UV/H2O2 AOP Full Scale Unit Operations

Outline

- Introduction
- Start-Up
- Monitoring and Analytics
- Communication
- Safeties and Interlocks
- Sampling Requirements
- Questions

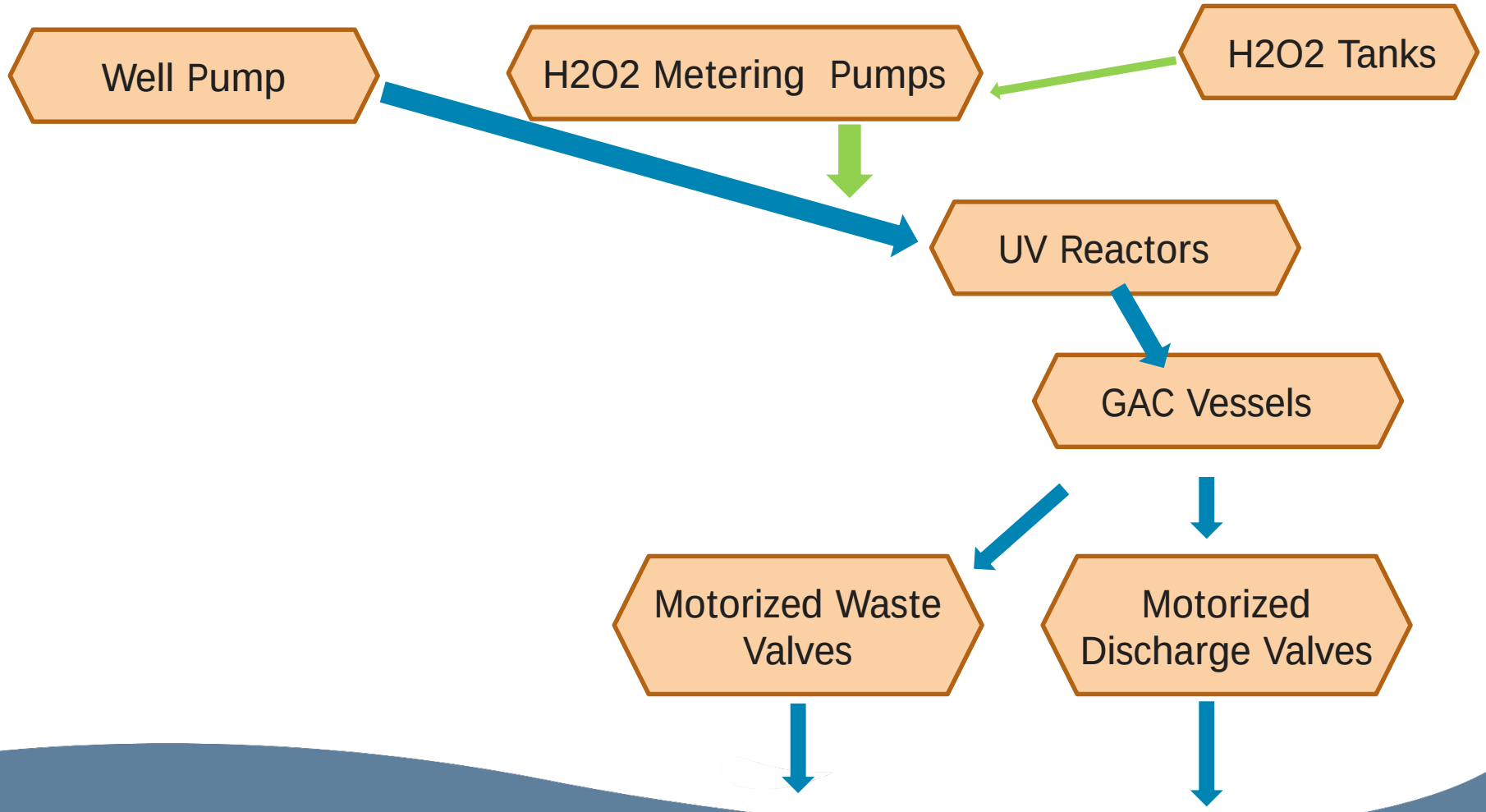
Introduction

- Presenter: Andrew Manfredi
  - B.S. in Chemical Engineering with minors in Environmental Engineering, Chemistry, and Math from Manhattan College
  - Eight years of experience in water/wastewater industry at H2M

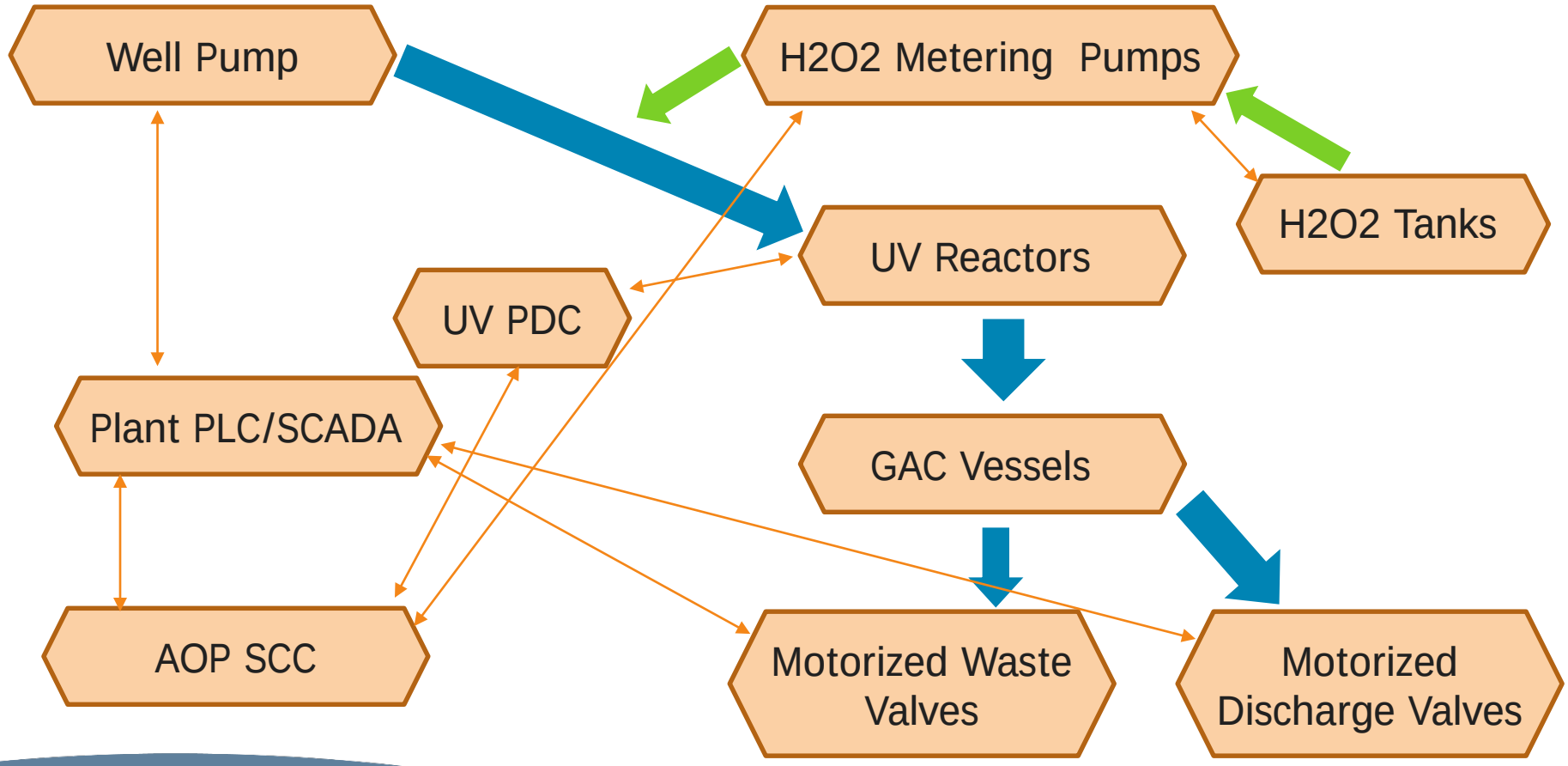
A Quick Disclaimer…

- This presentation is NOT an overview of AOPs
- We will be getting technical
- So by show of hands; who here has knowledge of the following:
  - AOP
  - UV/Hydrogen Peroxide AOP
  - Chemical Oxidation
  - Winning lottery numbers

