Coal-Fired Power Plant Configuration and Operation Impact On Plant Effluent Contaminants Conditions

DE-FE0031654

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September 3rd, 2020
Water Technologies Project Review Meeting

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Objective

Characterize coal contaminants in coal-fired power plant wastewater based on:

Coal Types

- Bituminous
- Sub-Bituminous
- Lignite

Plant Operational Profile

- Baseload
- Cycling

Wastewater Treatment Technology

- Chemical Precipitation
- Biological

Effluent Species

- Mercury
- Arsenic
- Selenium
- Nitrate/Nitrite
- Bromide

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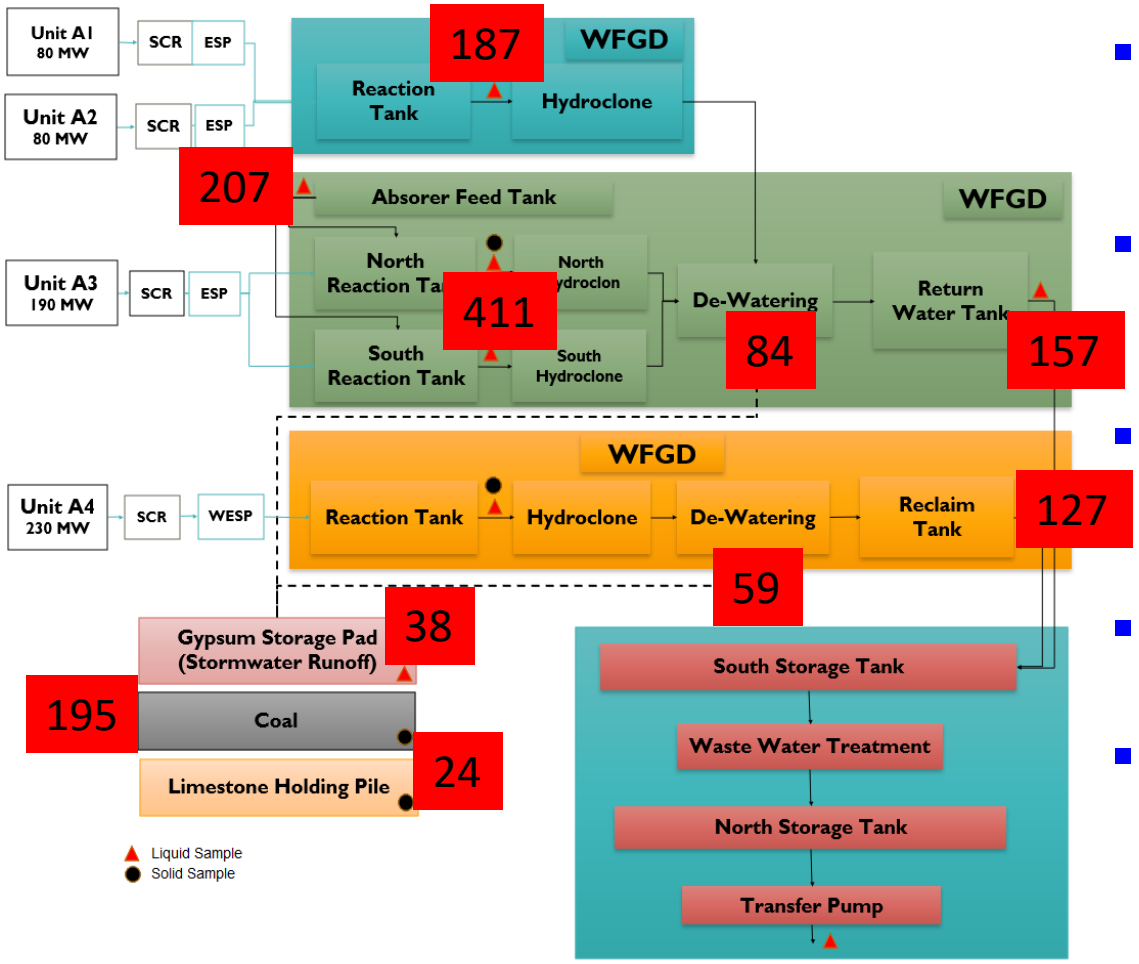
Power Plant A Configuration and Sampling Details



- Sub-bituminous coal
- Physical/chemical treatment of wastewater

- Sampling Duration: 10/2018 – 02/2019
- 753 Samples Collected (liquid and solid)
- Solid samples: Coal, limestone, gypsum
- 1835 analysis results
- Analyte include: Mercury, Arsenic, Selenium, Bromide, Nitrate, Nitrite, Coal Proximate Analysis and Ultimate Analysis.

