HALDOR TOPSOE

Fatima
Fertilizer Company Limited

Successful implementation of ClearView™ in Fertilizer Industry

Advances in the Digitalisation of the Process Industries

Successful implementation of ClearView™ in Fertilizer Industry

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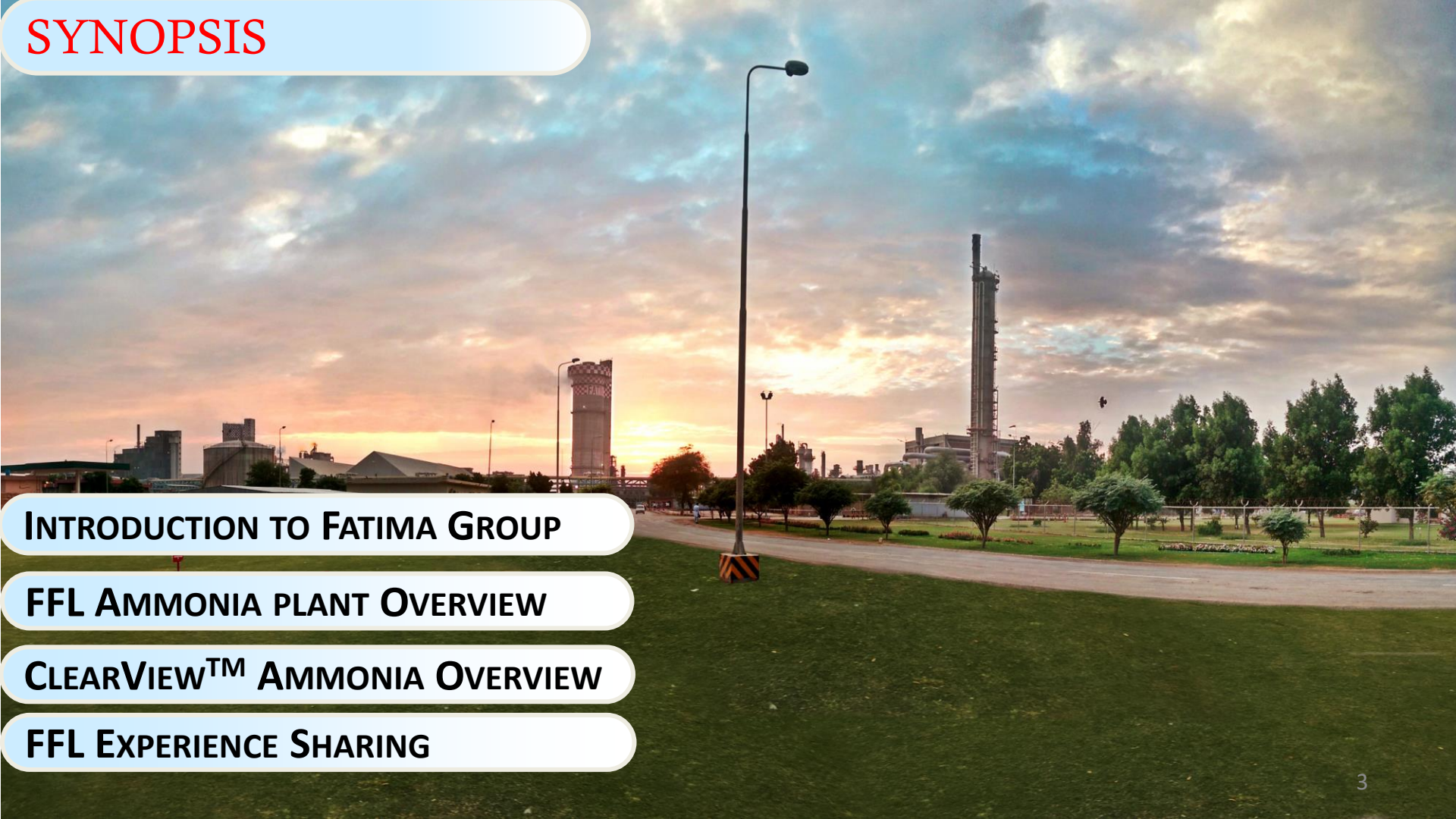
SYNOPSIS



