



Control of the Extraction Stage Using the True Terminal pH

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Agenda

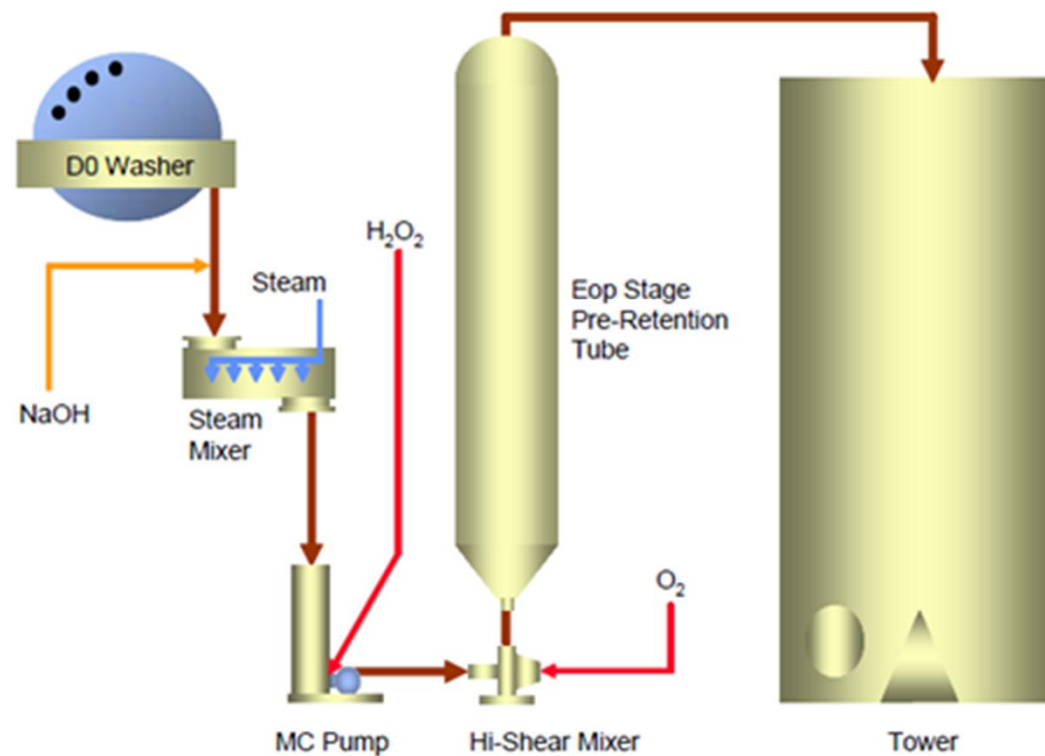
- Introduction
- Measuring pH
 - Manual
 - On-line
- Control Options
- Benefits

Objective

- The purpose of the extraction stage washer is two fold:
 1. solubilize and remove the organic material that was oxidized in the previous bleach stage and
 2. reactivation of the remaining lignin for further oxidation in the subsequent bleach stage
- Both functions directly impact the economics and efficiency of the subsequent bleaching stage.