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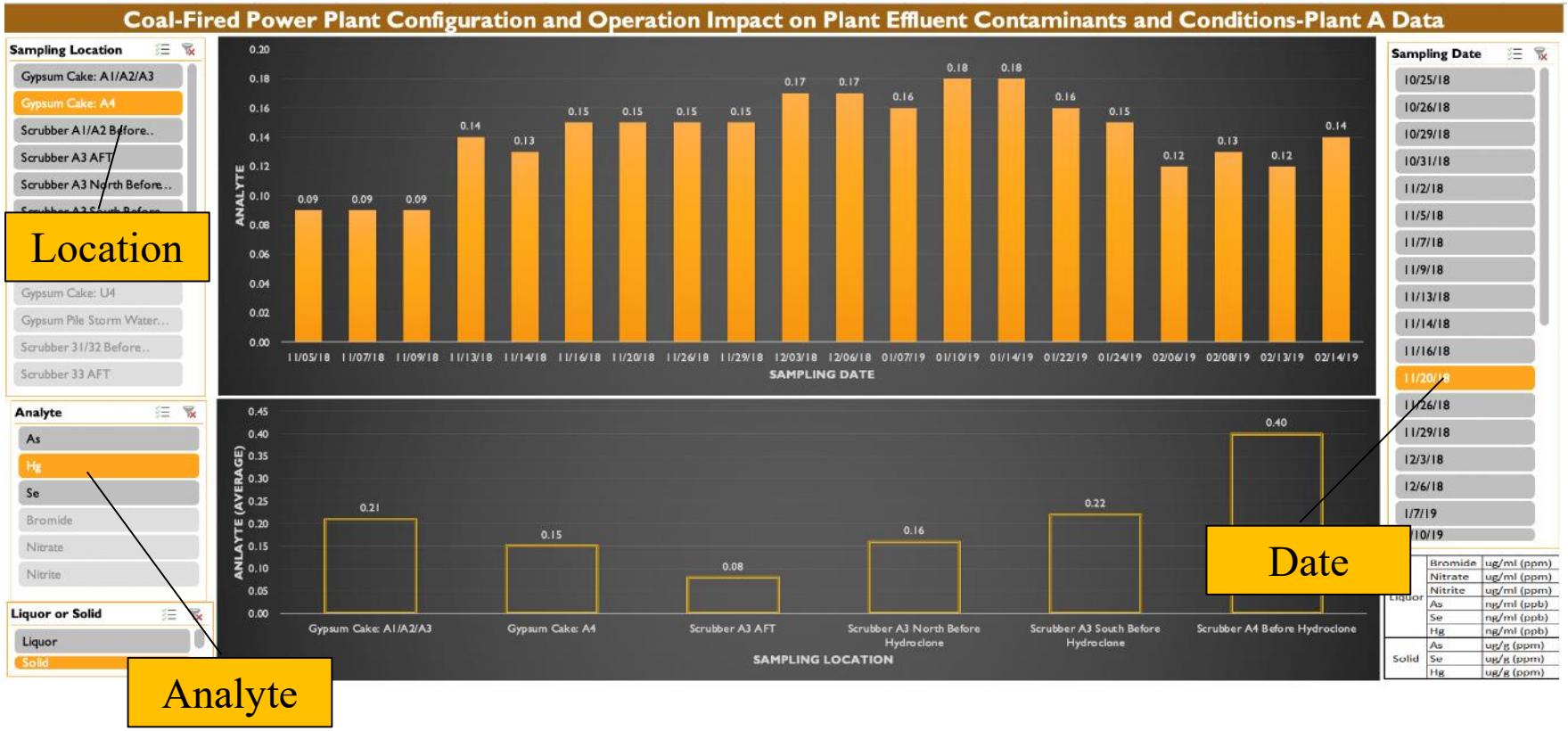
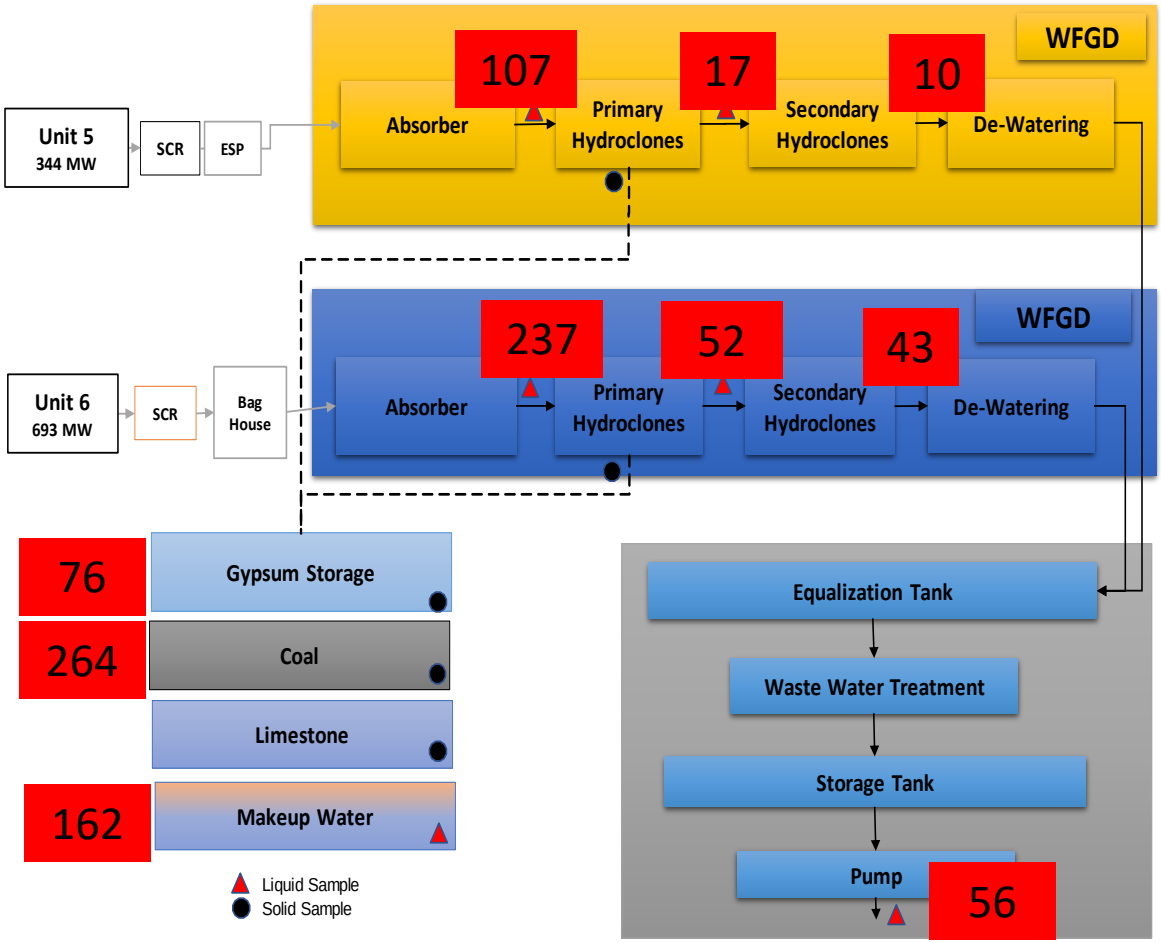
Plant A Database Main Dashboard