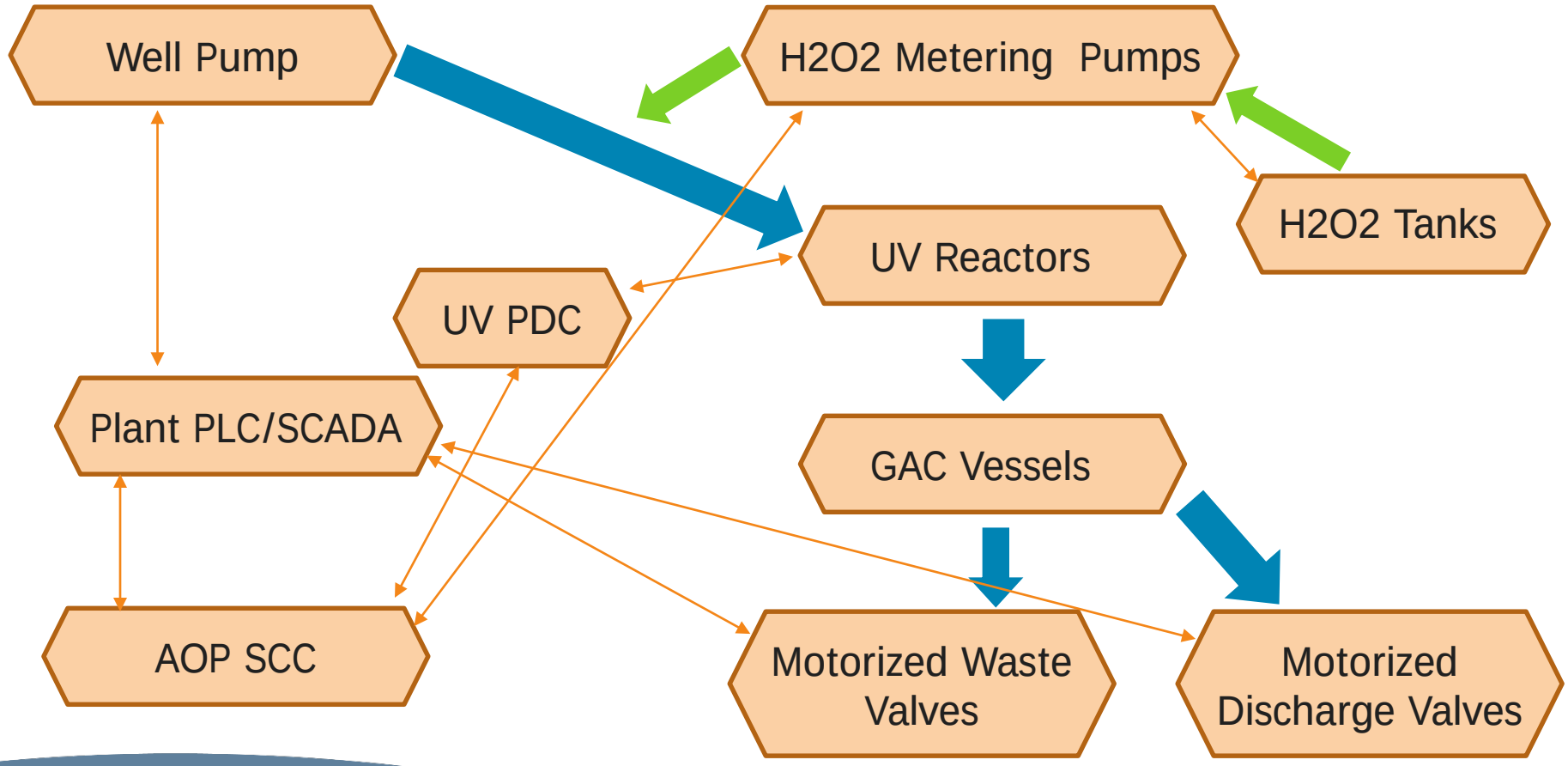
Sequence of Operations



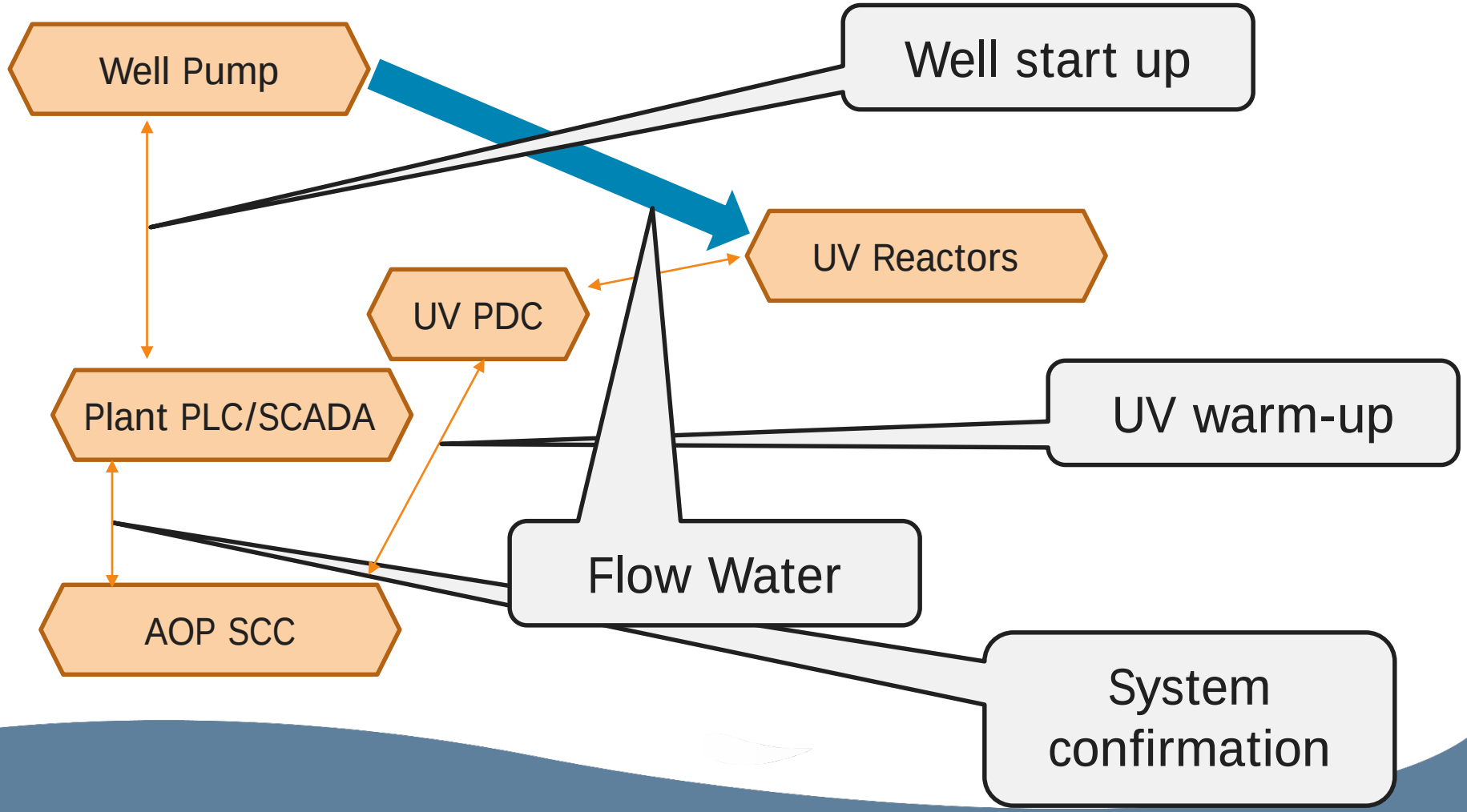
Sequence of Operations/Communications



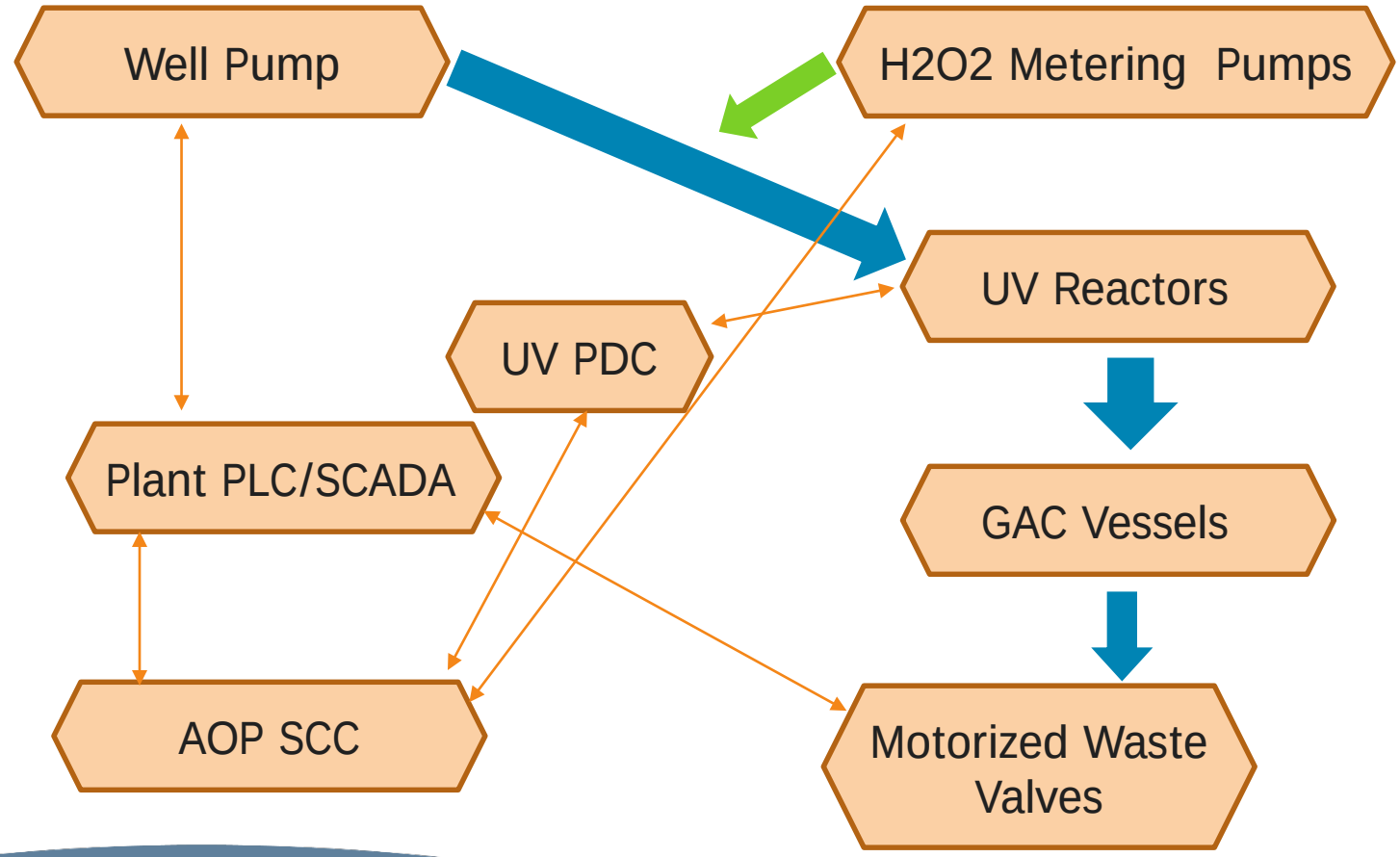
System Start Up – Warm Up



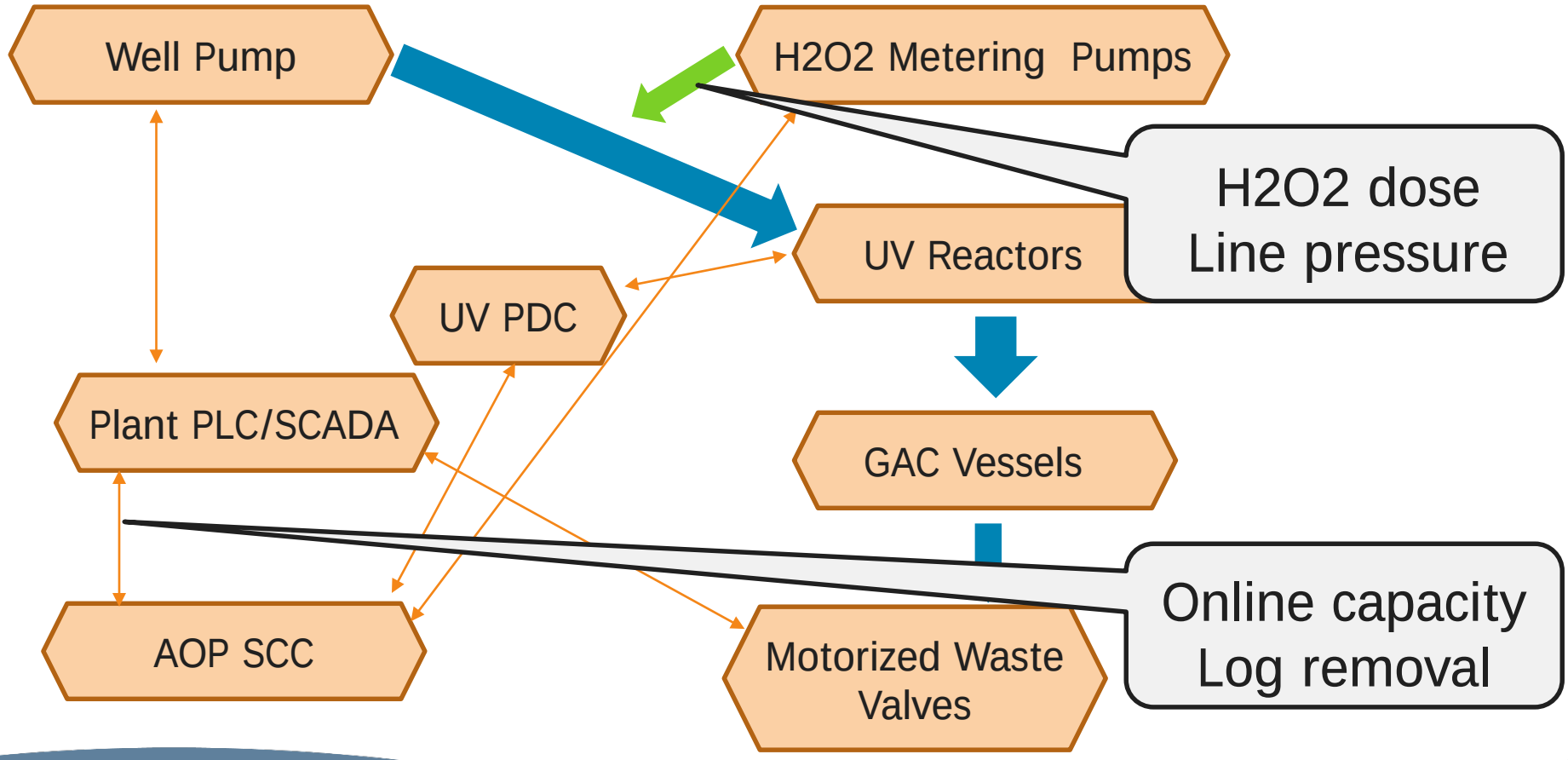
System Start Up – Warm Up



System Start Up – H2O2



