

Novel Approach to Hg Control for wFGDs

Nalco Water Project Mad Hatter

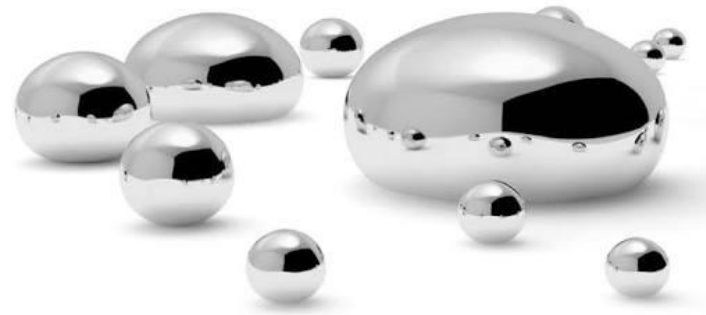
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Agenda

- ▲ Overview Nalco Mercury Control Experience
- ▲ Project Mad Hatter
 - Overview
 - Injection System
 - Full-Scale Results
- ▲ Conclusion

Nalco Mercury Control - Experience



- ▲ **Nalco MerControl Technologies installed on over 70 GW**
- ▲ **NA Market leader in Reemission Control**
 - Over 80% of market
- ▲ **Performed Over 100 Demonstrations**
 - Activated Carbon
 - Fuel Additives
 - Reemission Additives (MerControl 8034 Plus)
 - SDA/CDS Technology (MerControl SD-Hg)
 - **PROJECT MAD HATTER NEW!**

What is Project 'Mad Hatter'?



▲ Purpose:

- Increase mercury capture on units equipped with a wFGD
- Eliminate the need for activated carbon
- Decrease halogen loading compared to alternative methods
- Reduce compliance costs O&M (up to 40%)
- 30% reduction in capital compared to ACI

▲ Process:

- Dual Fluid Lances installed post ESP pre wFGD
- Proprietary Chemistries
- 100% liquid application

