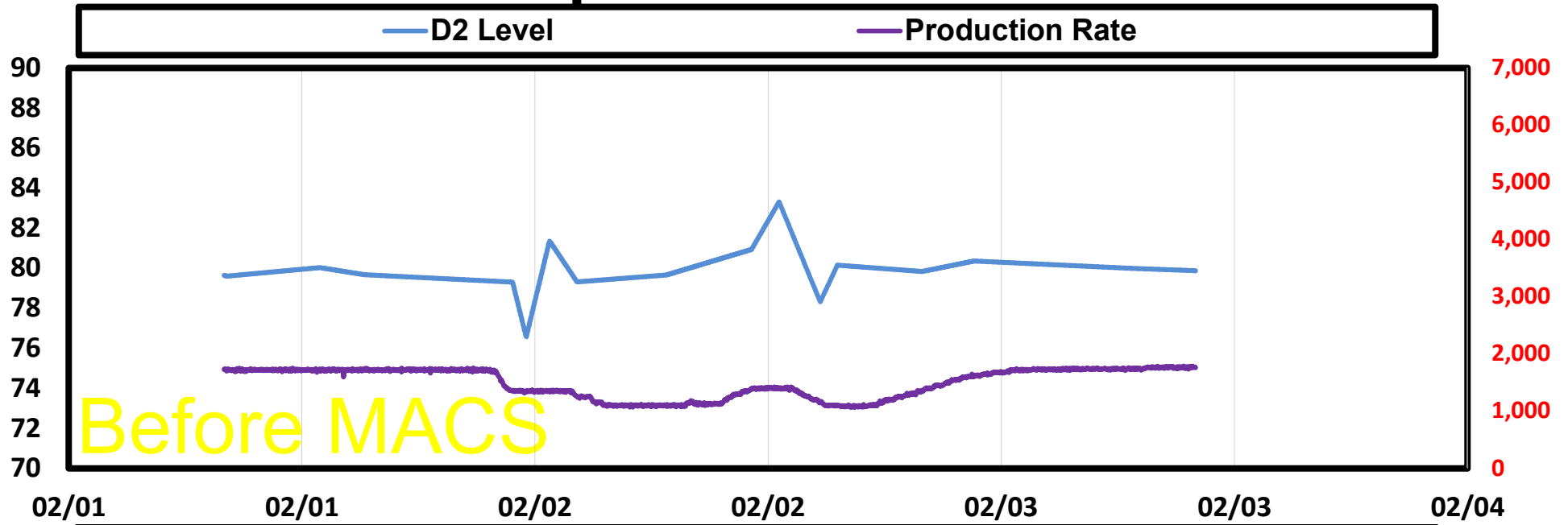
MACS - MPC control



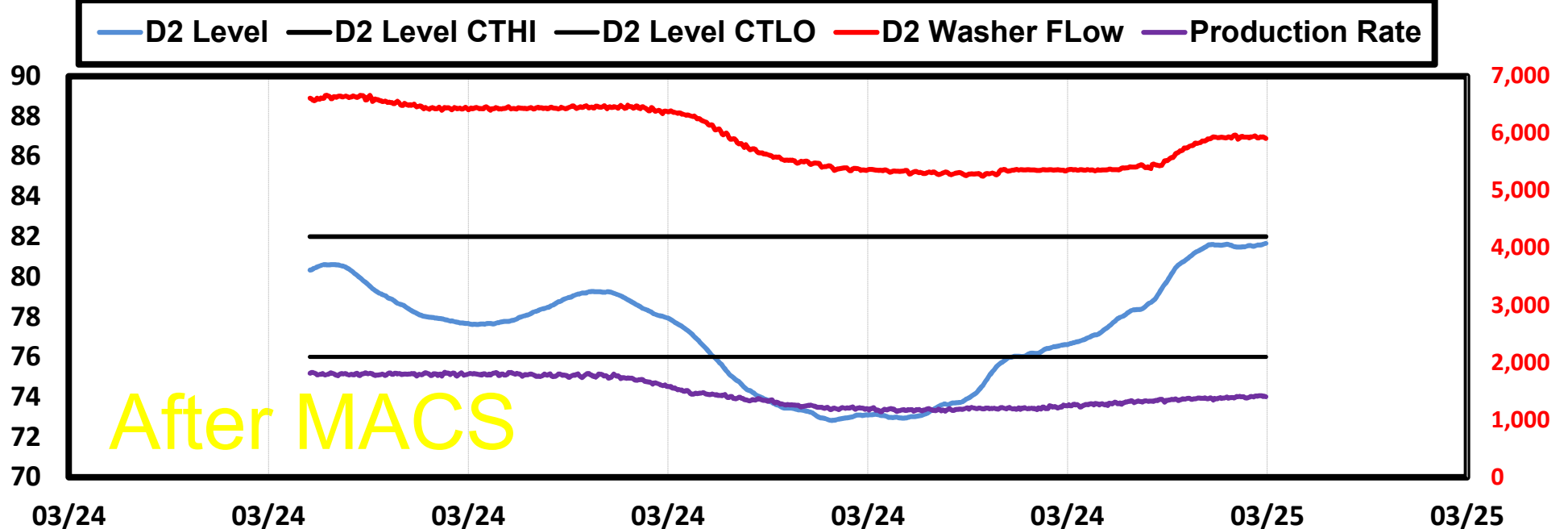