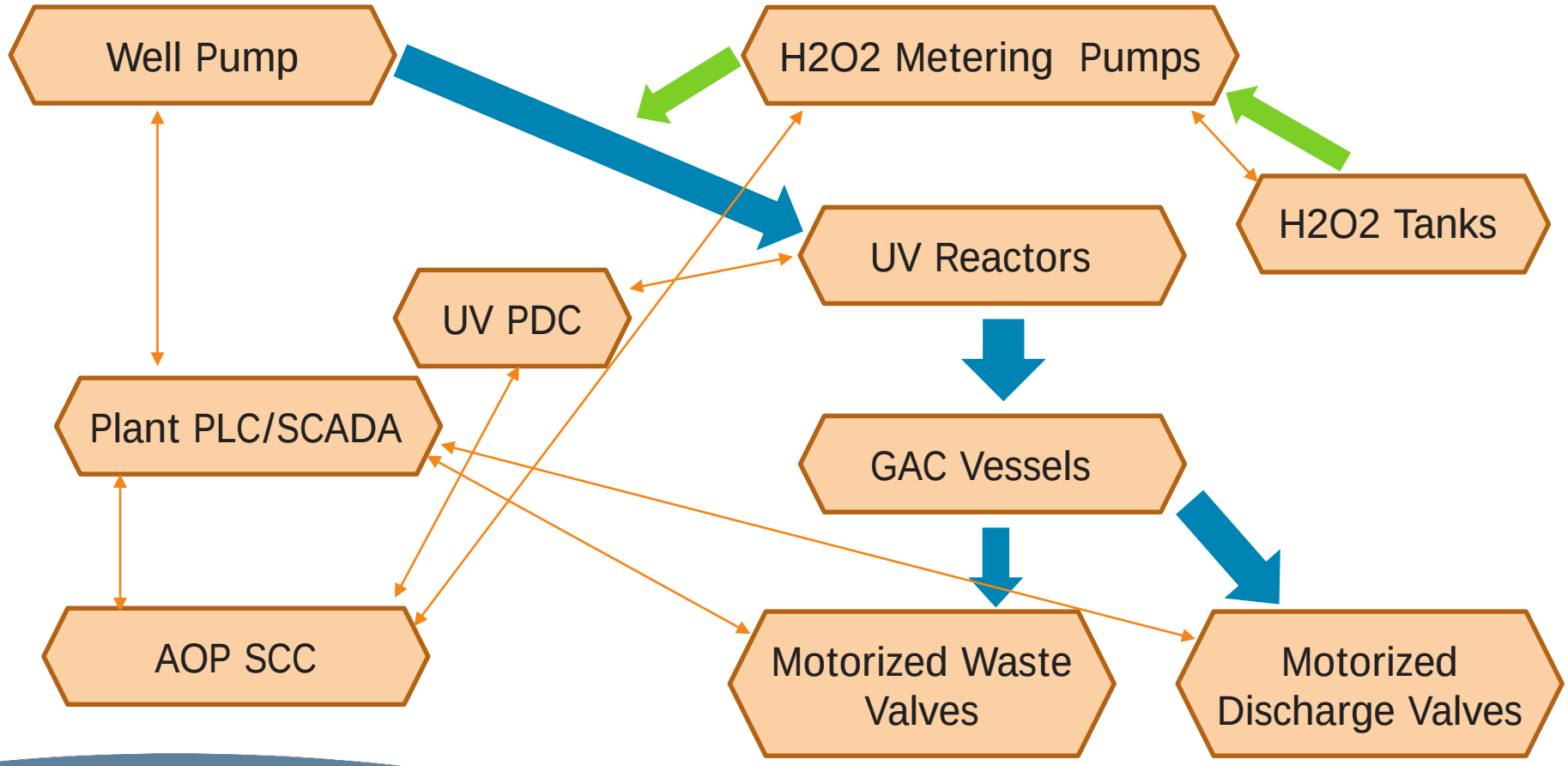
System Start Up - Confirmation



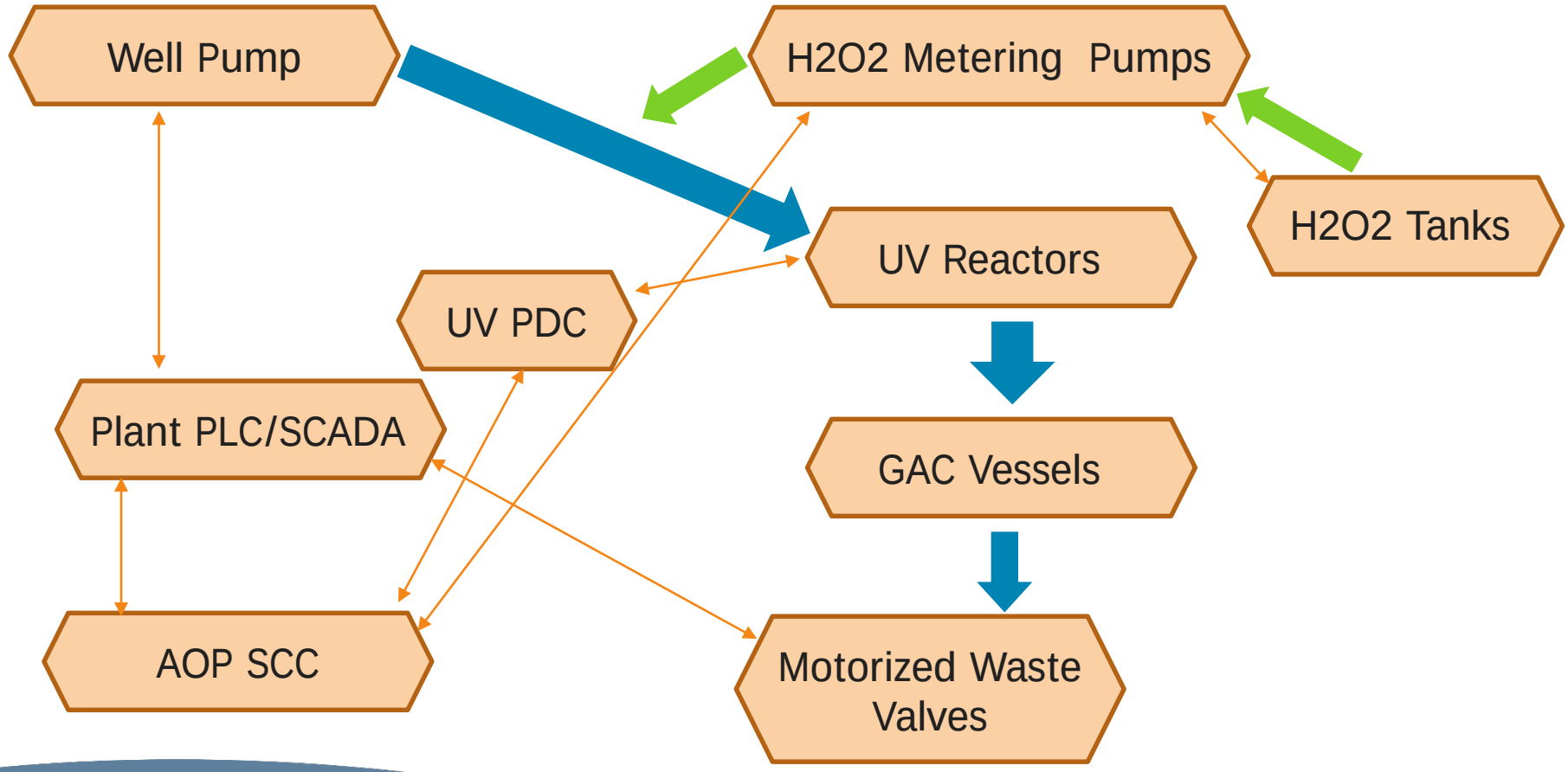
System Start Up - Metrics

- Goal = steady state
- Steady state means influent/effluent concentrations are constant
- Determined by hydraulic residence time
- Within the AOP unit, approximately five HRTs