Extraction Stage Layout

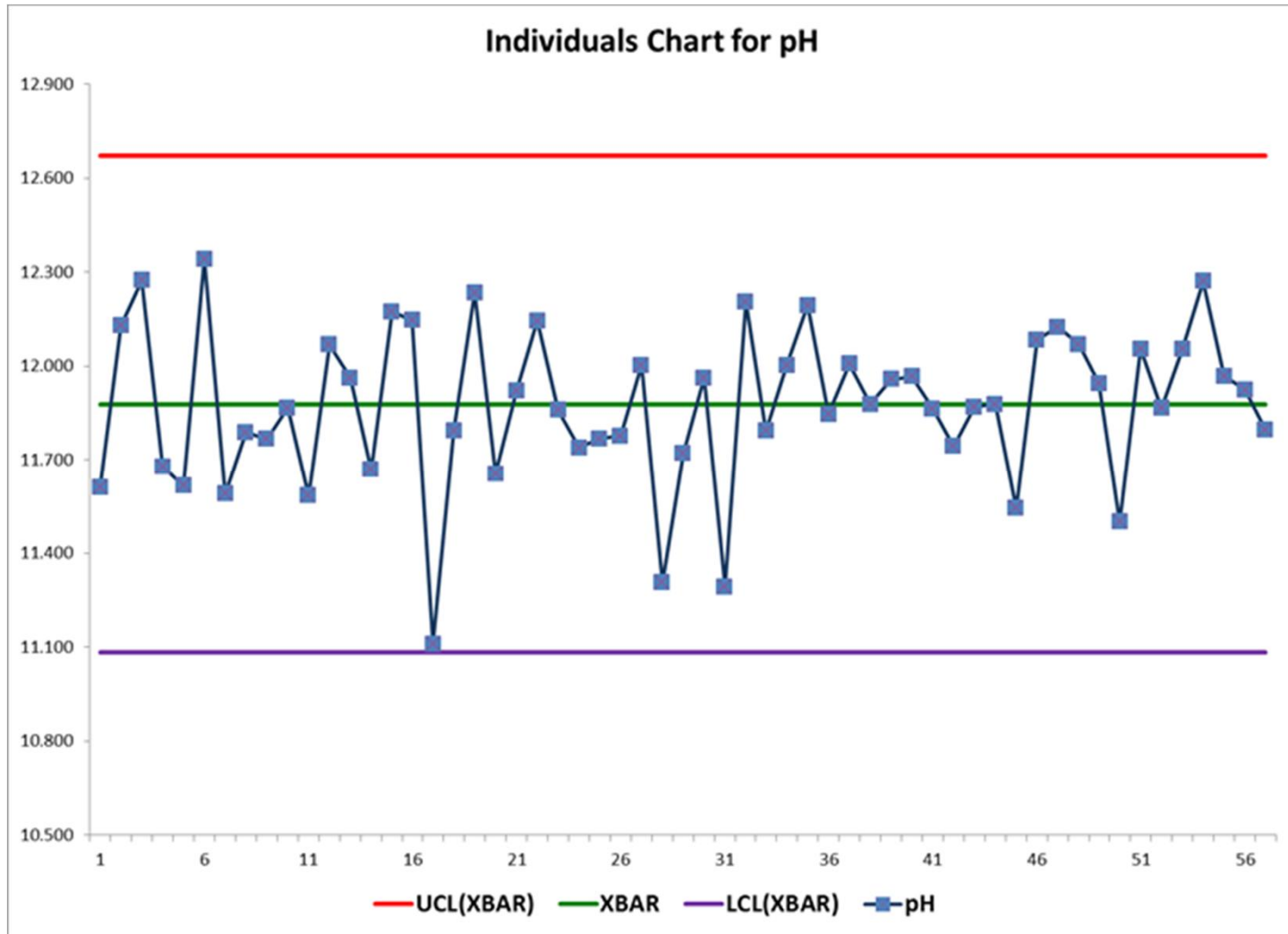
CHEMICAL ADDITION IN EOP CONFIGURATION



Measuring pH

- Where are you taking the sample?
- How do you prepare the sample?
- How are you processing the sample?
- Frequency of calibration of your pH probe
- Temperature Influences