Showing Hg in Solids at Unit A4 Gypsum



Power Plant B Configuration and Sampling Details



- Bituminous Coal
- Physical/chemical treatment of wastewater

- Sampling duration: 06/2019 - 02/2020
- 452 samples collected (liquid and solid)
- Solid samples: coal, limestone, gypsum
- 1024 analysis results
- Analyte include: Mercury, Arsenic, Selenium, Nitrate, Nitrite, Coal Proximate Analysis and Ultimate Analysis

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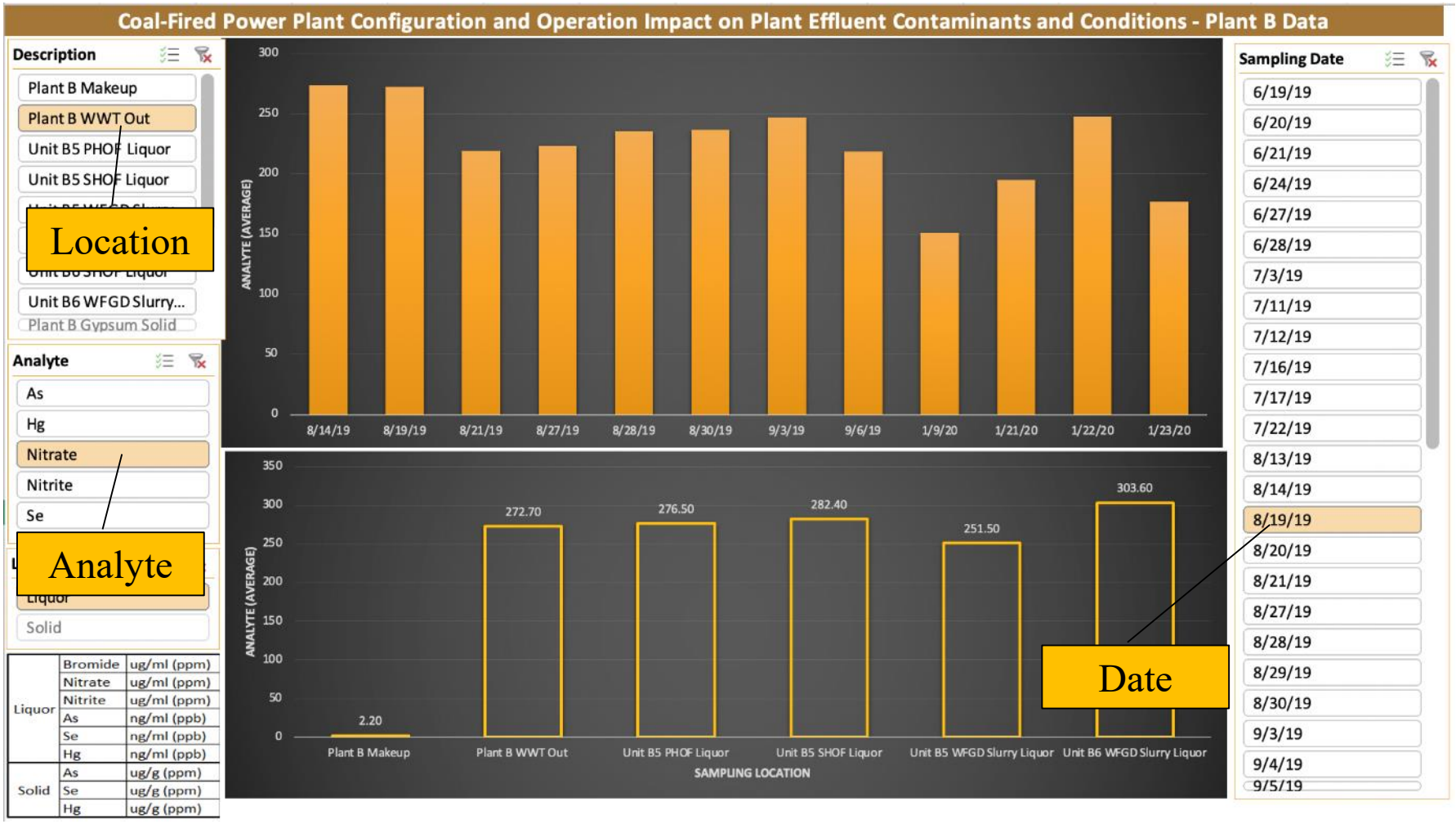
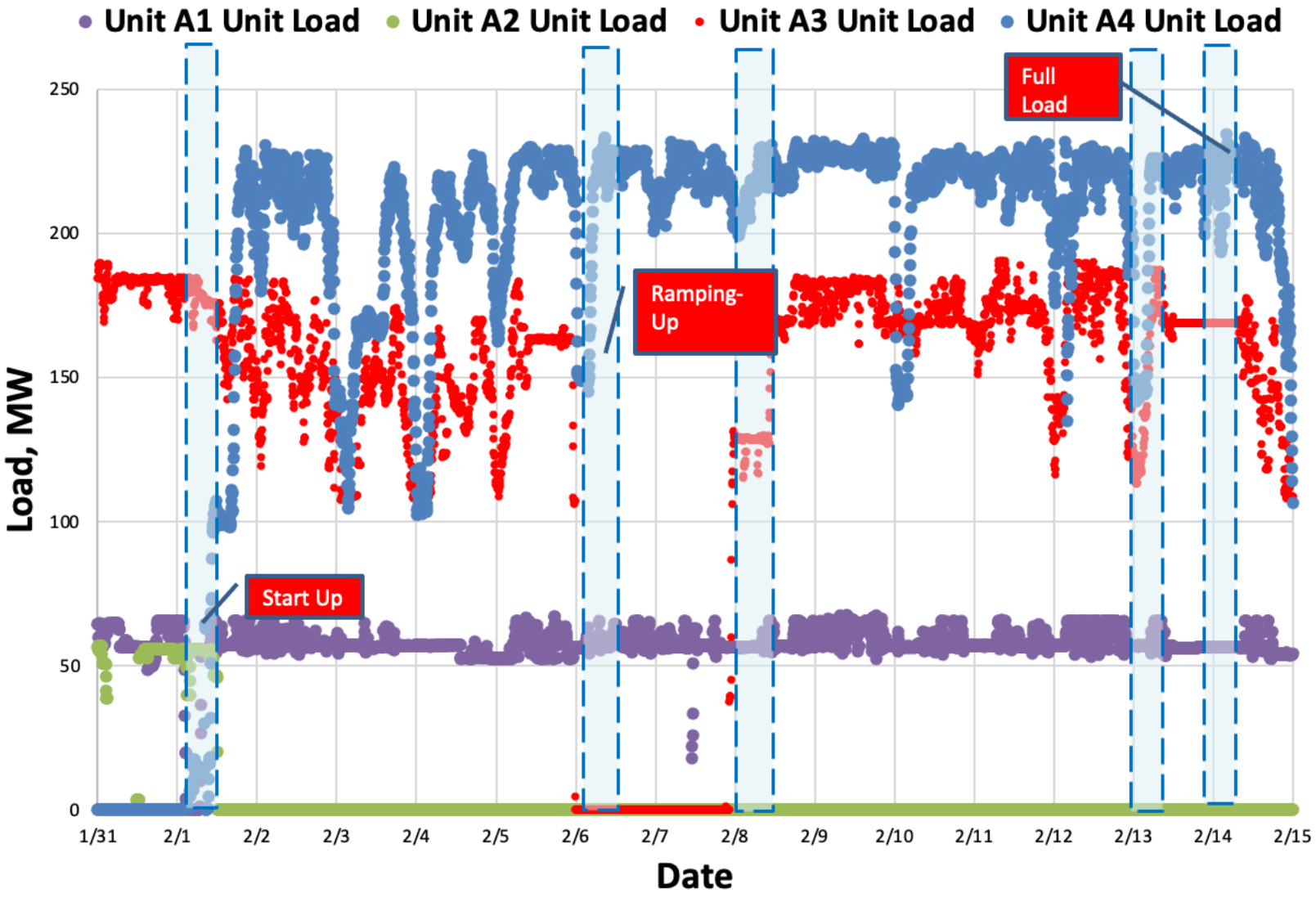
Plant B Database Main Dashboard