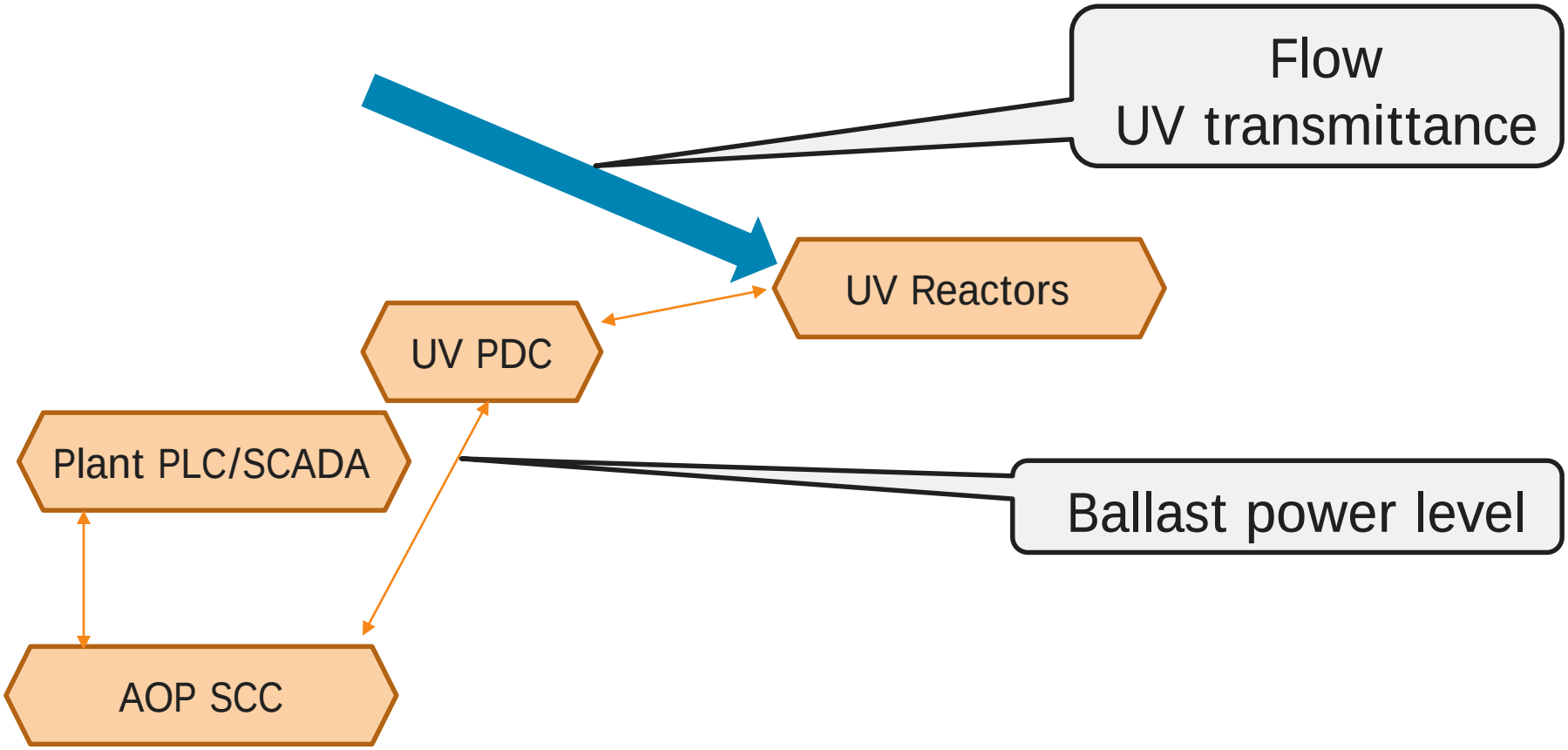
Monitoring and Analytics - Continuous



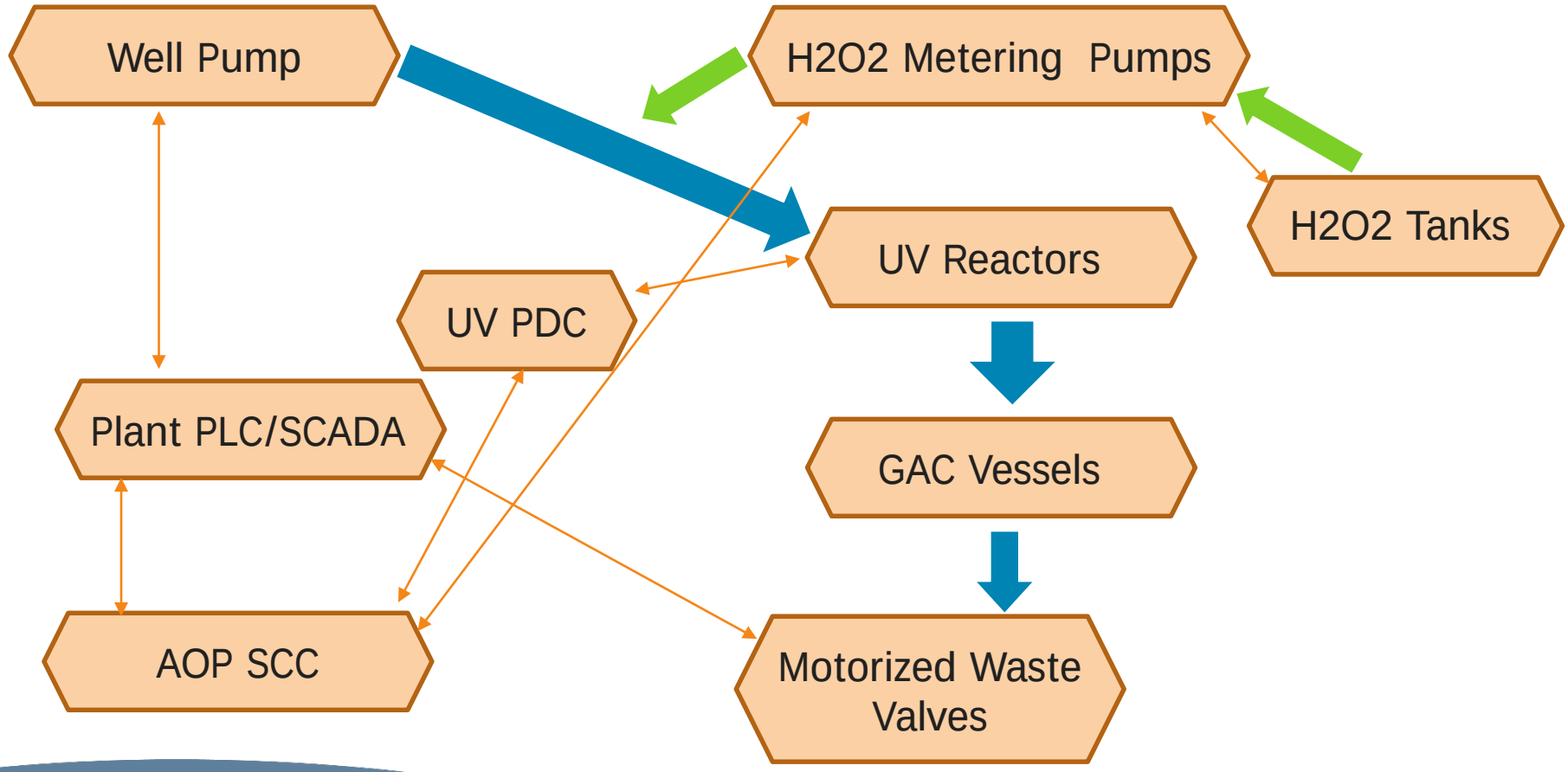
Monitoring and Analytics – UV Reactors



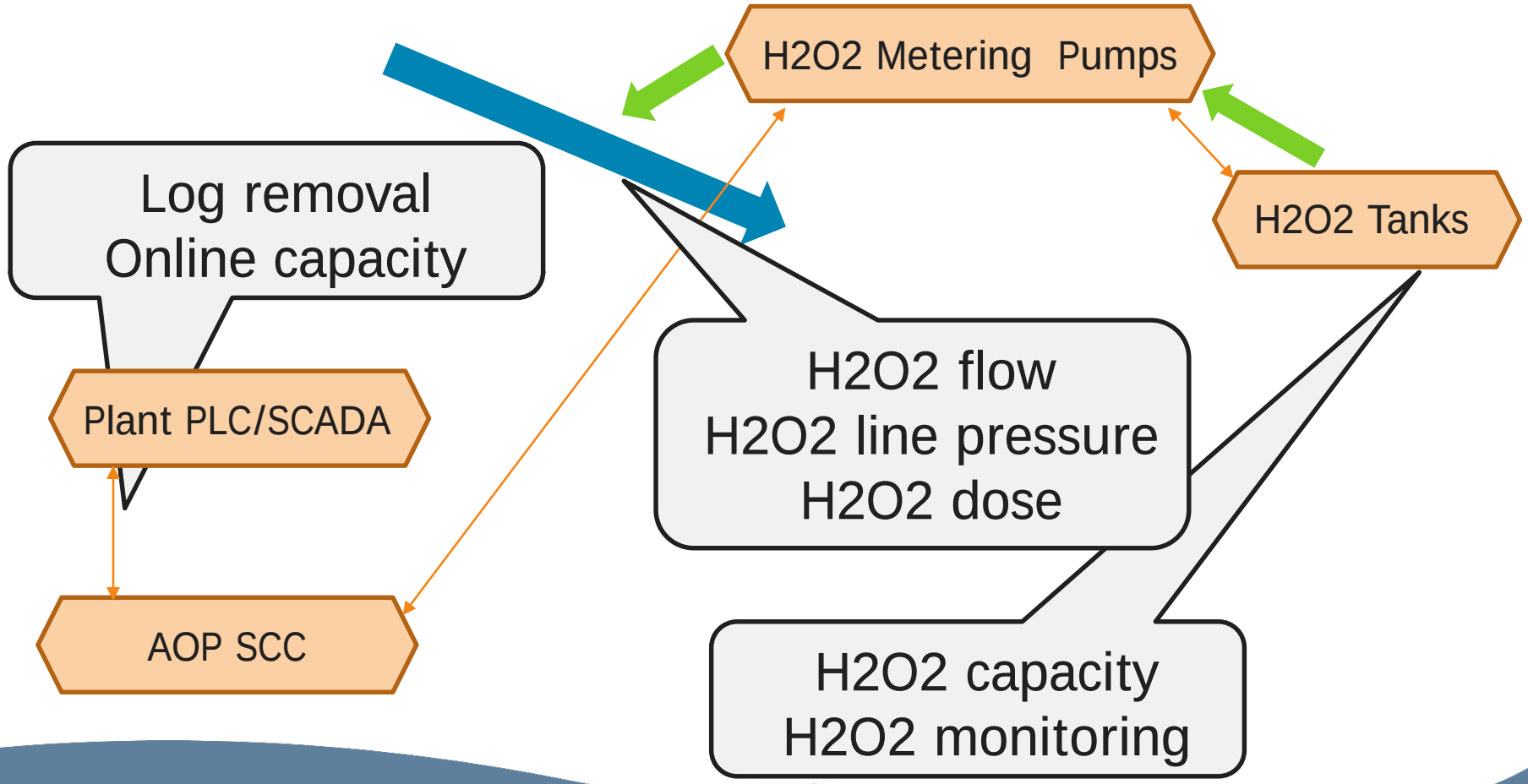
Monitoring and Analytics – UV Reactors



Monitoring and Analytics – H2O2 System



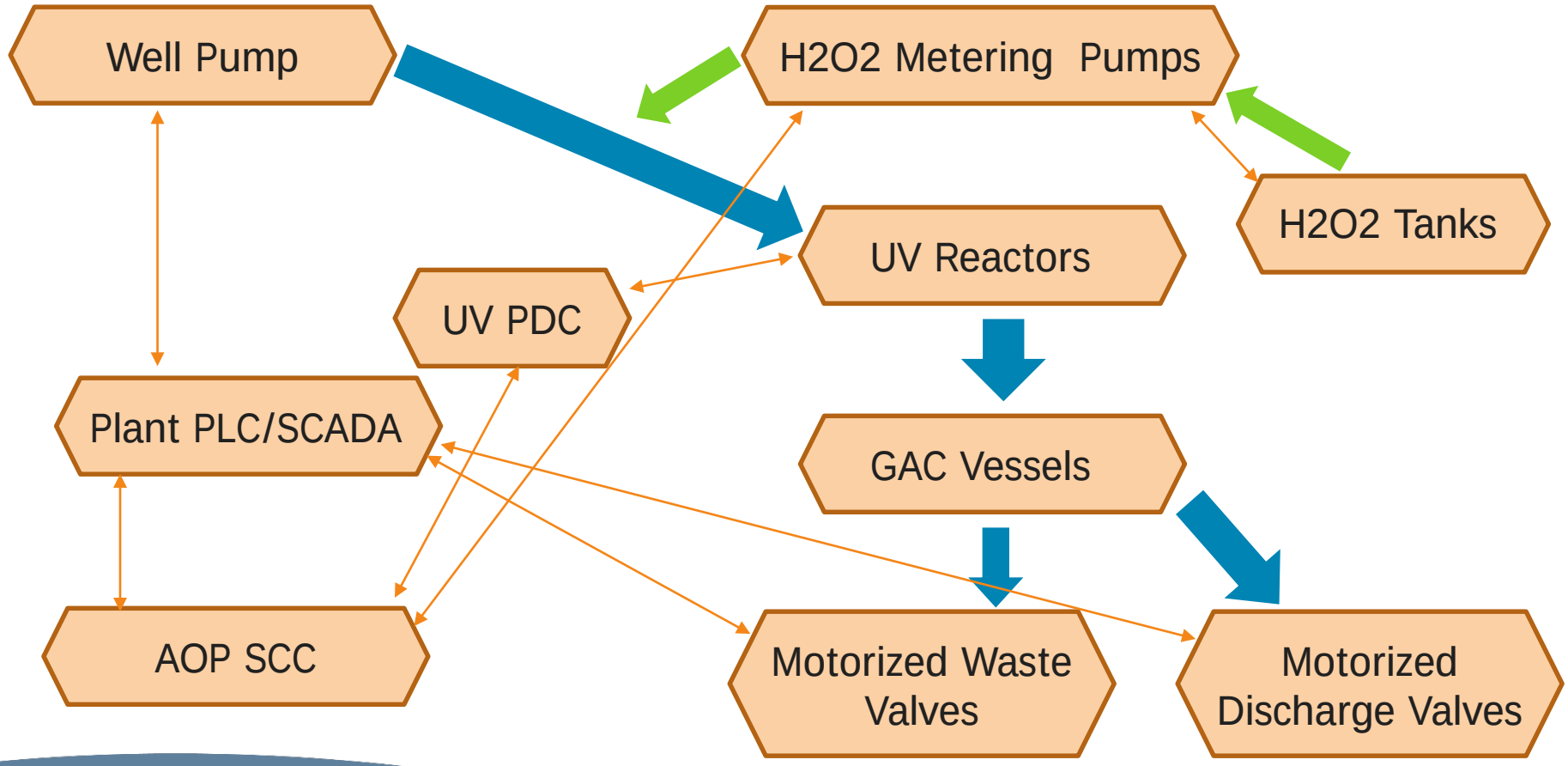
Monitoring and Analytics – H2O2 System



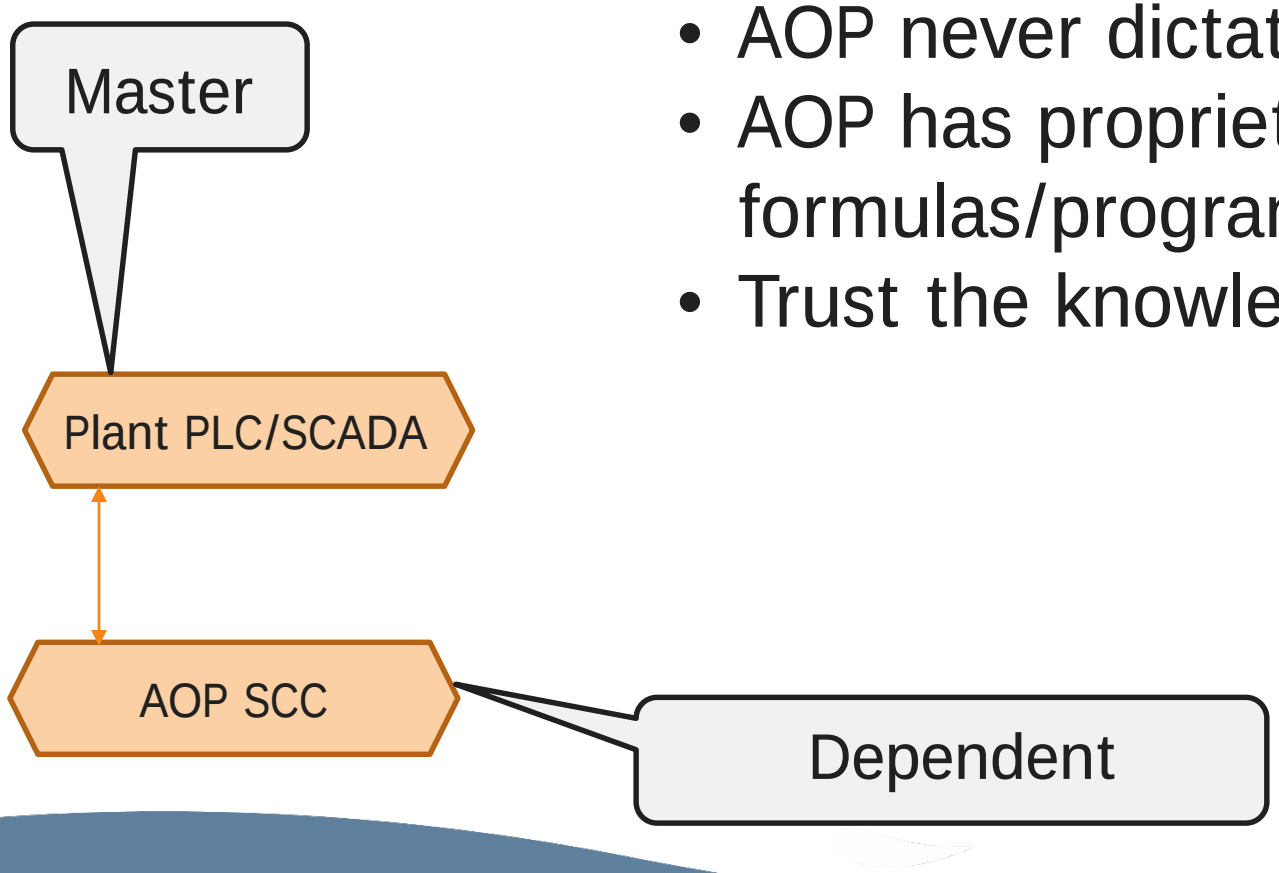
Monitoring and Analytics - Metrics

- Goal = steady state
- And maintaining steady state
- Also can modify system parameters based on influent water quality
  - Modify ballast power level
  - Modify H2O2 dosage
  - Maintain specified log removal