Project 'Mad Hatter' – Injection System



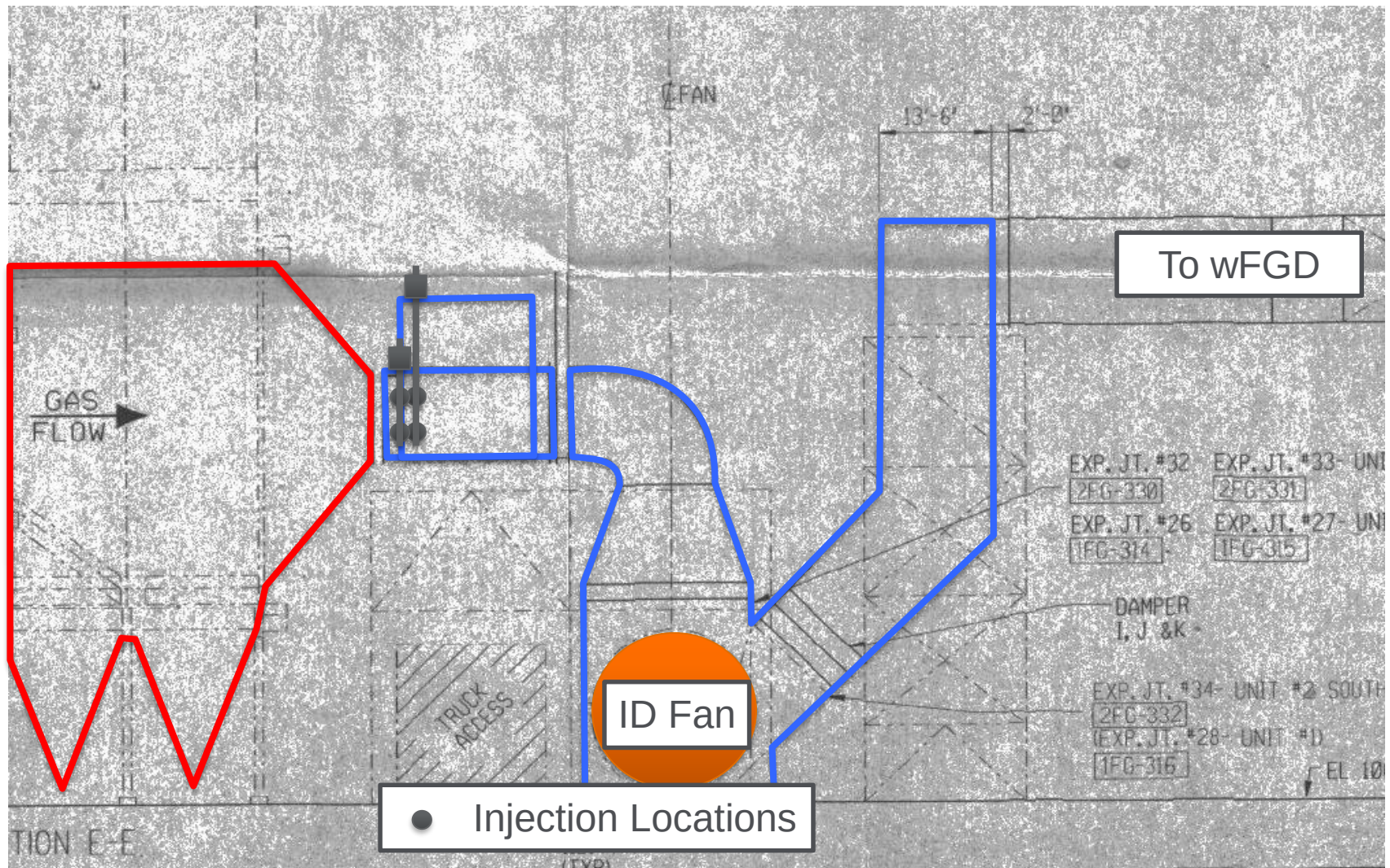
▲ Dual Fluid Injection Lances

- Compressed Air (275 scfm, 60 psi)
- Proprietary Liquid Chemistries (2-14 gpm, 80 psi)
- Located after ESP, before the wFGD