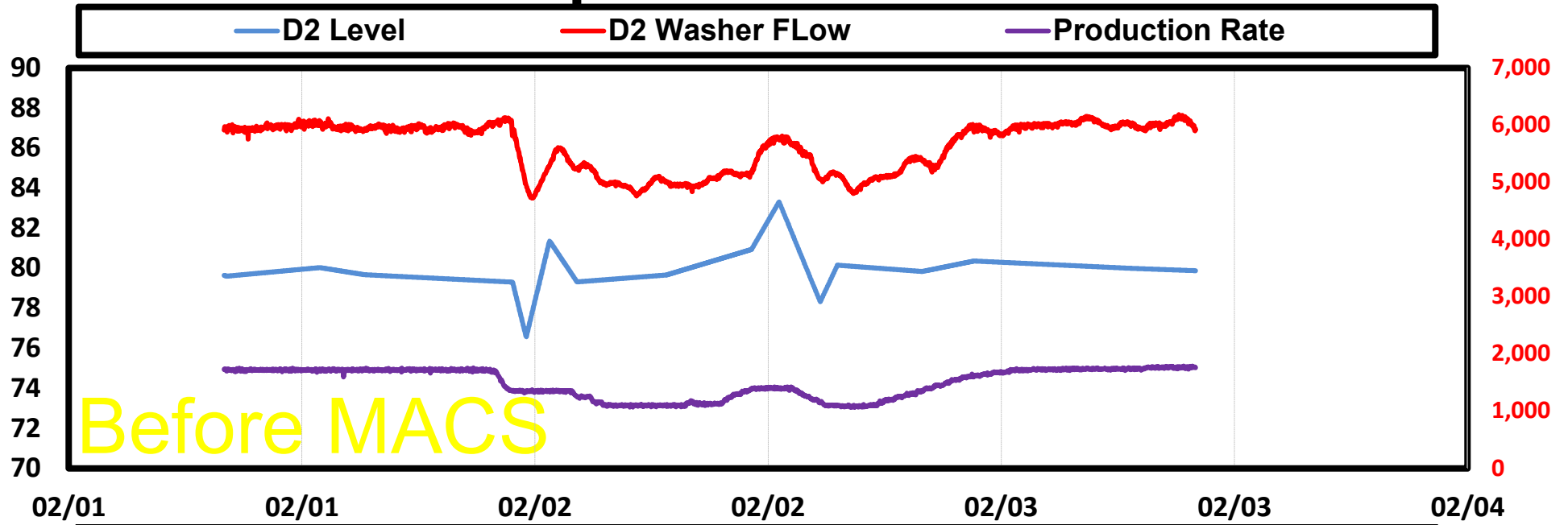
BTG/DCS Comparison Constant Production