Communications

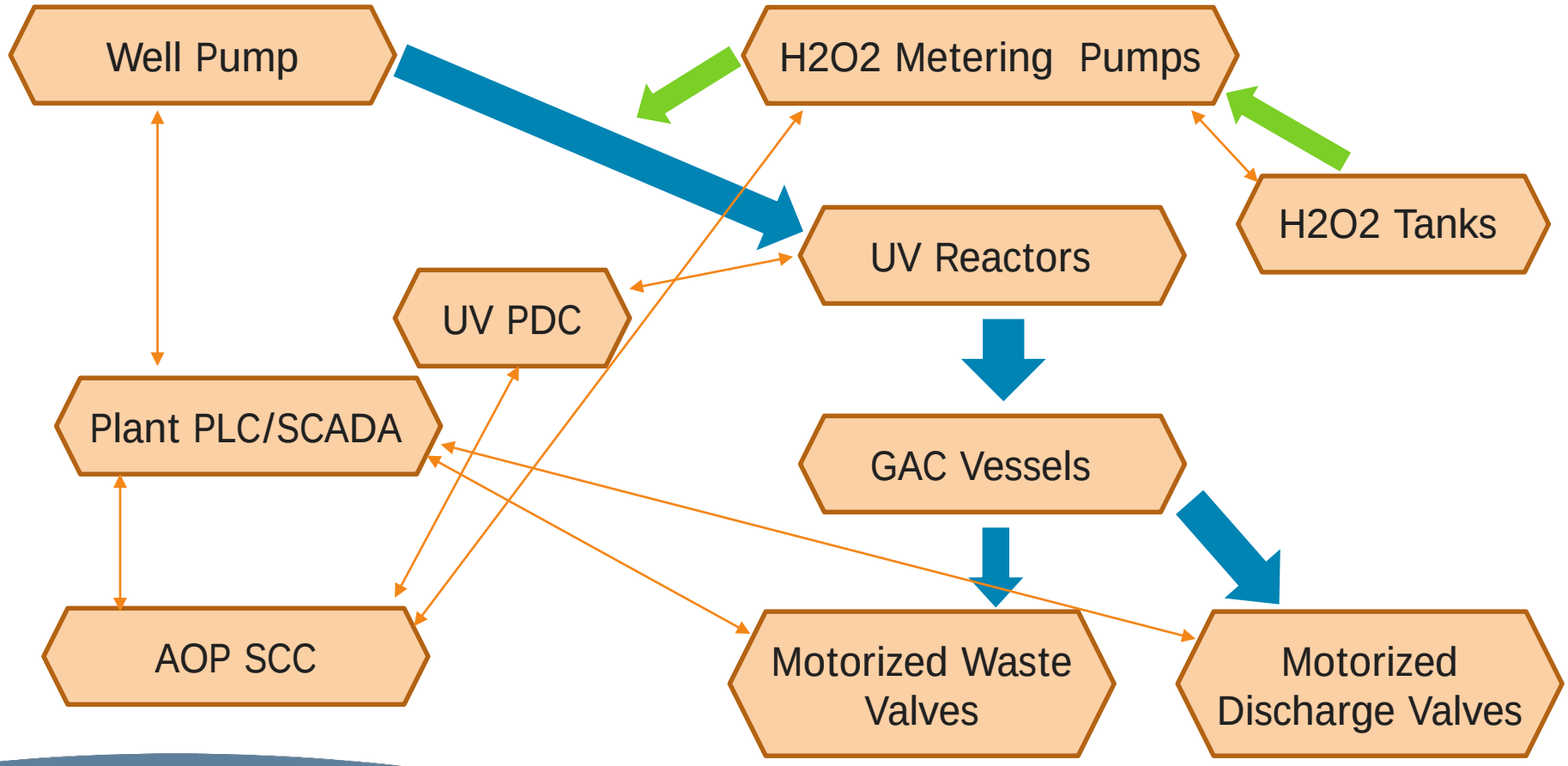


Communications

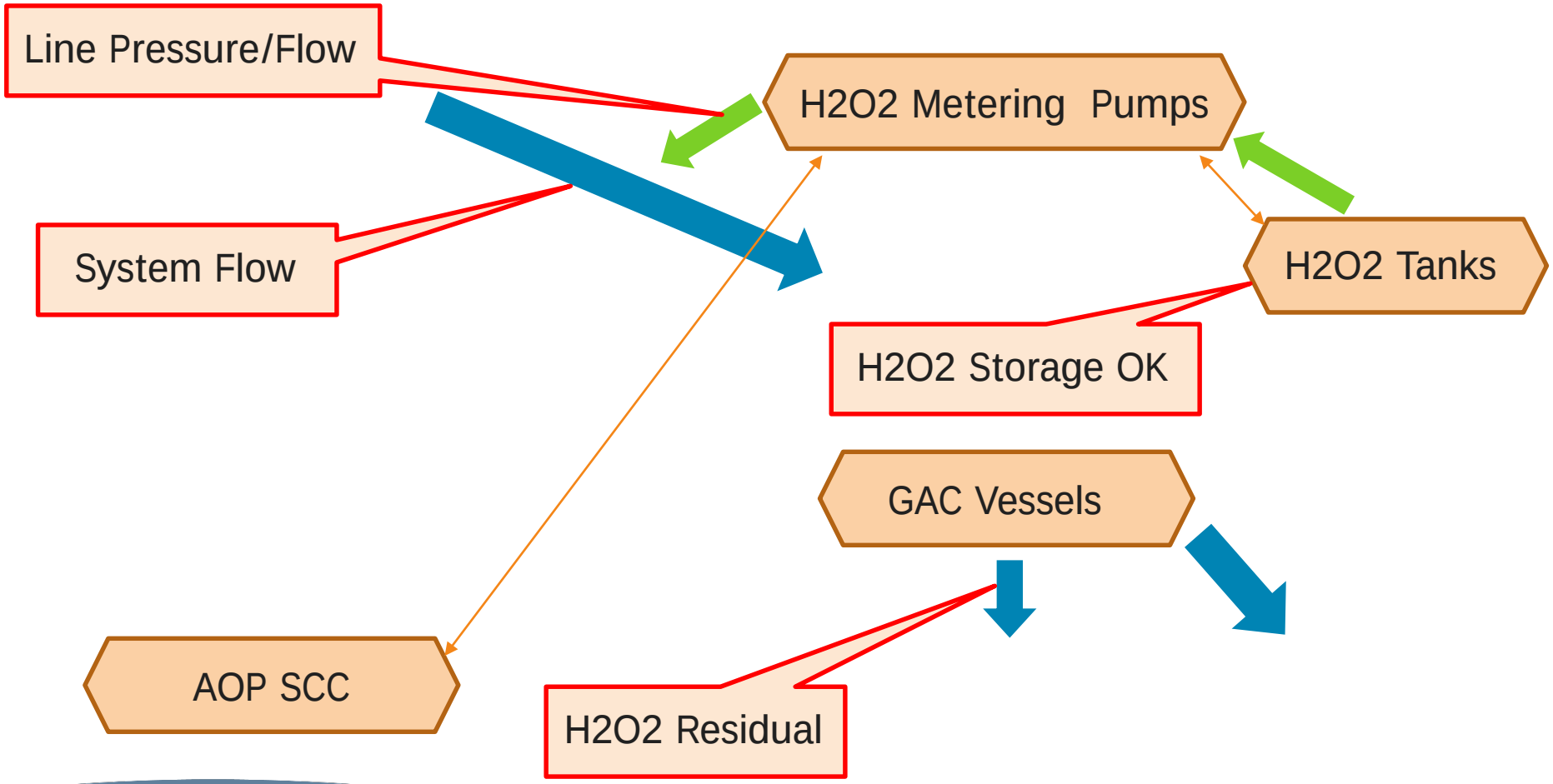


- AOP never dictates operations
- AOP has proprietary formulas/programming
- Trust the knowledge-base