Showing Nitrate in Liquor at WWT Out



Power Plant A Cycling Profile



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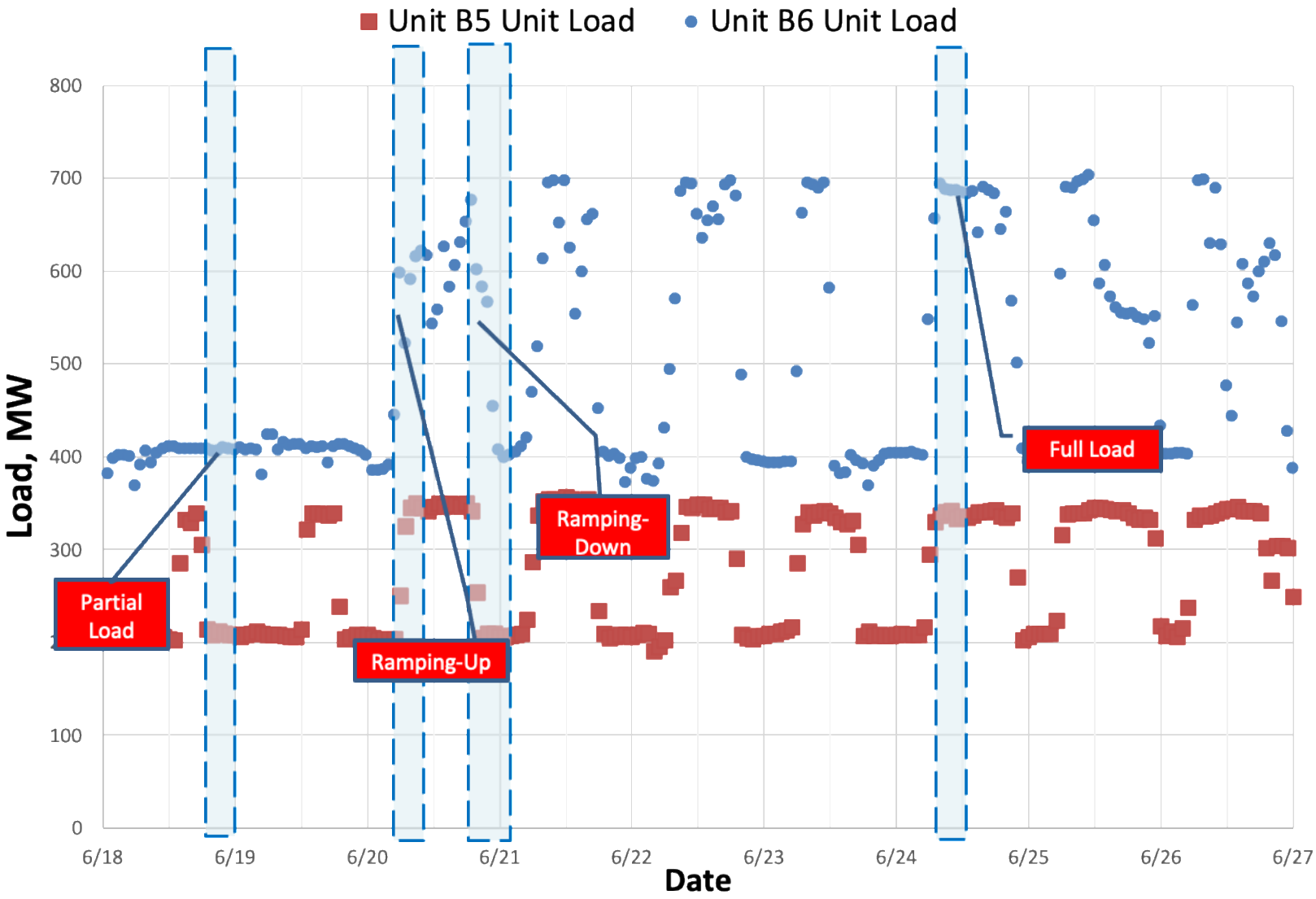
Power Plant B Cycling Profile