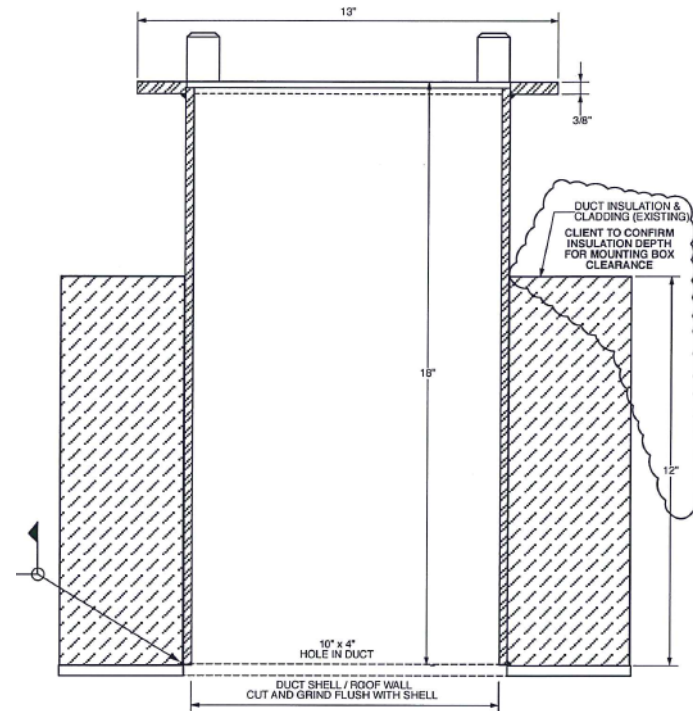
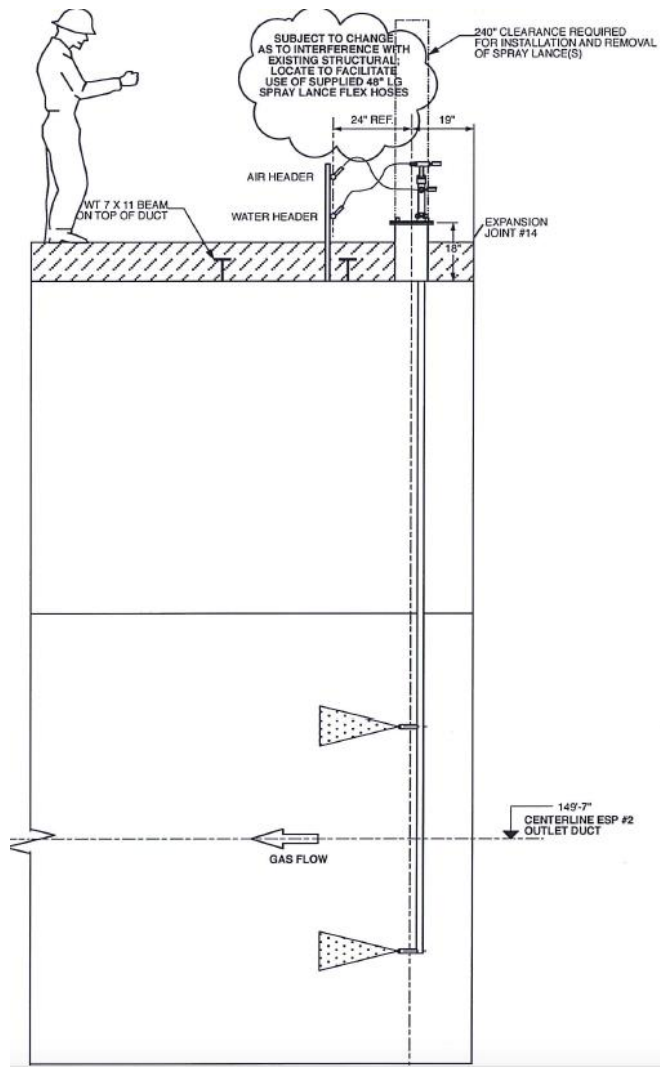
▲ Site Specific Design:

- Ensure adequate distribution
- Confirm droplet evaporation before ID Fan
- Dual Fluid application enhances product distribution

Project 'Mad Hatter' – Injection System



Project 'Mad Hatter' – Injection System



- ▲ Lances placed between ESP and wFGD
- ▲ Mounting boxes can be installed during plant operation