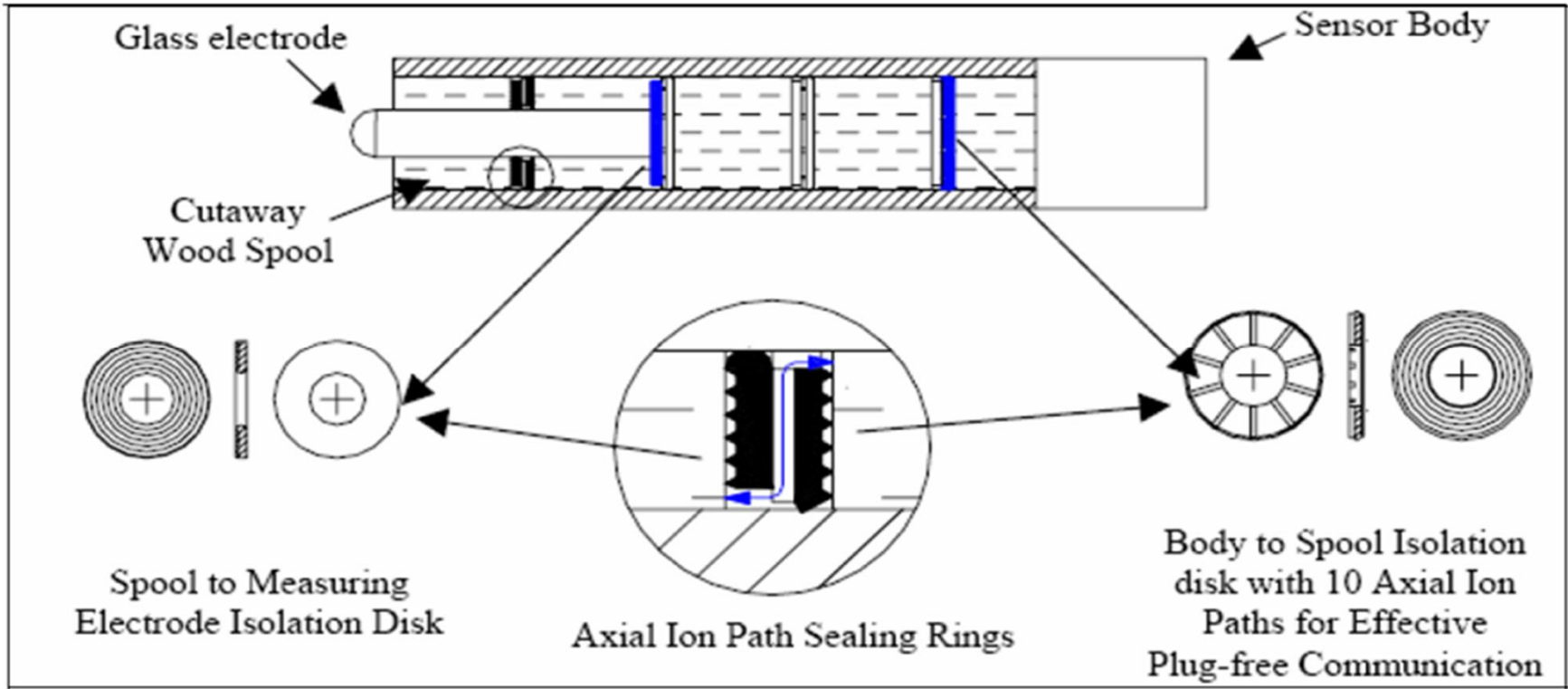
Calibration and Validation



Measuring pH

- Manual Methods
 - Highly Variable due to sample collection
 - Frequency too low for control
- In-Line Methods
 - In-line pH probes
- Semi-Automatic Methods
 - In-line filtrate extractor feeding a sample pot with pH probe