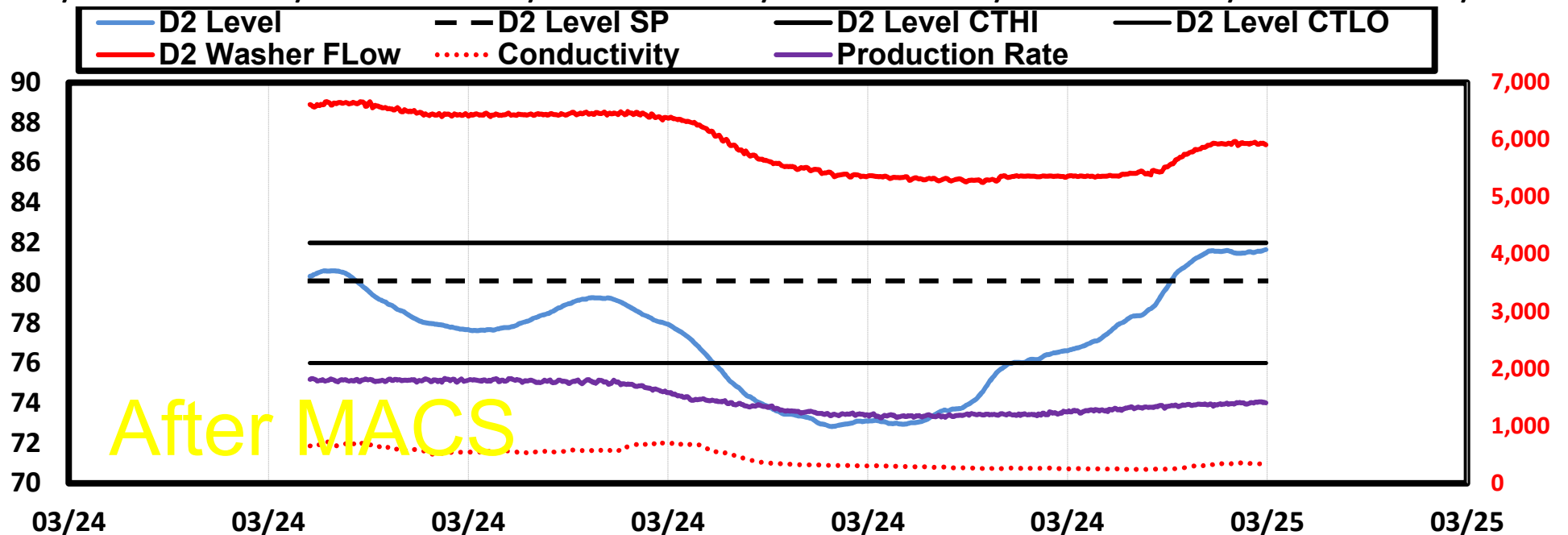
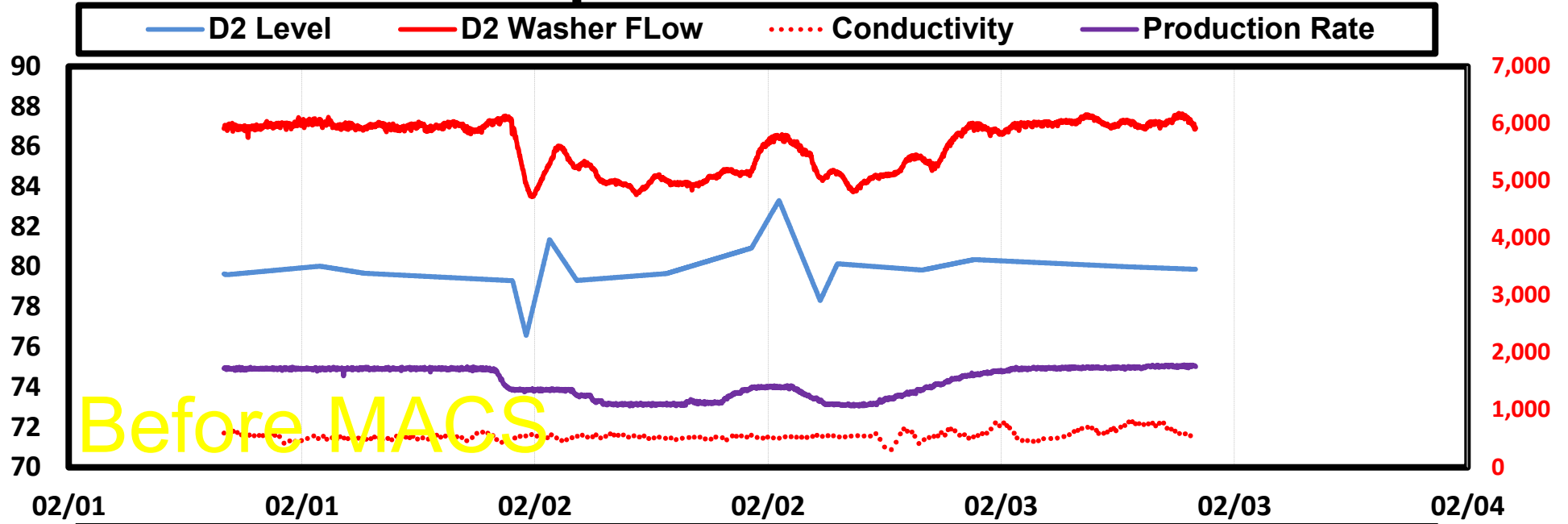
BTG/DCS Comparison – Level