Project 'Mad Hatter' – Injection System



Project 'Mad Hatter' – Chemistries



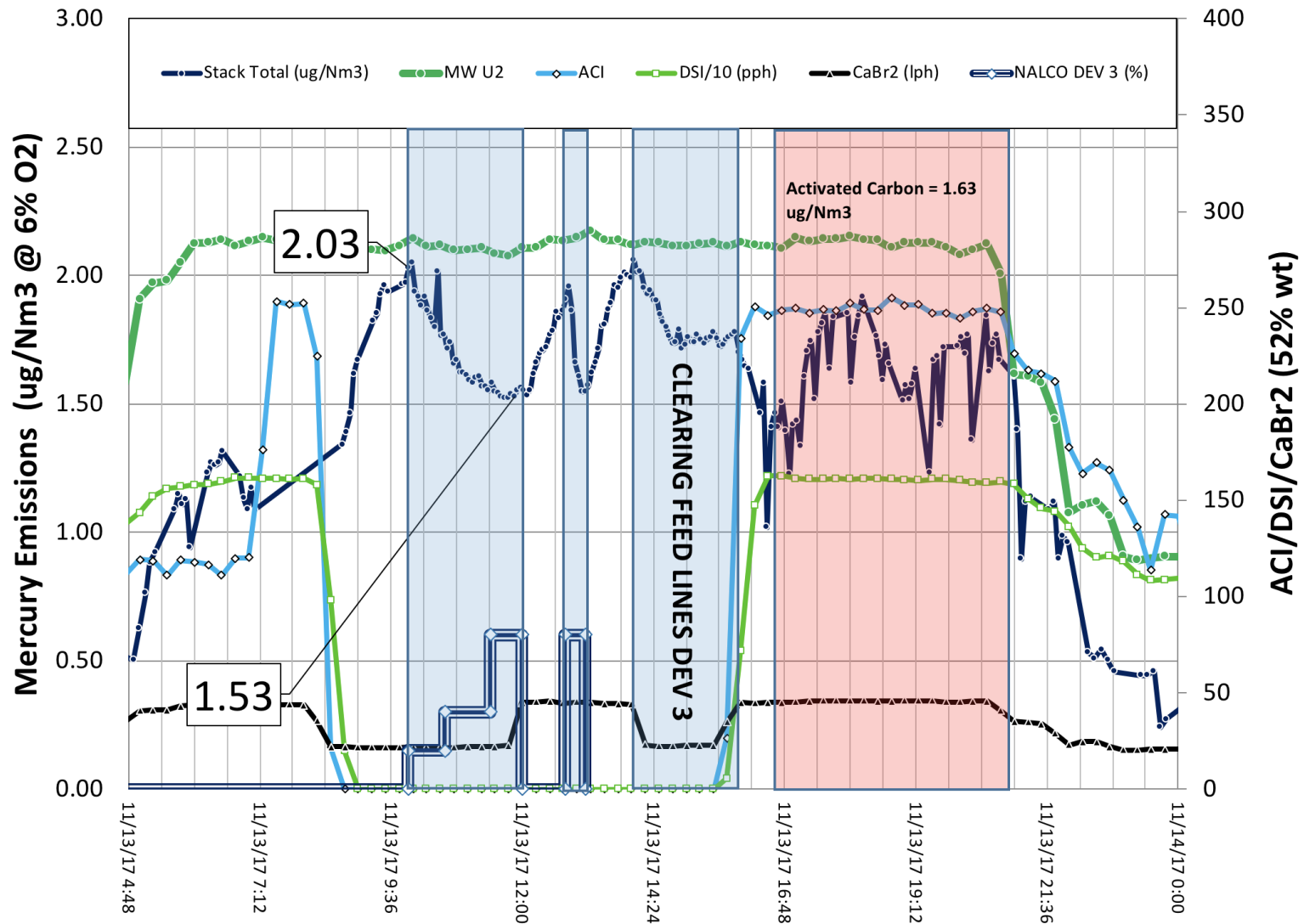
- ▲ Two Nalco Chemistries are mixed with plant service water
 - Nalco 8018
 - Nalco 8019
 - **Currently in use for over two years in NA for mercury control (semi-dry scrubbers)**

- ▲ Chemistry Benefits:
 - Non-carbon
 - Non-halogen
 - Liquid application
 - **Lower O&M cost by 30-40% compared to ACI**