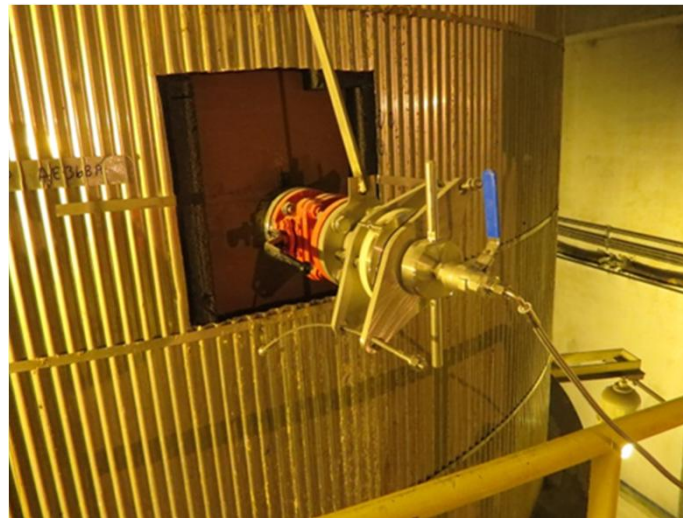
pH Probes



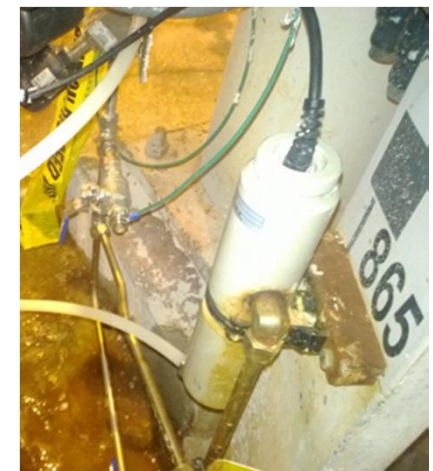
Examples of Field pH Measurement



Manual sample point

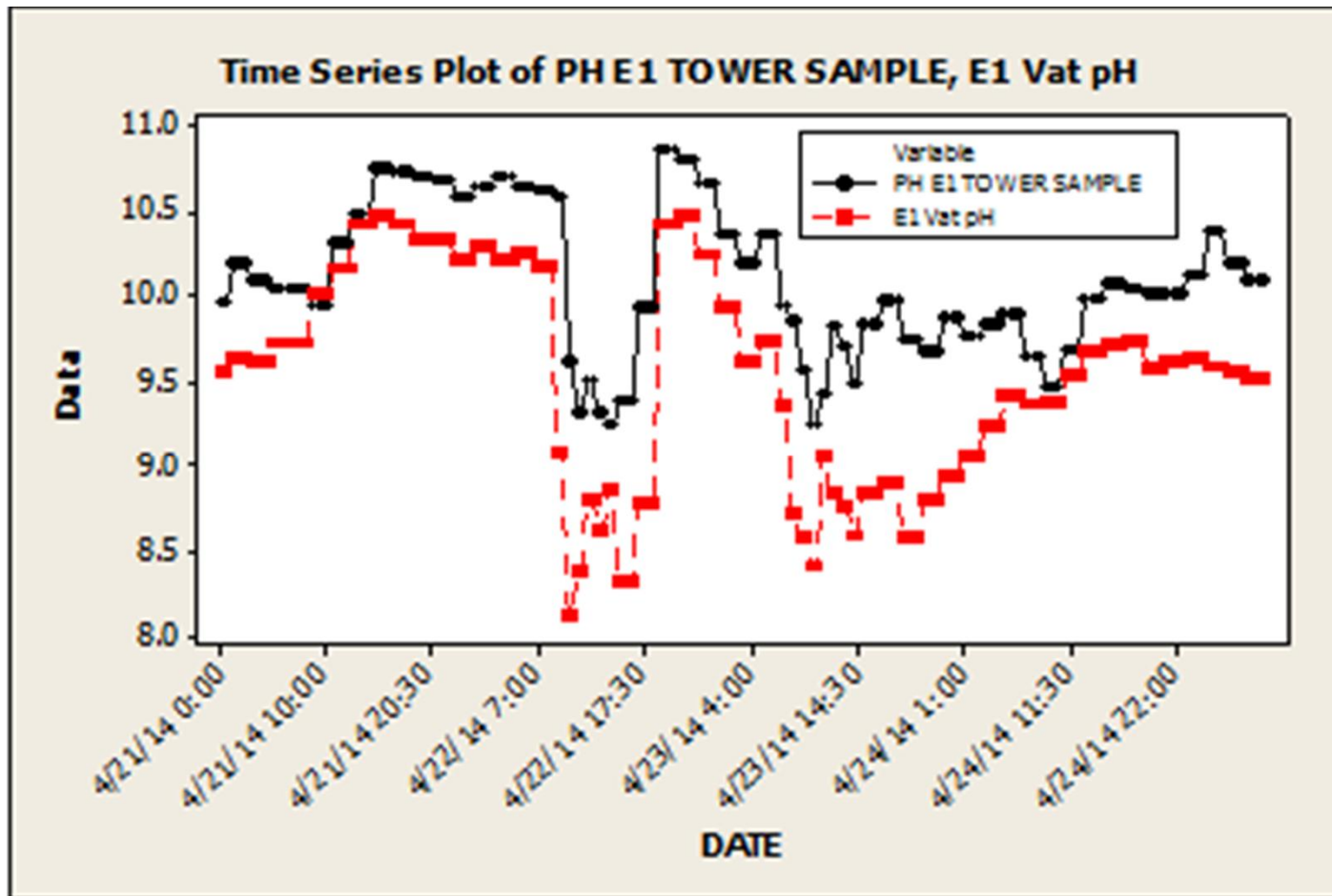