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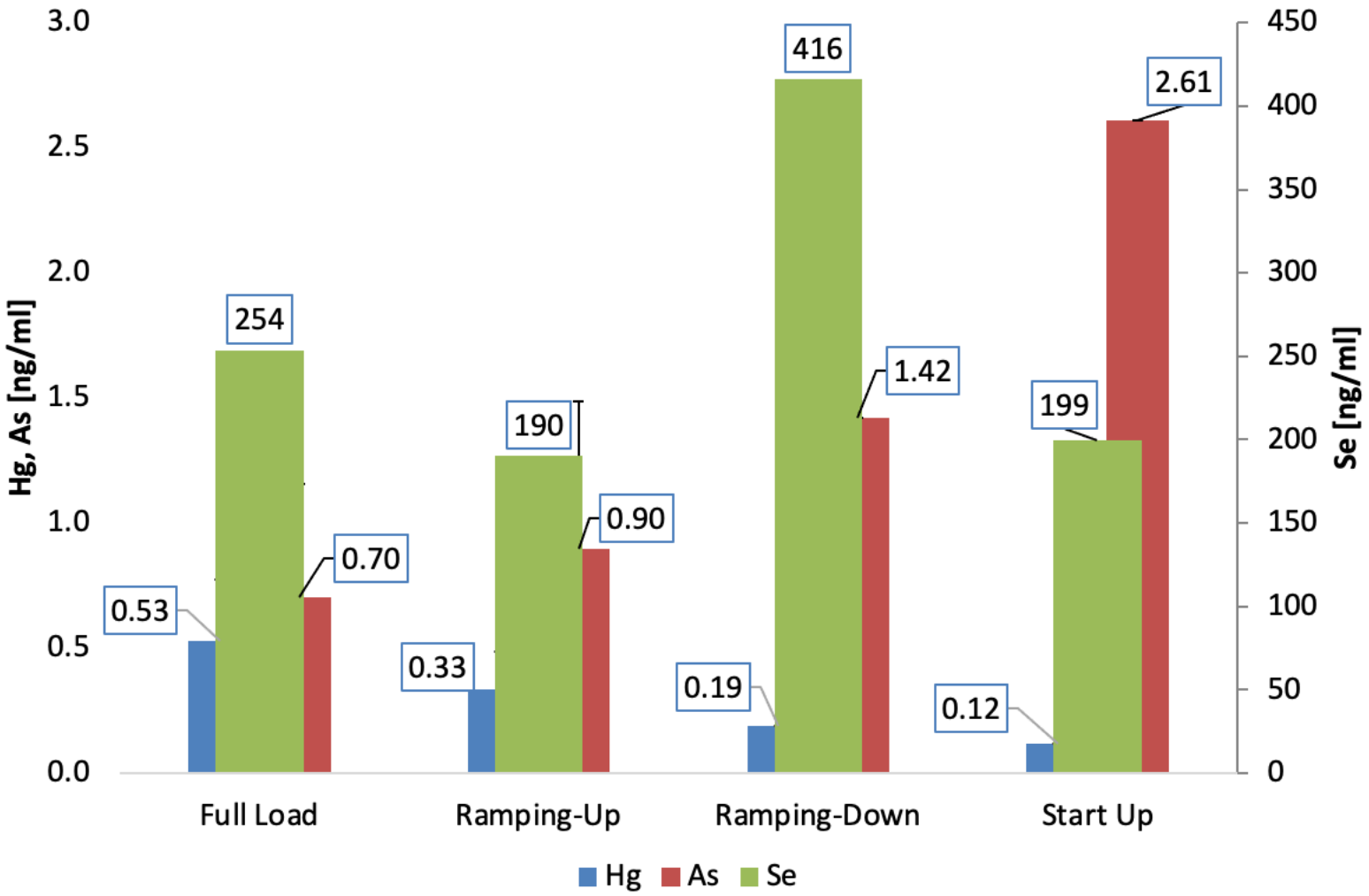
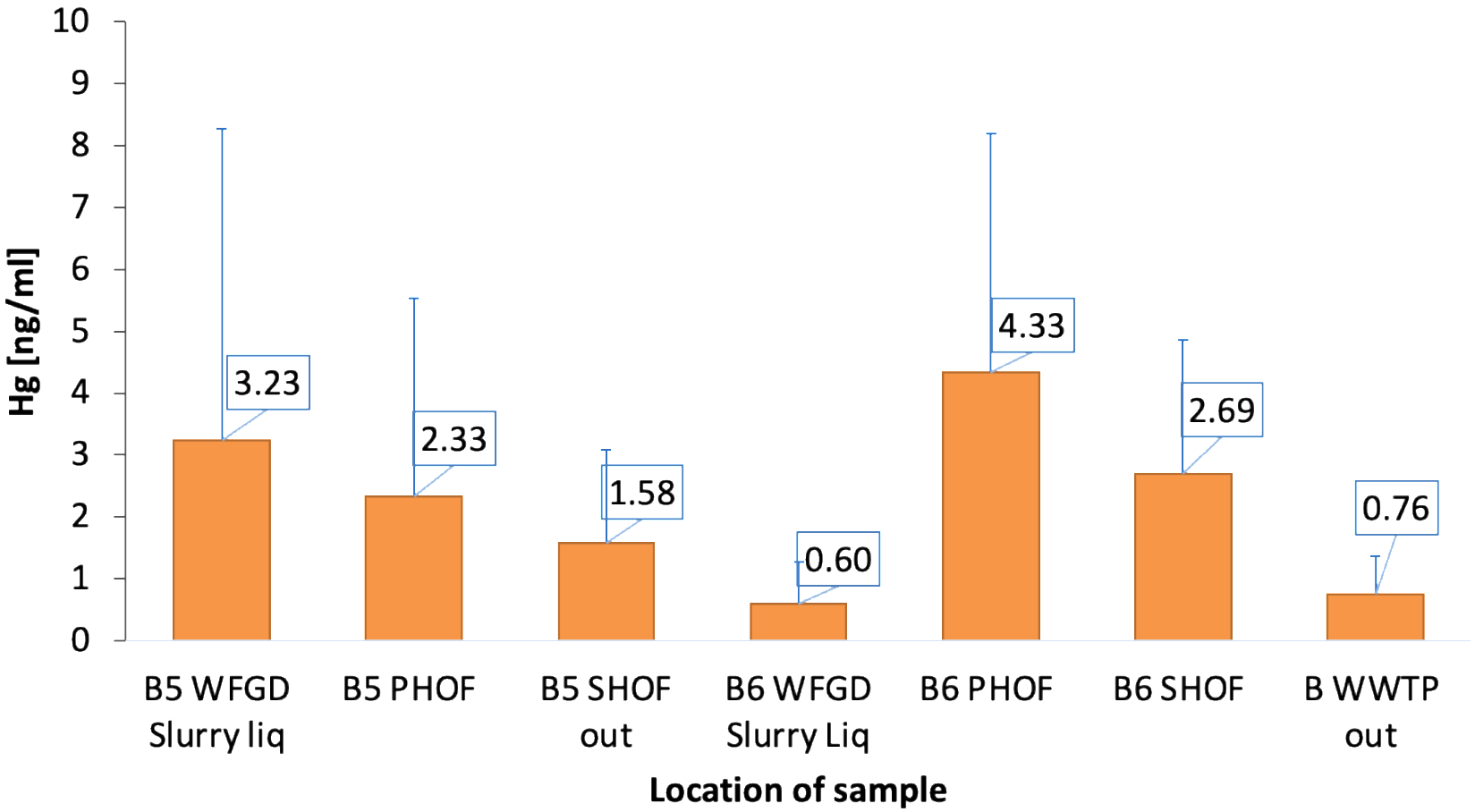