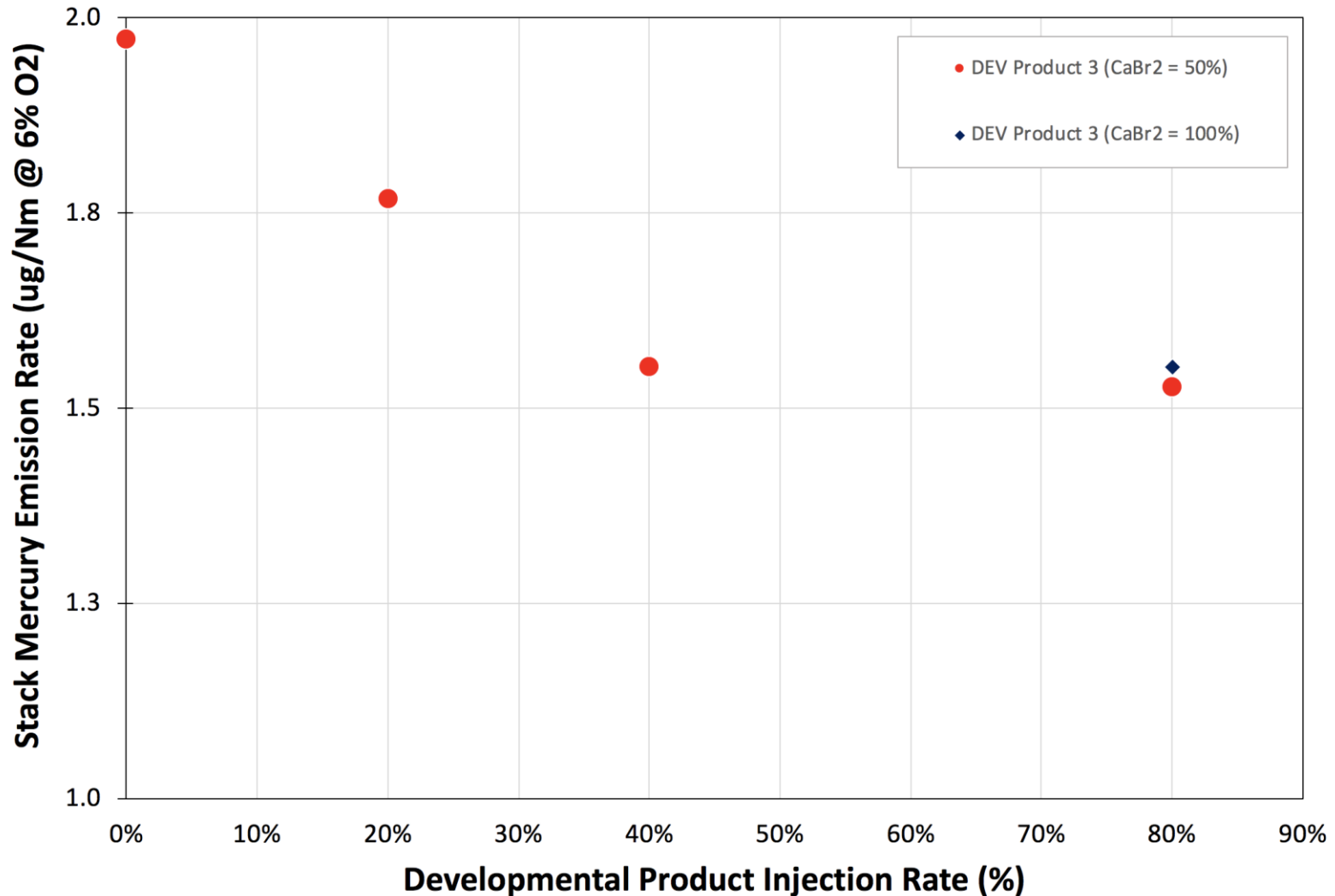
Project 'Mad Hatter' Demo - Overview

- ▲ Two boilers combine to common wFGD
 - Unit 1 = 150 MW
 - Unit 2 = 280 MW
 - Hard Coal (bituminous)
- ▲ Injection of Nalco product only on Unit 2
 - Only treated about 65% of flue gas flow
 - Technology applied over a 3-day period
- ▲ Plant uses activated carbon, hydrated lime and calcium bromide addition for mercury control.
 - **Activated carbon and hydrated lime used to reduce stack emissions about 0.5 ug/dscm to help with station average.**
 - Calcium bromide used to increase mercury oxidation rates.