Filtrate Extractor in Extraction Tower



pH sample pot

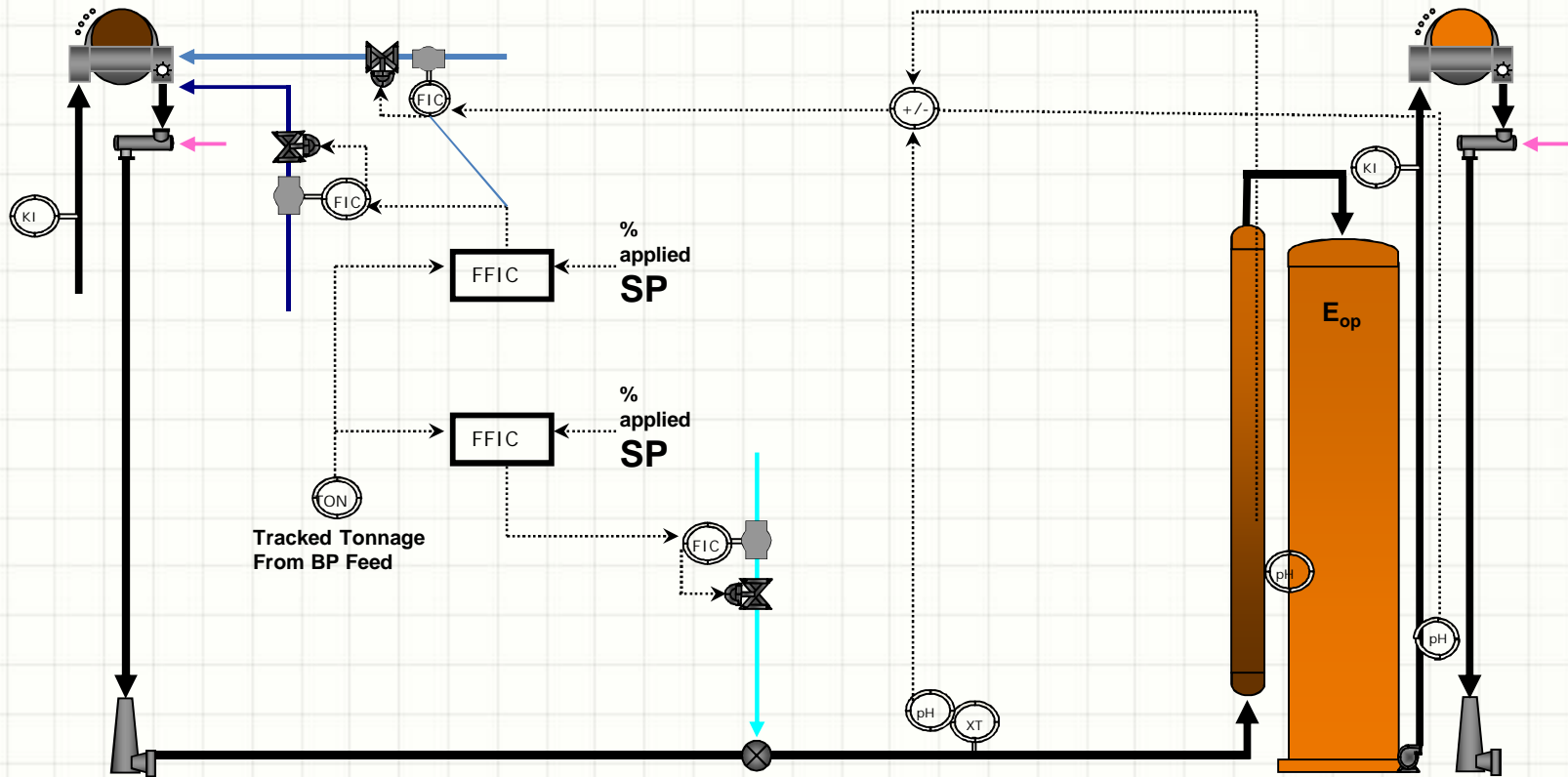
Where Should We Sample Terminal Extraction pH?



How Should We Control the Extraction Stage?