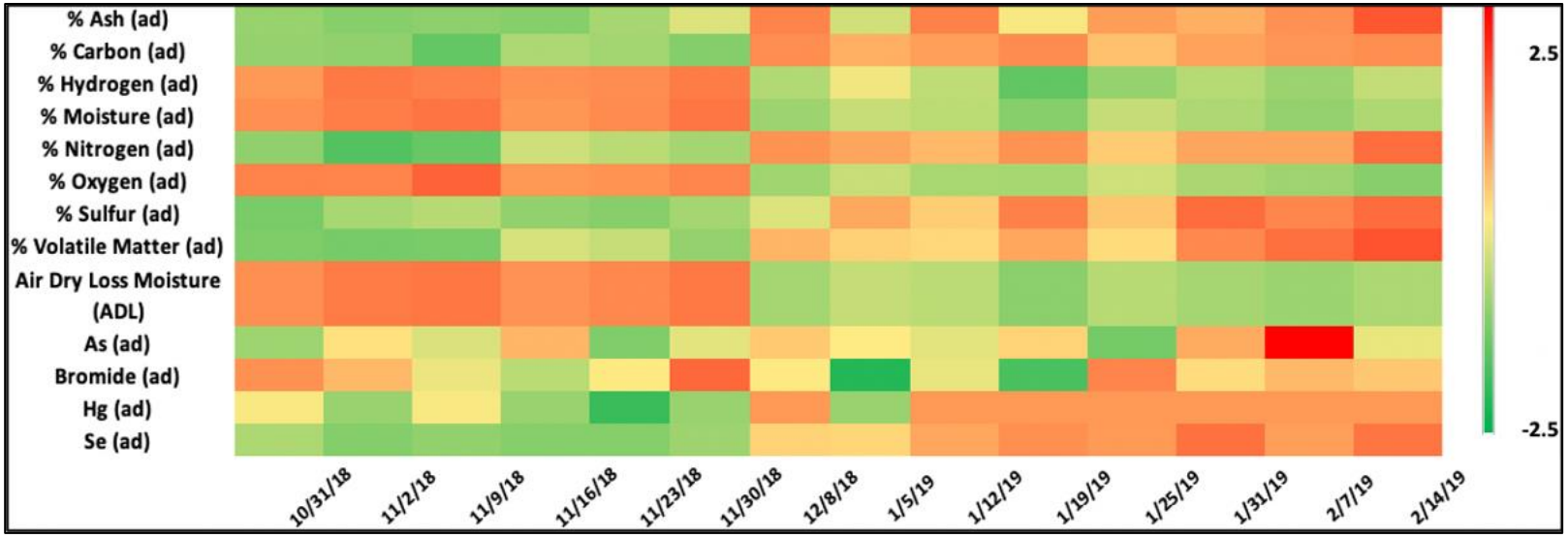
Plant A: Average Hg, As, Se concentration in Liquor at Unit A4 before Hydroclone with respect to Unit Cycling