- INTRODUCTION TO FATIMA GROUP
- FFL AMMONIA PLANT OVERVIEW
- CLEARVIEW™ AMMONIA OVERVIEW
- FFL EXPERIENCE SHARING

Fatima Group – At A Glance

1936 FATIMA GROUP ESTABLISHED

1966 **FAZAL CLOTH MILLS LIMITED**

1989 Fatima Sugar Mills Limited — A Fatima Group Company

1990 Reliance Weaving Mills Limited — A Fatima Group Company

1996 Reliance Commodities Private Limited — A Fatima Group Company

2003 Fatima Fertilizer Company Limited
Urea/CAN/NP
1.48 MMT/yr

2005 pakarab FERTILIZERS LIMITED
Urea/CAN/NP
0.83 MMT/yr.

2009 Pakistan Mining Company Limited — A Fatima Group Company

2012 Fatima Energy Limited — A Fatima Group Company

2015 fatimafert limited
Urea
0.50 MMT/yr.

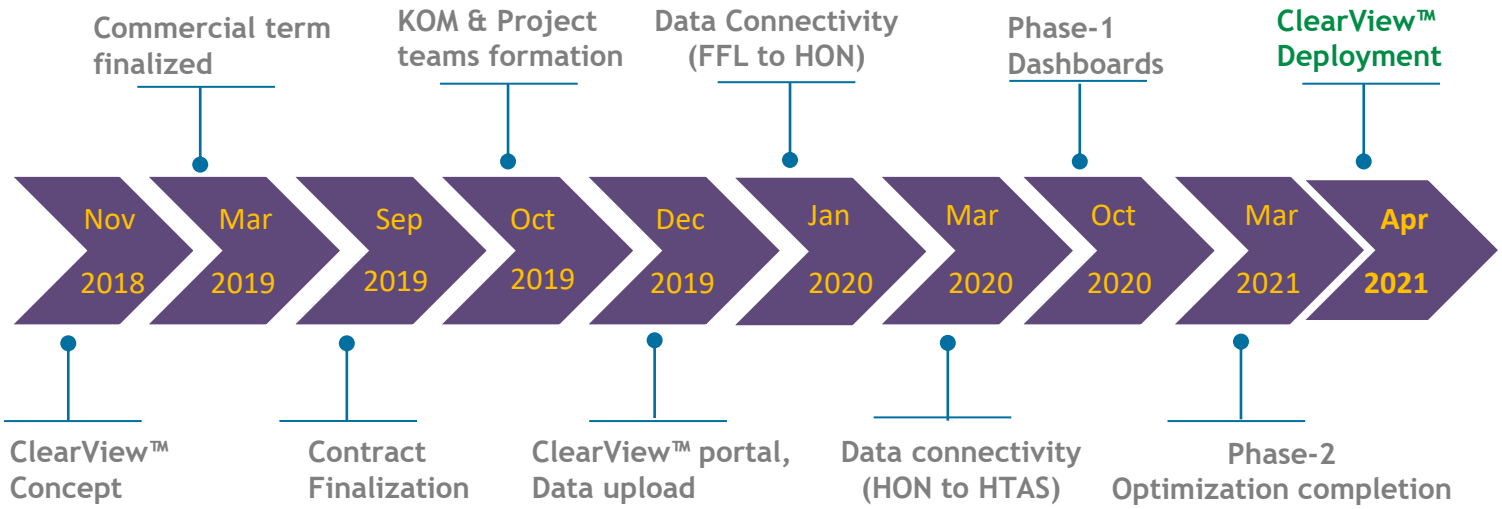
Fertilizer Businesses:

- 03 Plant Sites
- Capacity: **2.8 MMT/year**

Successful implementation of ClearView™ in Fertilizer Industry

FFL Ammonia Plant

ClearView™ Ammonia Project Journey



Haldor Topsoe digital solution, ClearView™, is now operational at Fatima's ammonia plant.