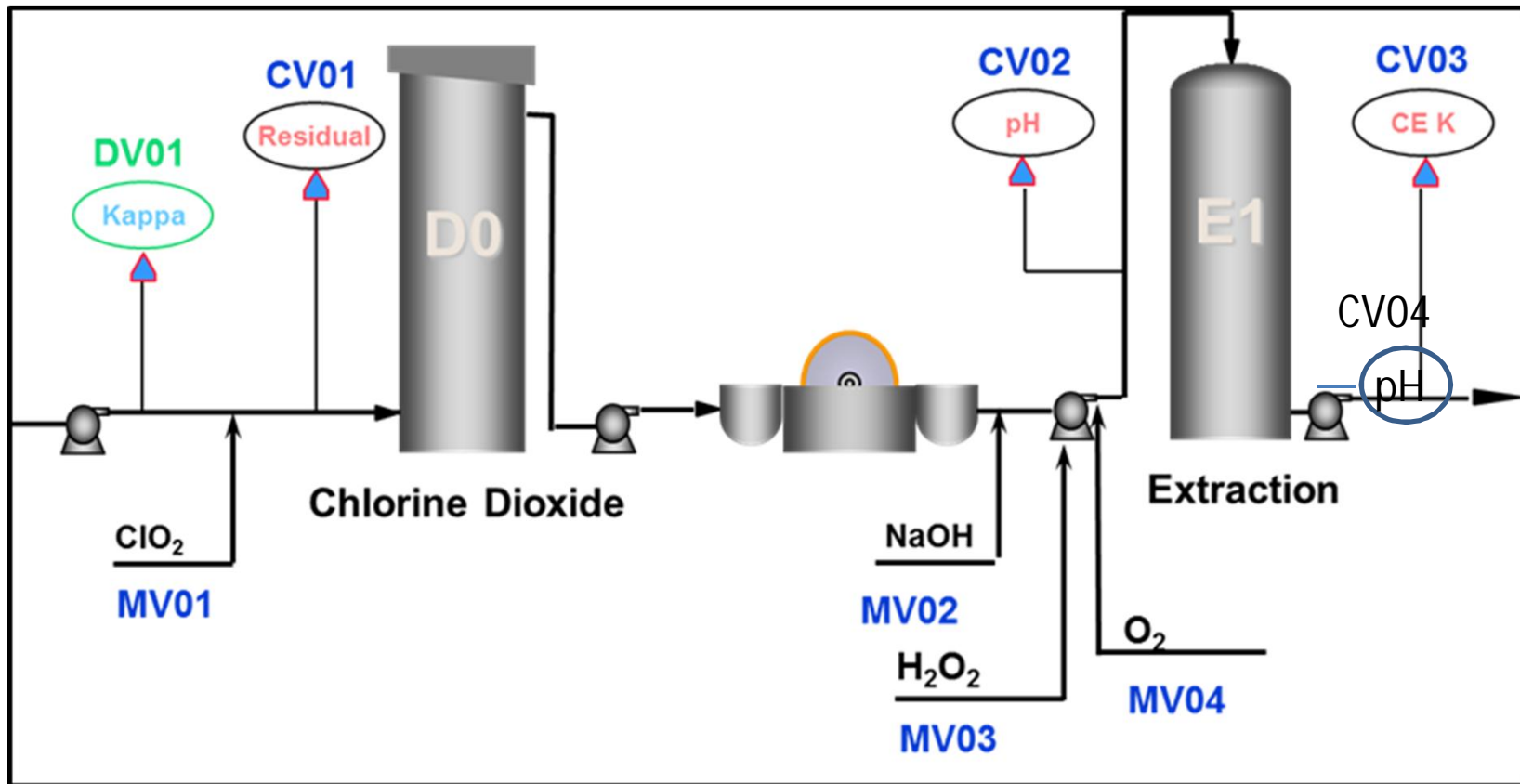
- What are the components?
 - Tonnage
 - Incoming pH
 - Caustic Dosage
 - Caustic to Eq. ClO₂ Ratio

Eop Control



NaOH	Steam	Cl ₂	ClO ₂
H ₂ SO ₄	H ₂ O ₂	O ₂	

Elements of Advanced Control



Preliminary Mill Trial

- Manual samples were taken in tower and vat prior to installation of filtrate extractor
- Control strategy was modified to use a feed forward Caustic to TEC ratio that was trimmed using terminal pH value
- D1 charge and brightness was recorded for comparison

Results

	<u>Before</u>	<u>After</u>	
Incoming Kappa	9.90	9.95	
D0 % ClO2 Charge	0.947	0.950	
Incoming Eo pH	10.75	10.77	
Eo Caustic Charge	1.196	1.055	11% ↓
% D1 ClO2 Charge	0.86	0.82	5% ↓
D1 Brightness	86.58	87.60	

Conclusions

- The extraction stage remains an important part of the bleaching process
- pH can be an effective “surrogate” measure of the efficiency of the stage
- Sample location and collection techniques are critical
- True terminal pH control has been shown to be effective
- Further mill studies to follow.

Acknowledgements

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Thank you!
Merci beaucoup!