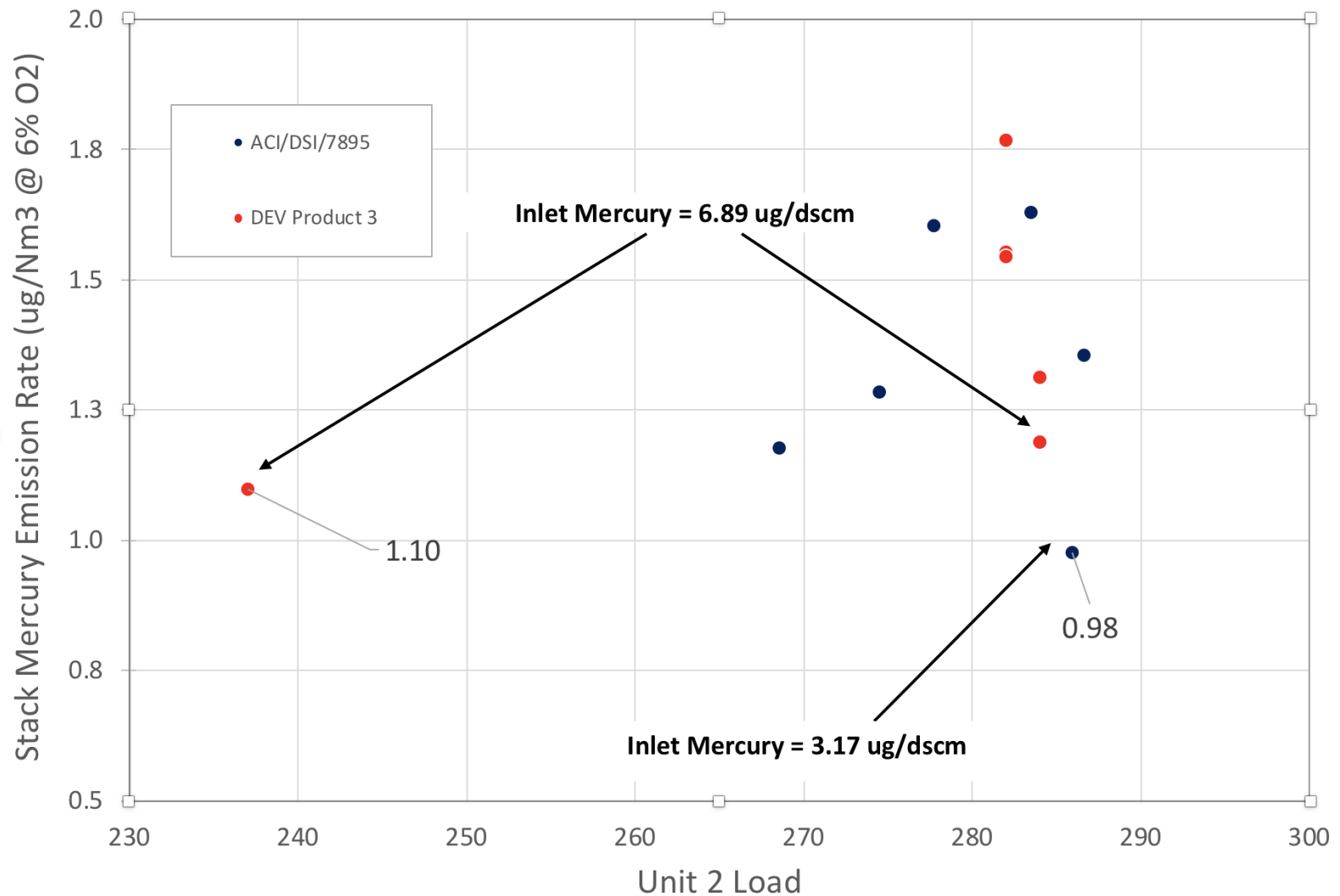
Project 'Mad Hatter' – Full Scale Results