ClearView™ Ammonia Project Journey

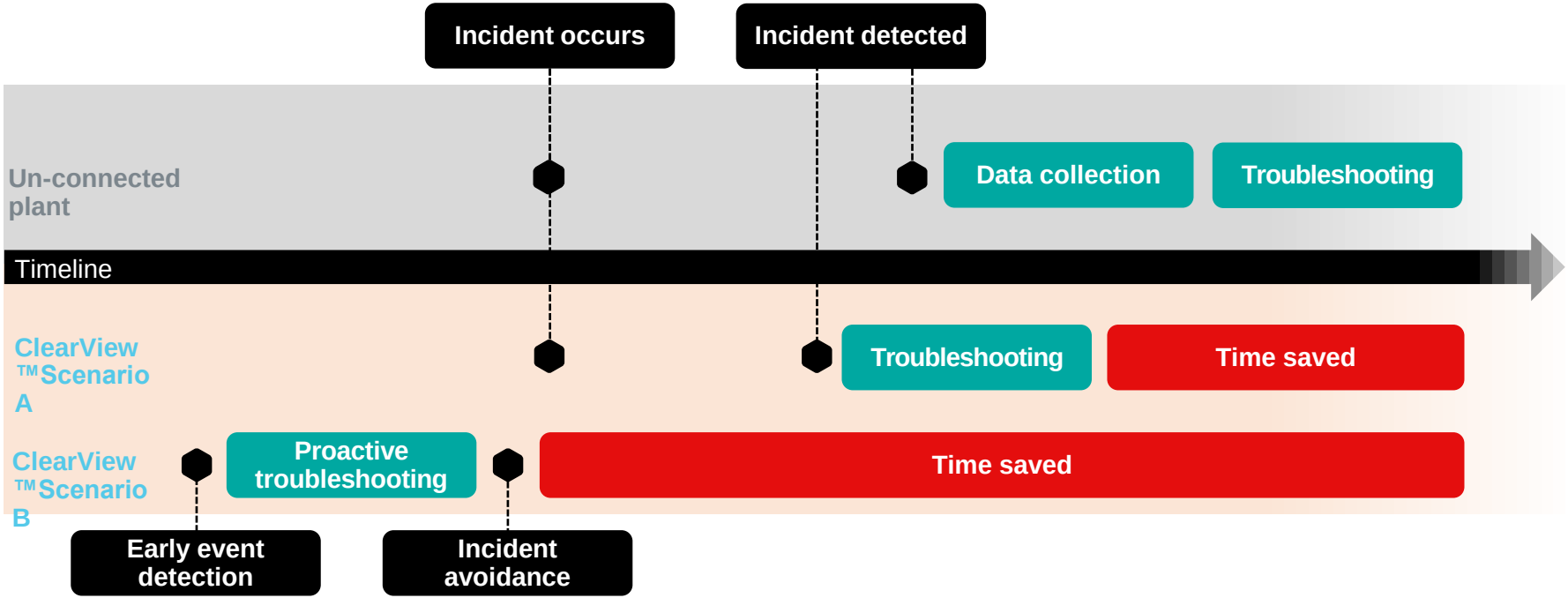
Fatima Fertilizer's (FFL) Ammonia plant is the First Plant among ~400 Ammonia Plants worldwide and ~125 Ammonia plants licensed by Haldor Topsoe to implement novel digital solution ClearView™.