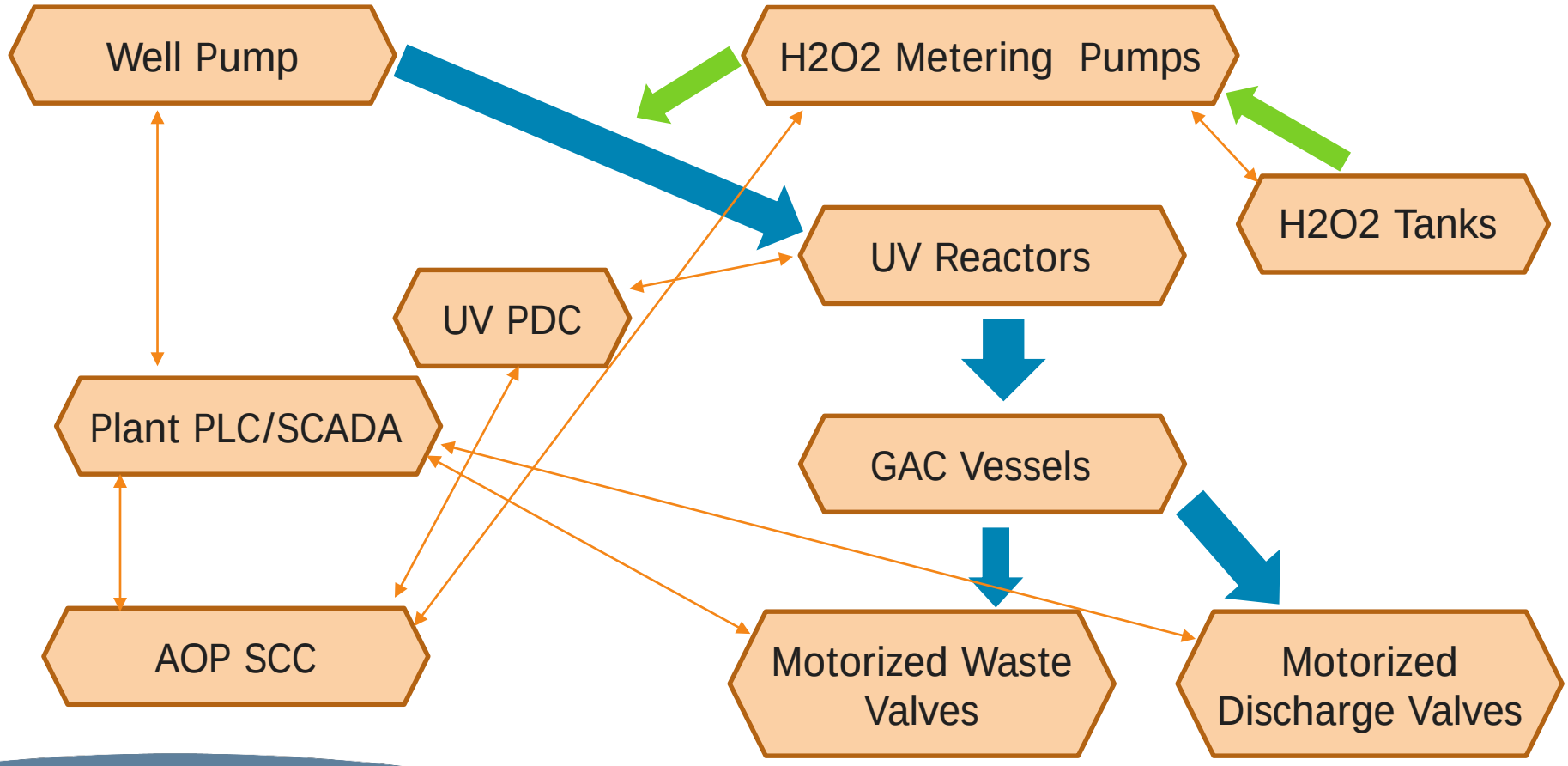
Safeties and Interlocks



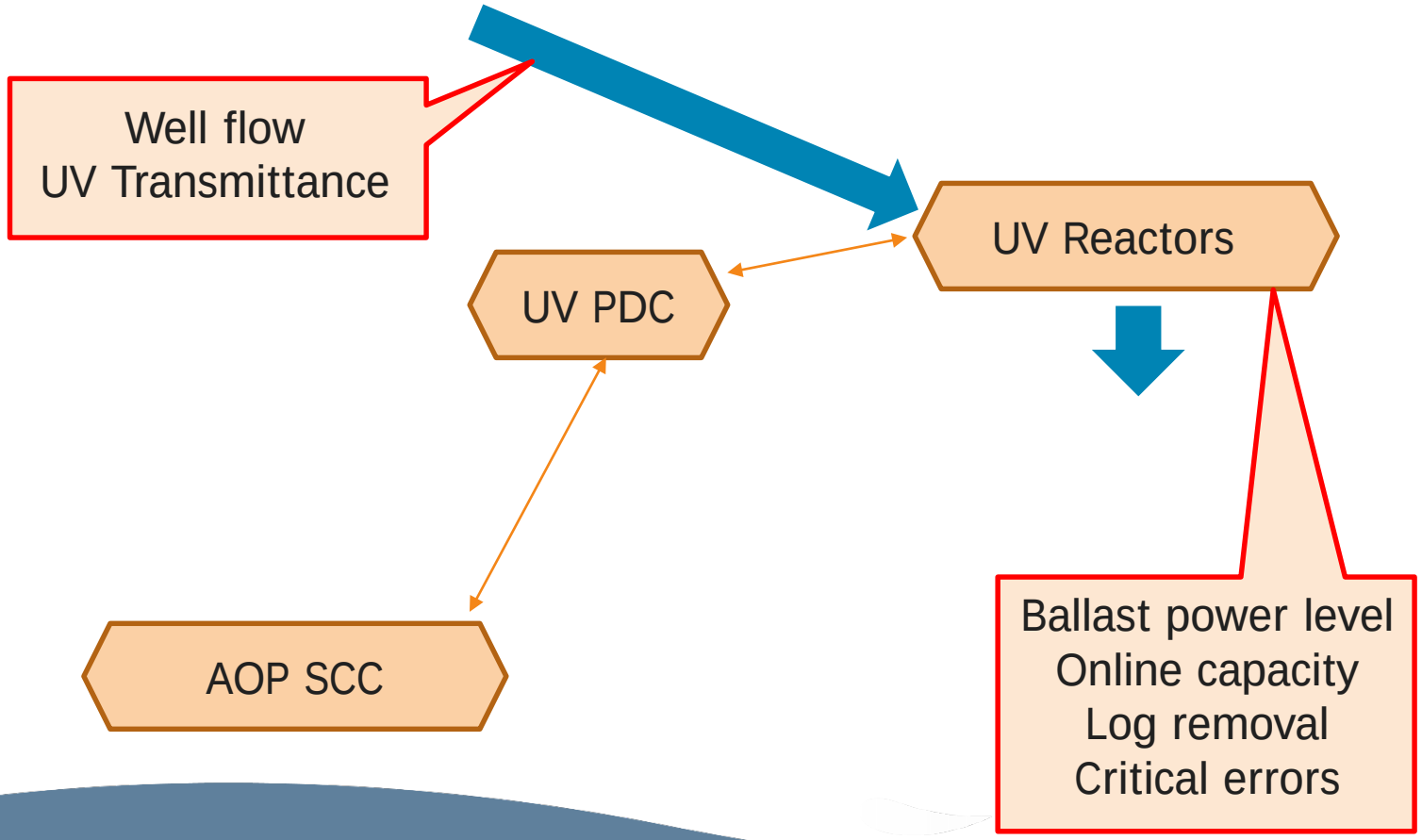
Safeties and Interlocks – H2O2



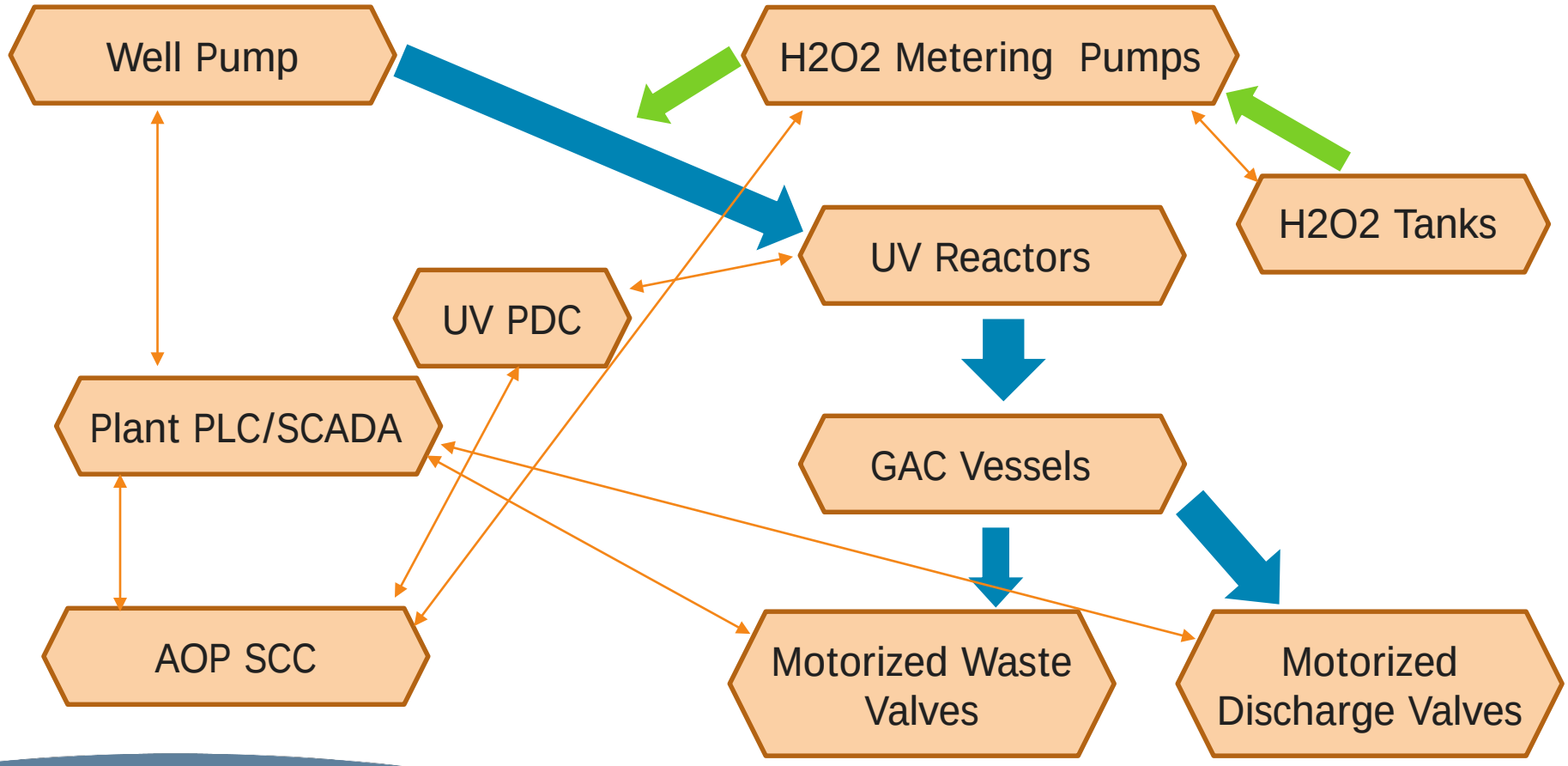
Safeties and Interlocks – UV System



Safeties and Interlocks – UV System



Safeties and Interlocks – Plant PLC



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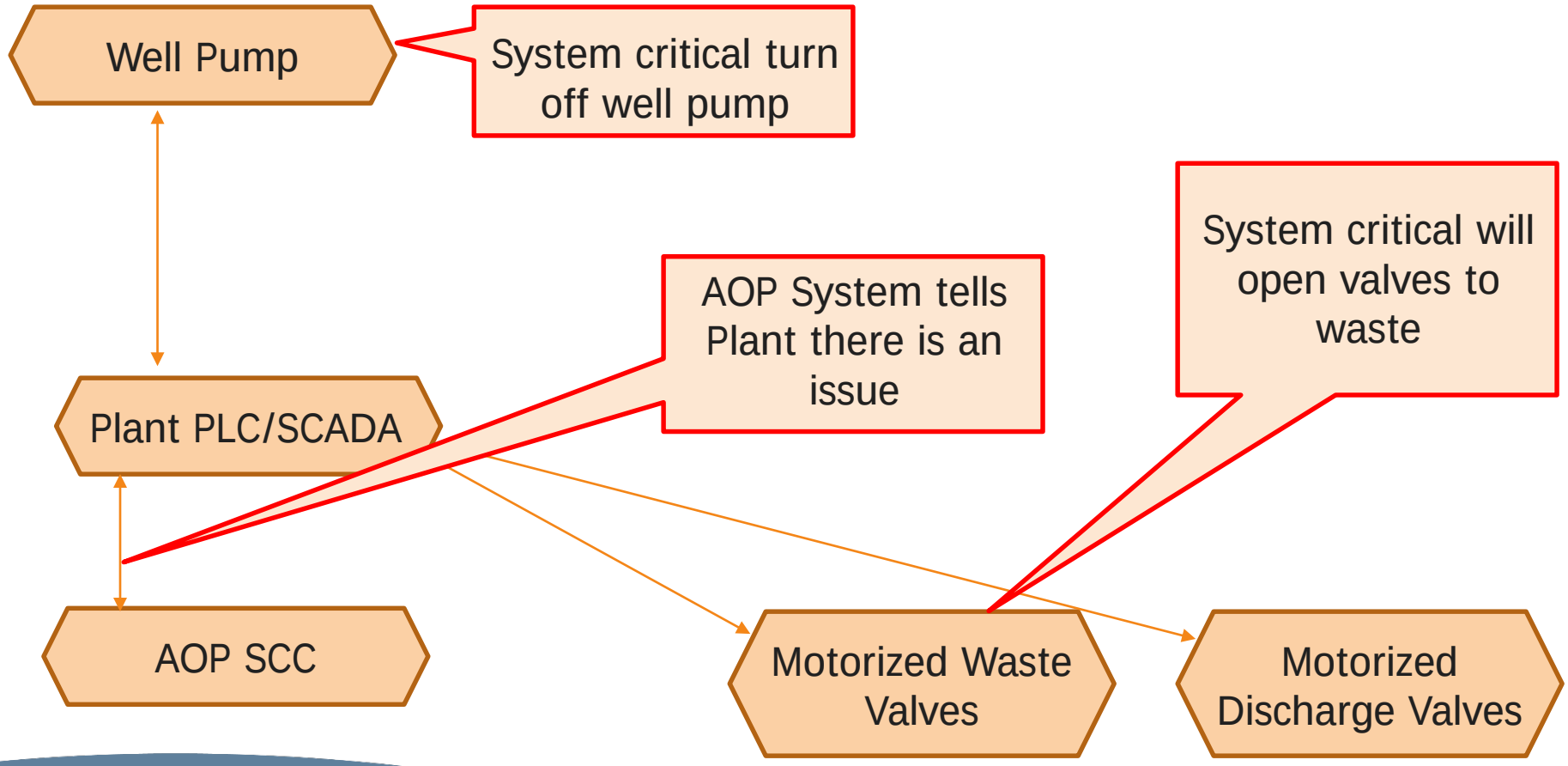