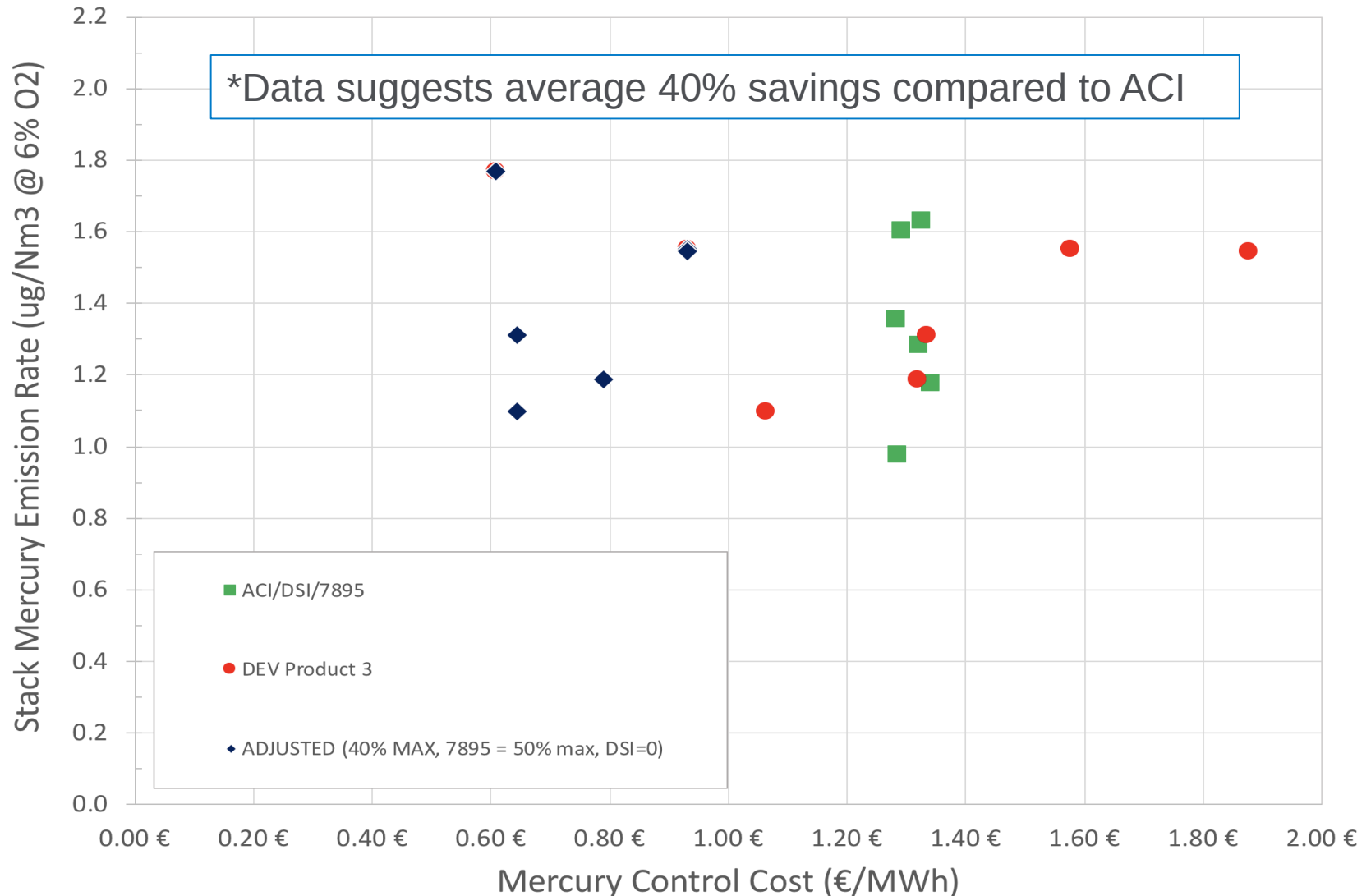
Project 'Mad Hatter' – CaBr₂ Impacts



Project 'Mad Hatter' – Full Scale Results



Project 'Mad Hatter' – Full Scale Results



Project Mad Hatter - Conclusion

- ▲ Proprietary technology injected post ESP prior the the wFGD
 - Dual Fluid Lances
 - Liquid Reagents
 - Non-halogen chemistries
- ▲ Can eliminate the need for activated carbon on units with a wFGD
 - Initial demonstration suggests potential O&M savings of 40%
- ▲ Actively seeking a lignite fired demonstration site
 - Long-term injection
 - Balance of Plant Impacts

Questions?

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