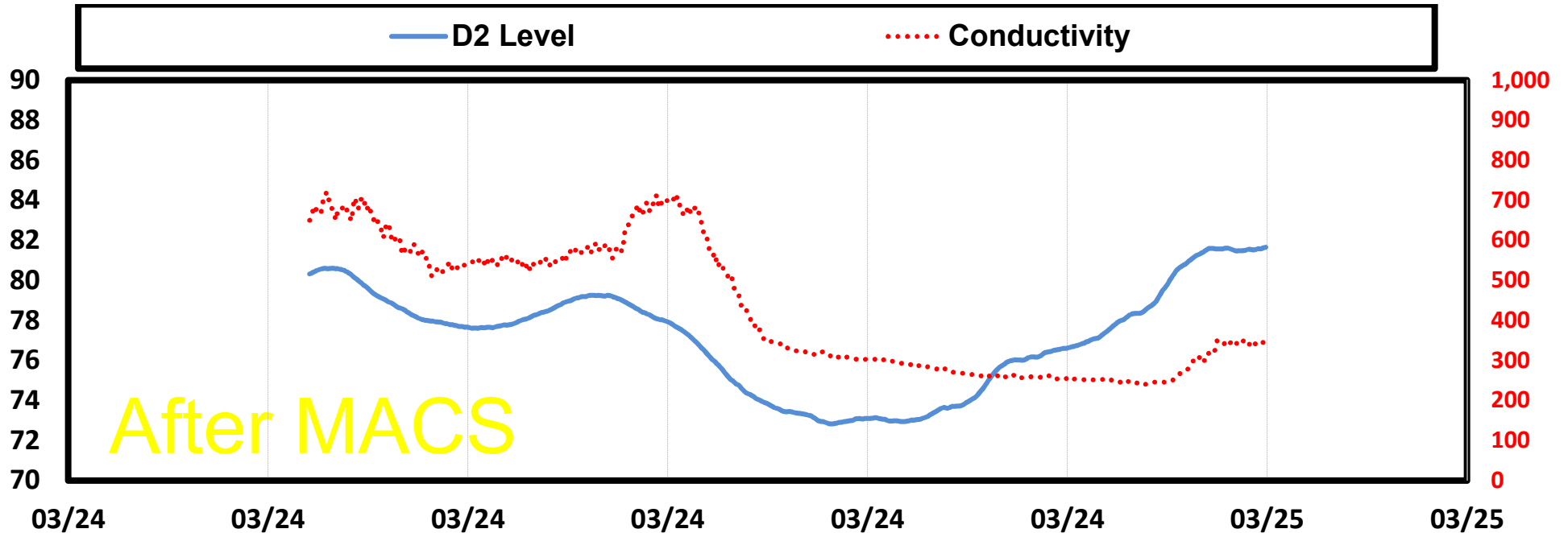
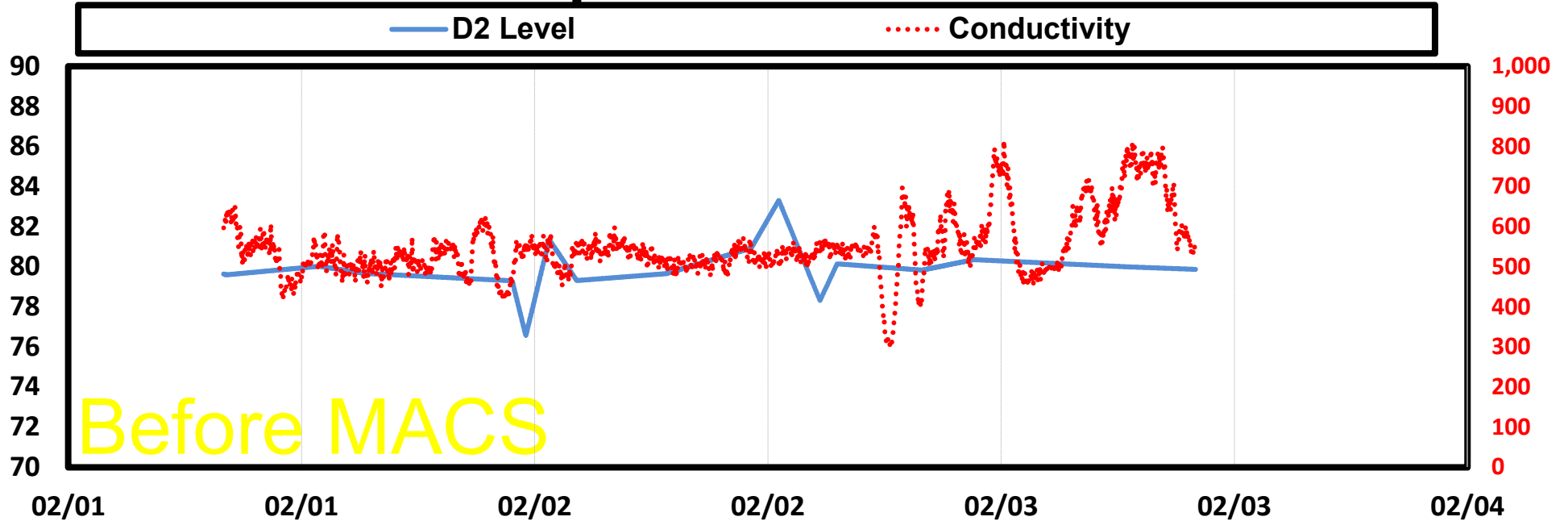
BTG/DCS Comparison – Level + Flow