Introduction to ClearView™ Ammonia

- ClearView™ introduction video

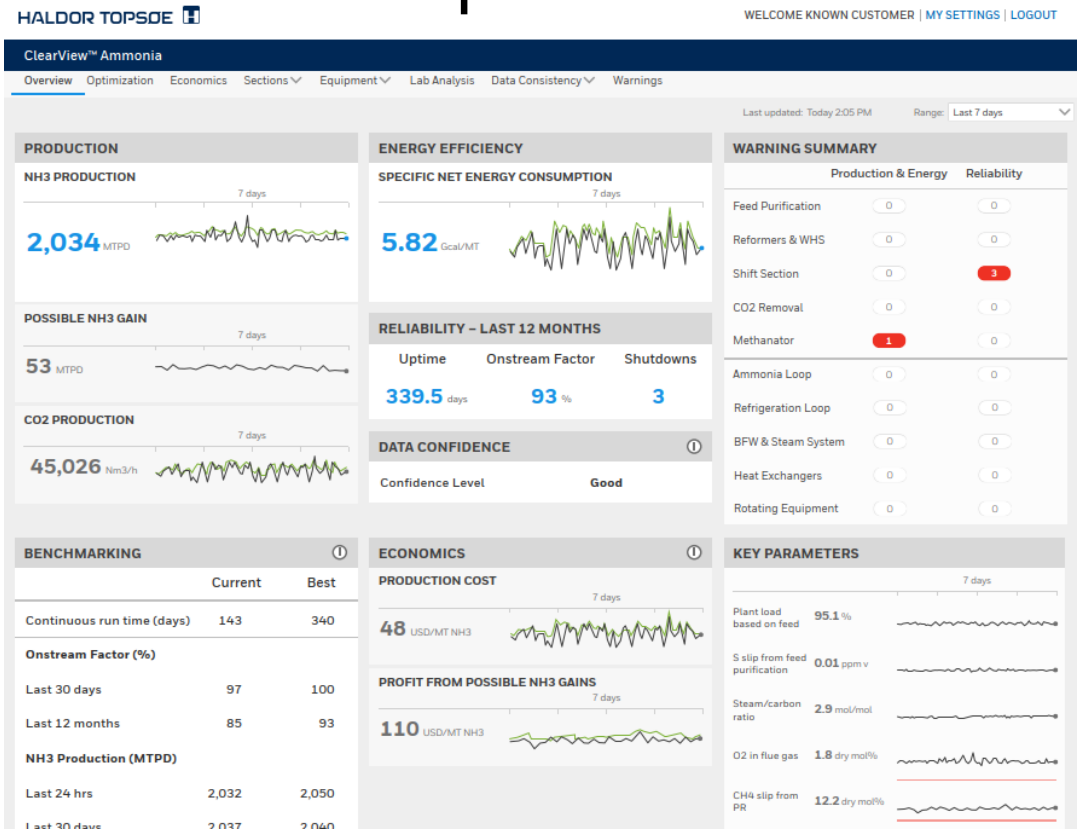
Introduction to ClearView™ Ammonia cont.

Connected plants - The best accidents are those that never happen



Introduction to ClearView™ Ammonia cont.

- Online dashboard examples



Introduction to ClearView™ Ammonia cont.

- HTAS ClearView™ projects

  - 11 ClearView™ contracts are signed
  - 4 references have been deployed
  - Other contracts are expected to be deployed within 2021
  - Being a licensor we foresee increase in references via all new projects

ClearView™ contracts	Deployment status
4 ammonia plants	3 live + 1 for 2021
2 WSA plants	1 live + 1 for 2021
1 Hydrocracker unit	2021
2 Diesel hydrotreater	2021
2 Naphtha hydrotreater	2021

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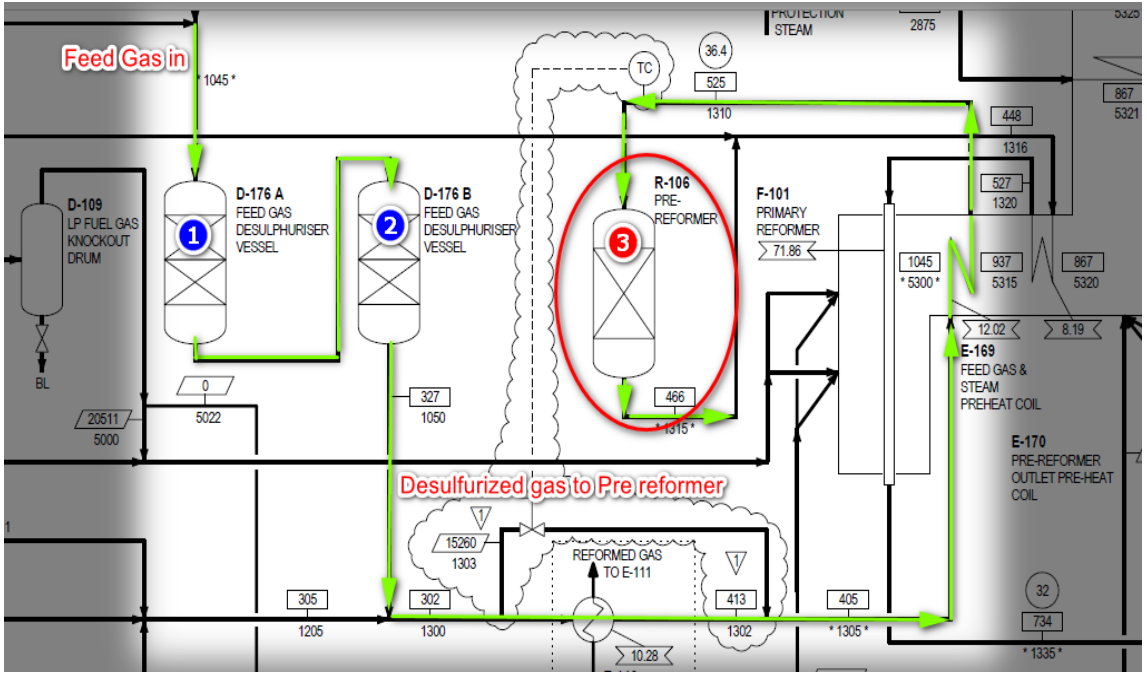
FFL Experience