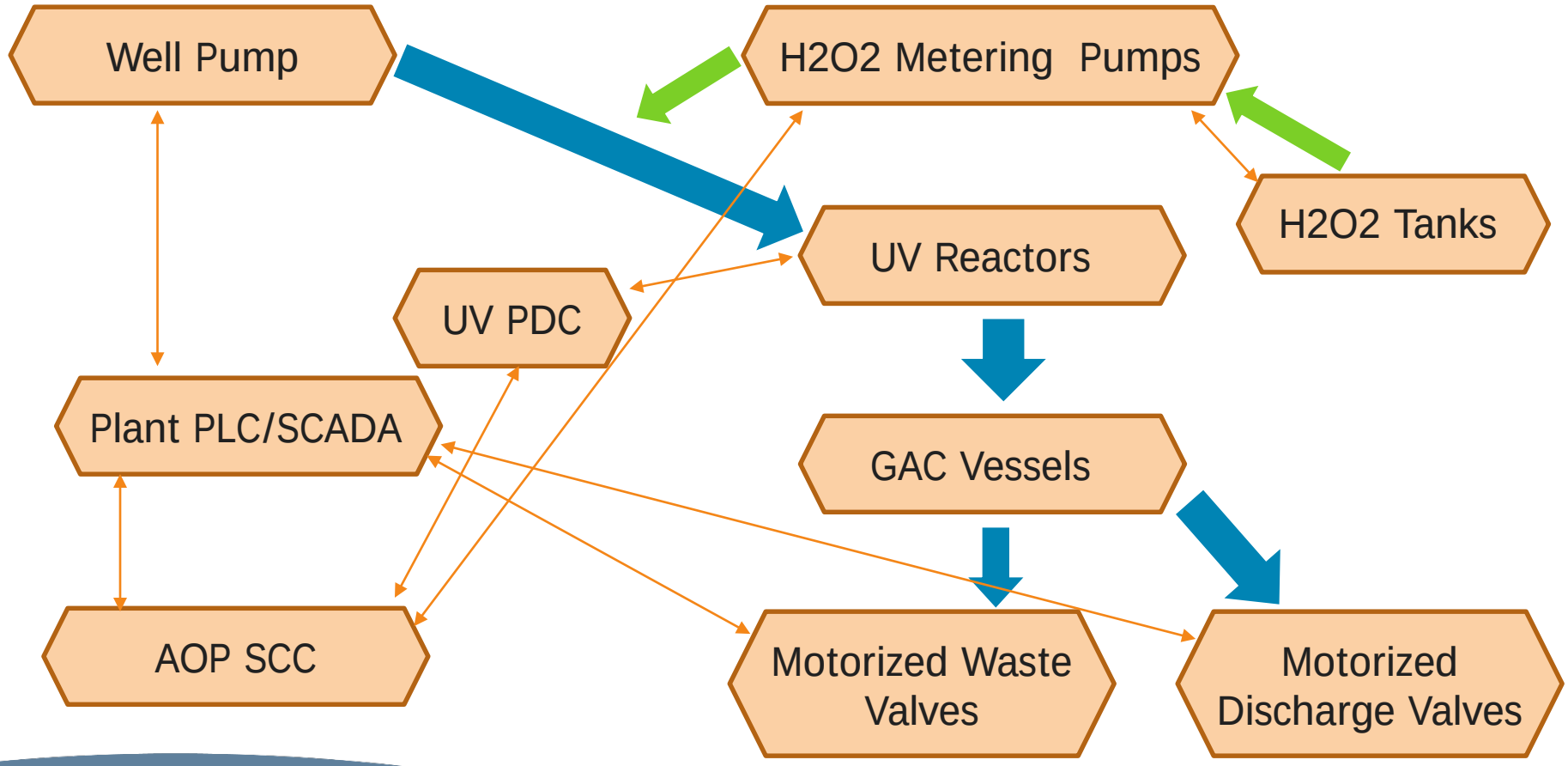


Safeties and Interlocks - Metrics

- Goal = steady state
- And maintaining steady state
- Should be rigid and critical; not nuisance
- Parameters are going to change
  - Should you worry about that parameter change?
  - Does the parameter change critically affect the system?
- Keep it simple!