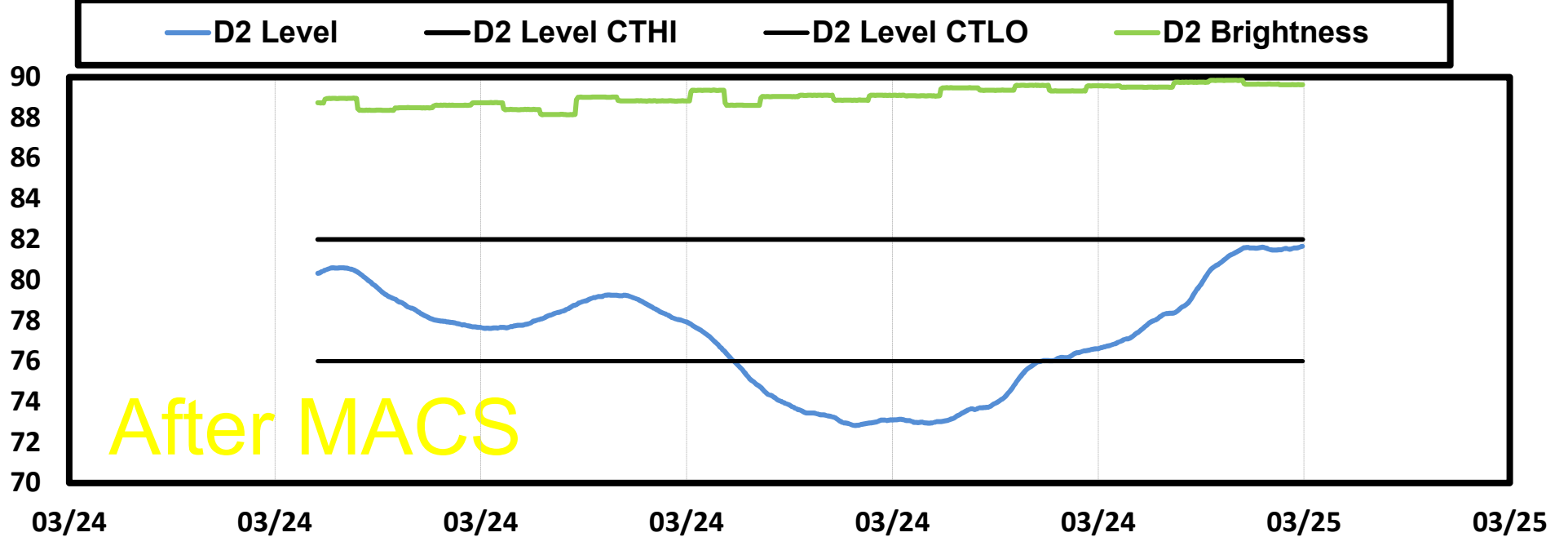
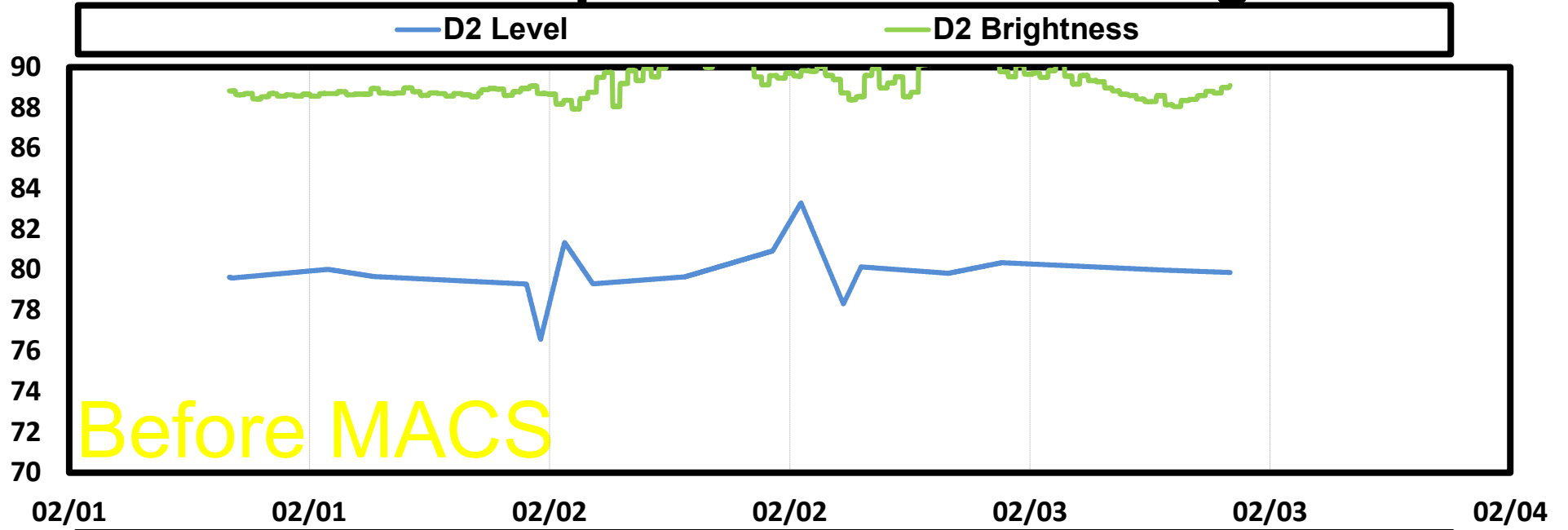
BTG/DCS Comparison – Level+ Flow + Cond



BTG/DCS Comparison – Level + Cond



BTG/DCS Comparison – Level + Brightness



Uptime

Uptime increased quickly as operators became used to the new control

Values	Dec - 18	Jan - 19	Feb - 19	Mar - 19	
Average of Uptime		47%	63%	82%	99%

Flow and Conductivity

We see a 40 to 50% reduction in conductivity and flow variability

Values	Dec 2018 - March 2019
StdDev of Conductivity, MACS OFF	214
StdDev of Conductivity, MACS ON	126
StdDev of Flow, MACS OFF	666
StdDev of Flow, MACS ON	281

Brightness

Brightness variability dropped as well

Values	Dec 2018 - March 2019
StdDev of D2 Bright, MACS OFF	1.26
StdDev of D2 Bright, MACS ON	0.56
StdDev of E2 Bright, MACS OFF	2.02
StdDev of E2 Bright, MACS ON	0.97

Conclusions

- With change in level of D2 tower we expected to negatively impact brightness, but more consistent washer flow lead to brightness variability reduction!
 - Conductivity variability was reduced in half!
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