Case Study-1

Case study-1:
Sulfur Slip from Feed Purification Section

During May'21, Organic sulfur slip from Desulfurizer increased to 15 ppb from <10 ppb.



Sulfur is poison to Reforming and Shift section catalysts.

Case study-1

Solutions against high Organic sulfur slip:

1. Increase inlet temperature
2. Increase inlet Hydrogen
3. Catalyst replacement

Impact is decrease in production and higher energy consumption.

Pre reformer Deactivation monitoring:

1. z90 based upon simulated temperatures
2. Deactivation progression with time

Case Study-1 : Conclusion

- No alarming deactivation of Prereformer in ClearView™
  Actual : 0.5% per month (~3 ppb Sulfur slip)
  Expected: 2 to 3 % (15 ppb Sulfur Slip)

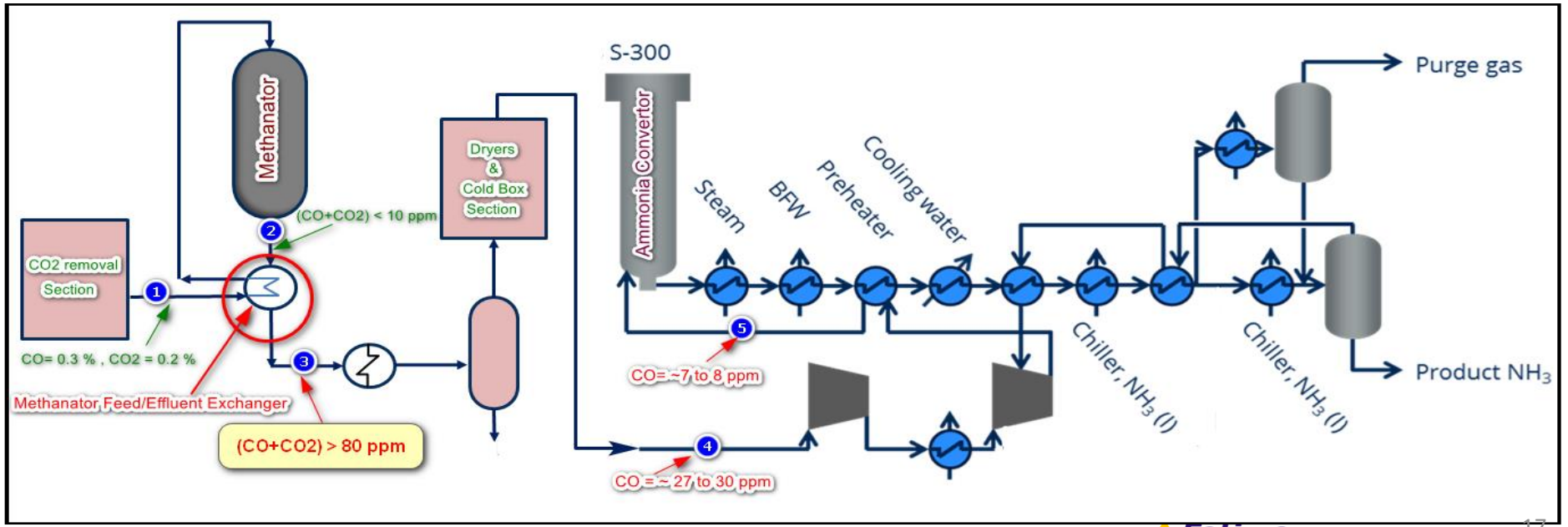
- Based upon ClearView™ monitoring, no further actions were taken and Catalyst replacement job removed from TA'21.