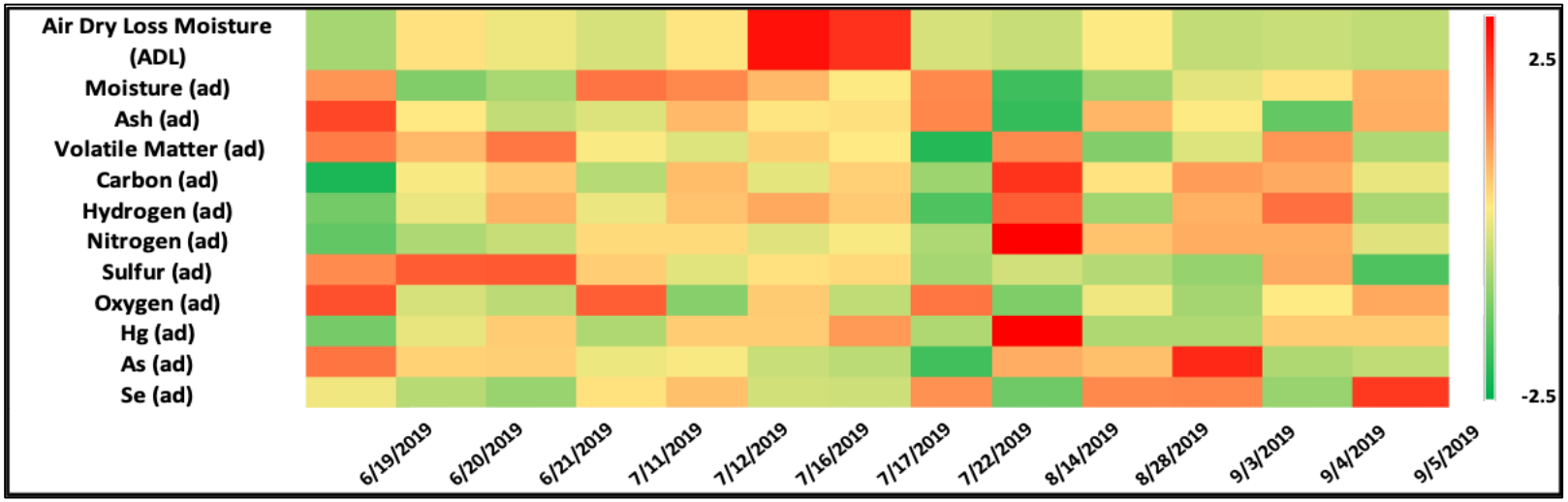


Plant B: Average Hg Concentration in Liquor across sampling locations



Coal Quality Heat Map: Plant A (top) and Plant B (bottom)





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Conclusion

- Plant operational profile and configuration influences the effluent concentration.
- While an increased unit load directly correlated with an increased concentration for Hg and reduced concentration of As (plant A) at unit A4, this trend was not proven at other units.
- The range of concentration of effluents vary greatly across the dates and unit operation.
- The testing for Plant C will be completed this year

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Thank you!

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