Sampling Requirements



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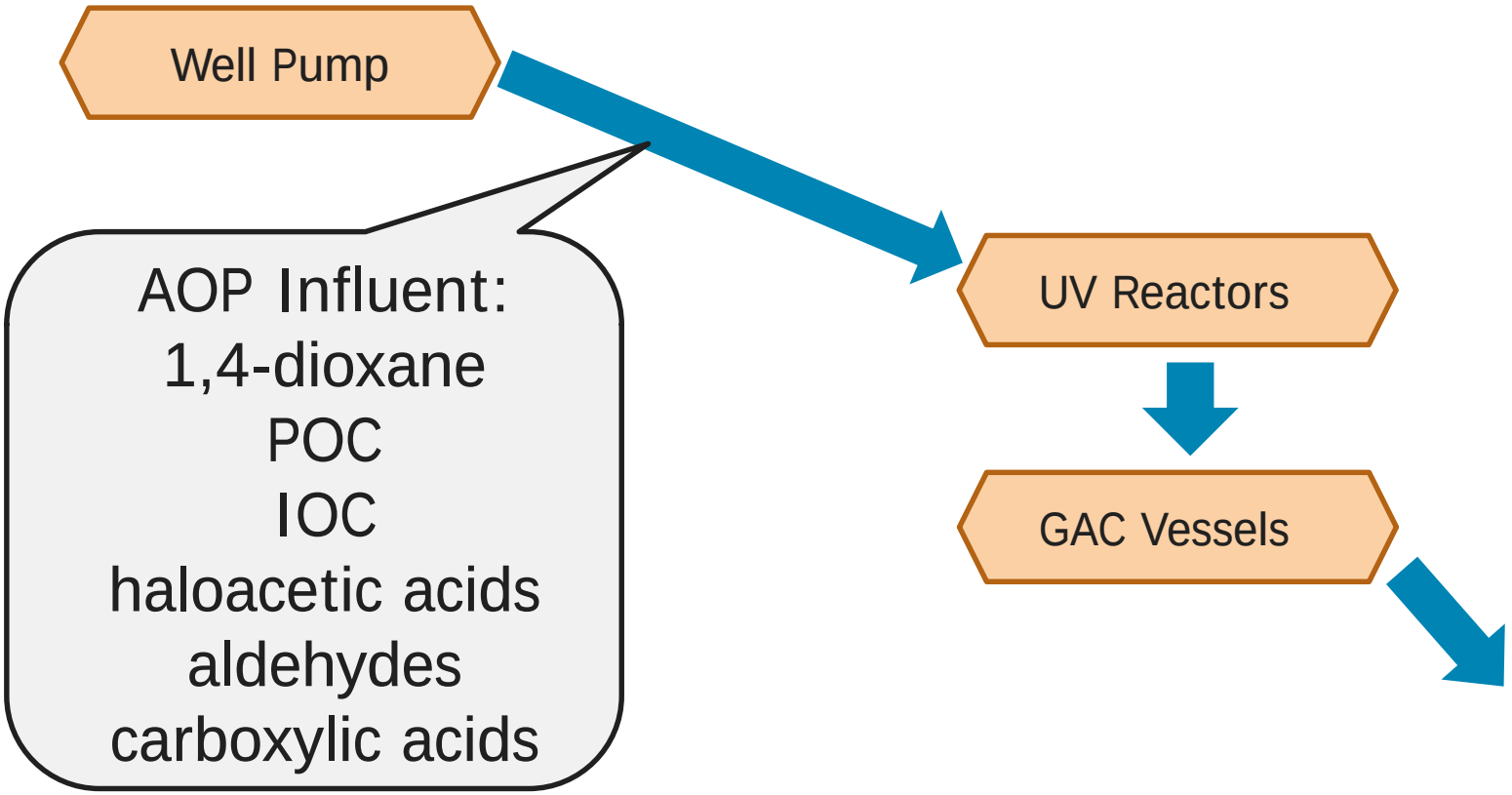

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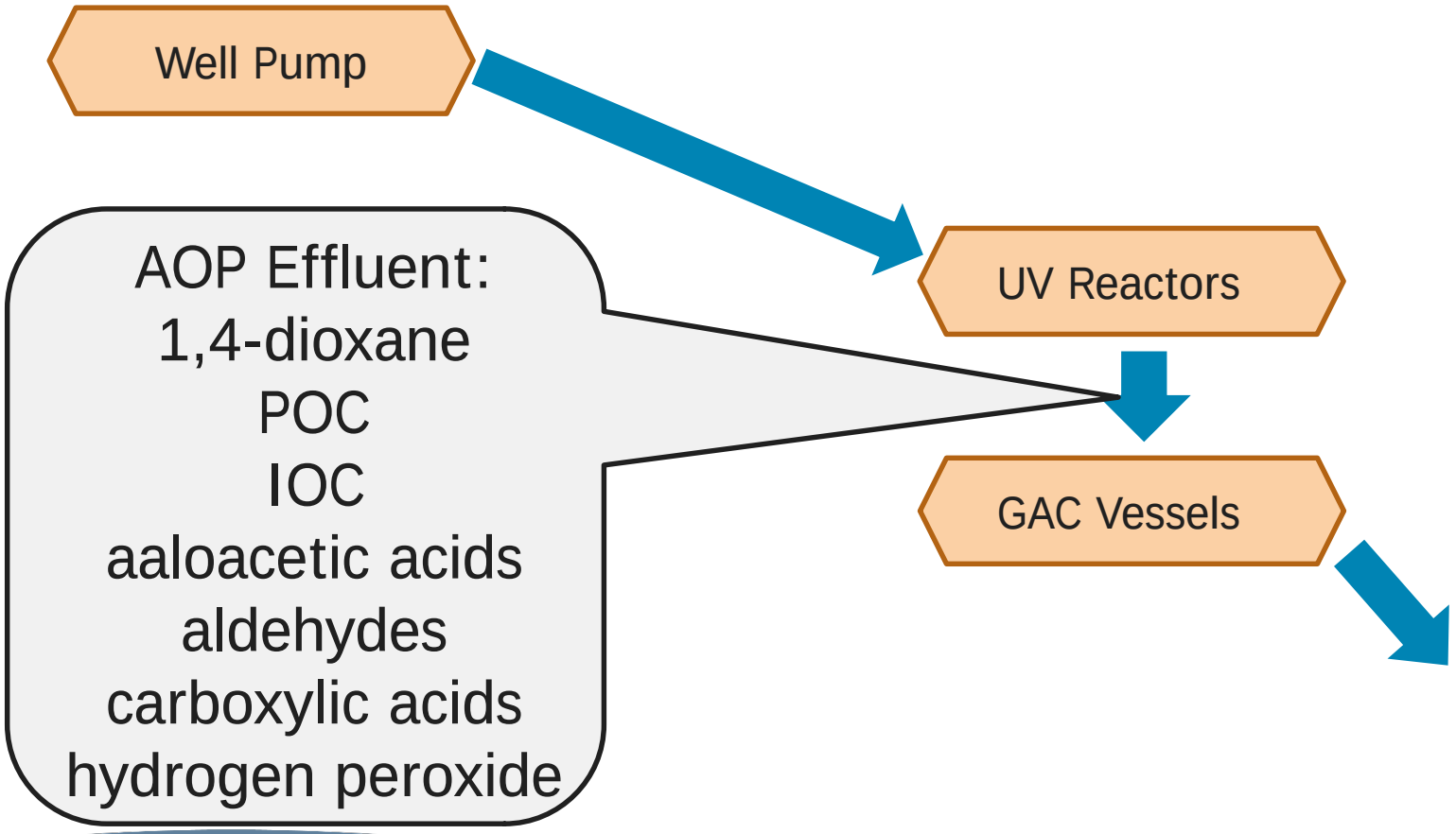
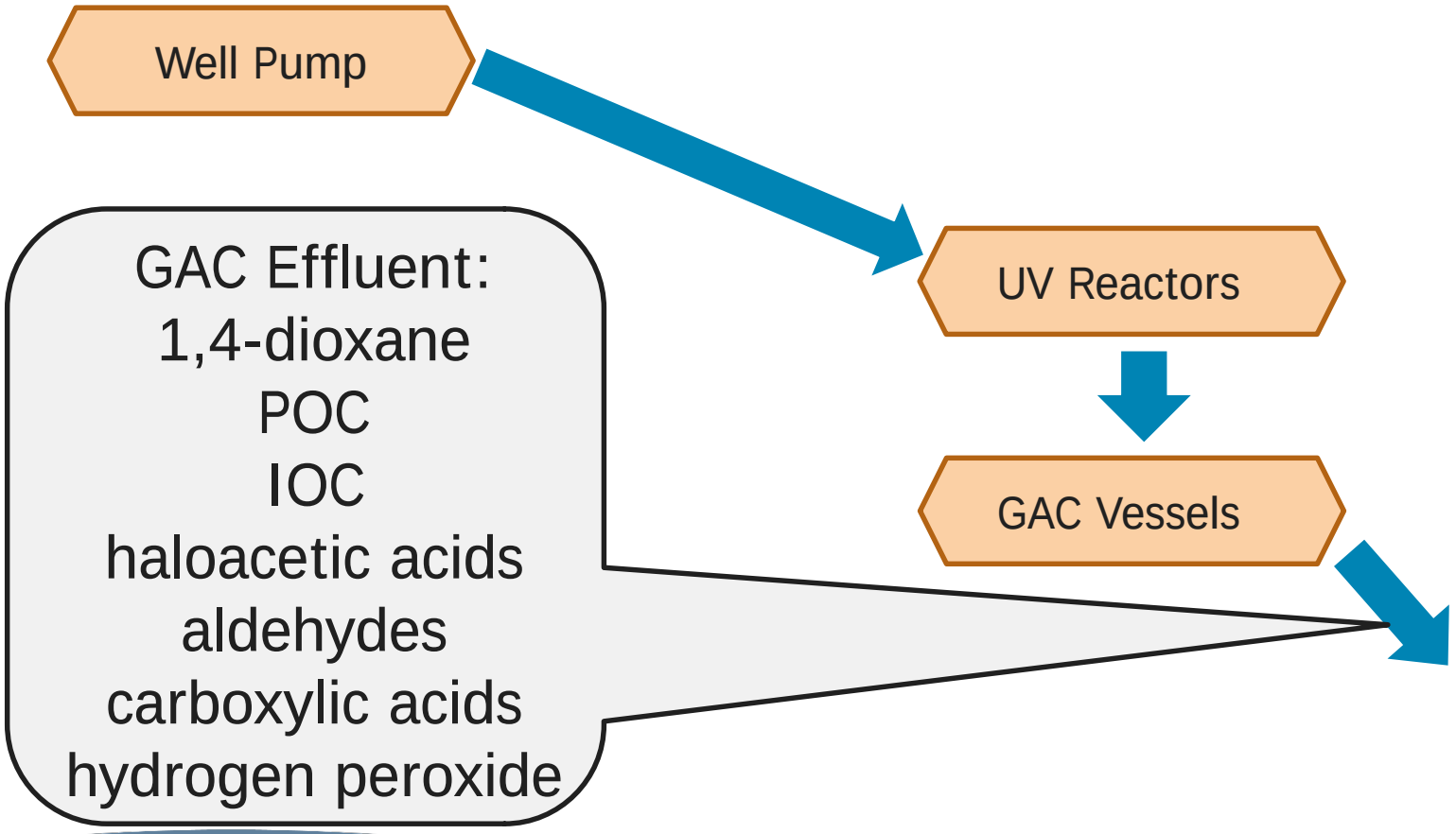


Sampling Requirements



Sampling Requirements- Metrics

- What's an aldehyde?
- What's a carboxylic acid?
- Can we utilize a continuous hydrogen peroxide analyzer?

Conclusions

- AOP is complicated
- But… it can be simple in operation
- Understand the critical items
- Monitor those items
- Adjust the system as necessary
- Don’t go and re-invent the wheel

Thank-Yous

- Bethpage Water District
  - Board of Commissioners
  - Supt. Mike Boufis
  - Pete Schimmel
- TrojanUV
  - Terry Keep
  - Steve McDermid
- NYSDOH
  - Scott Alderman, ph.D, P.E.
- Pace Analytical
  - Stu Murrell
- Colleagues
  - Rich Humann, P.E.
  - James Neri, P.E.
  - John Collins, P.E.

Questions?

- I never learn anything talking. I only learn things when I ask questions.