Case Study-2

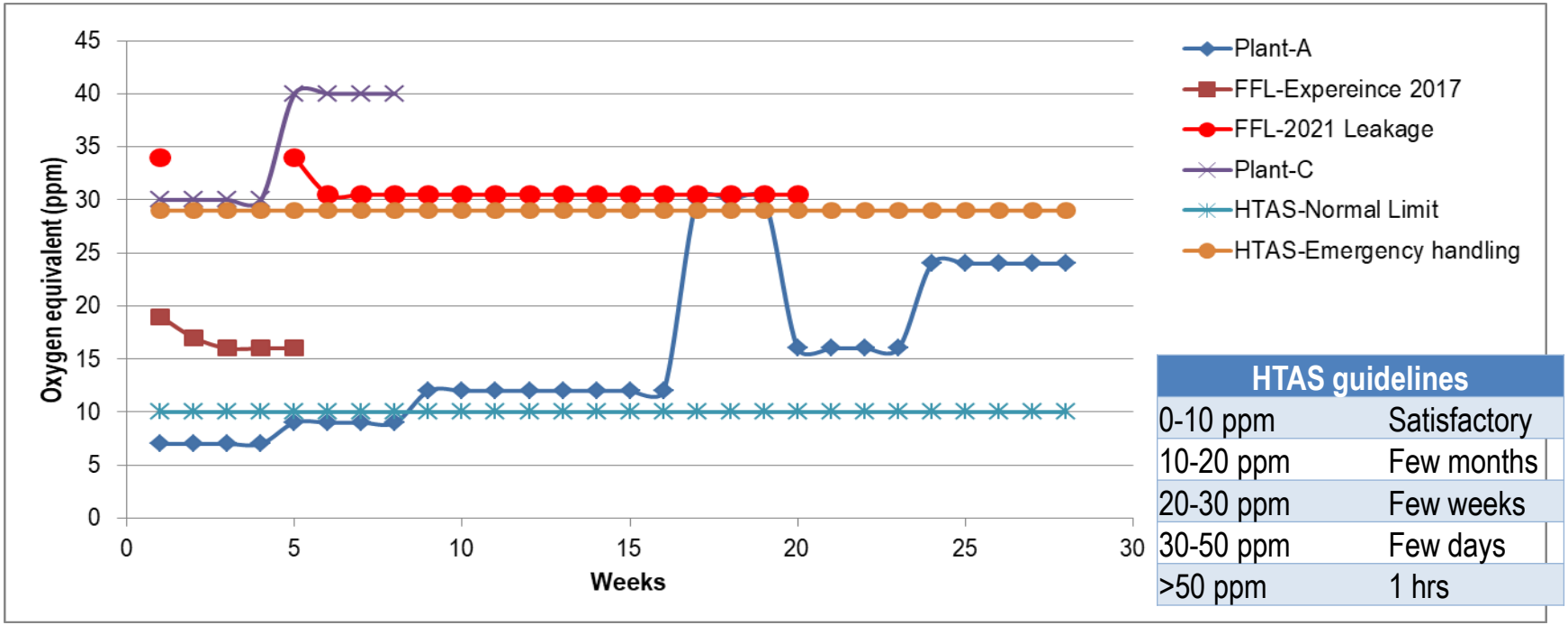
Ammonia Convertor Operation with CO Leakage

17-18 June 2021: 18 hours unplanned shutdown

- Leak across methanator effluent exchangers
- CO measured inlet NH_3 converter



Industrial Experience



HTAS guidelines	
0-10 ppm	Satisfactory
10-20 ppm	Few months
20-30 ppm	Few weeks
30-50 ppm	Few days
>50 ppm	1 hrs

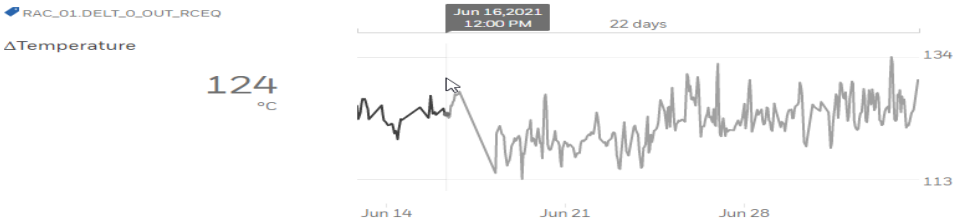
~4.5 days plant shutdown required to fix the leakage. It could be taken immediately or postponed for 14 days (Maintenance preparation)

Convertor Performance

With close focus and implementation of ClearView recommendations:

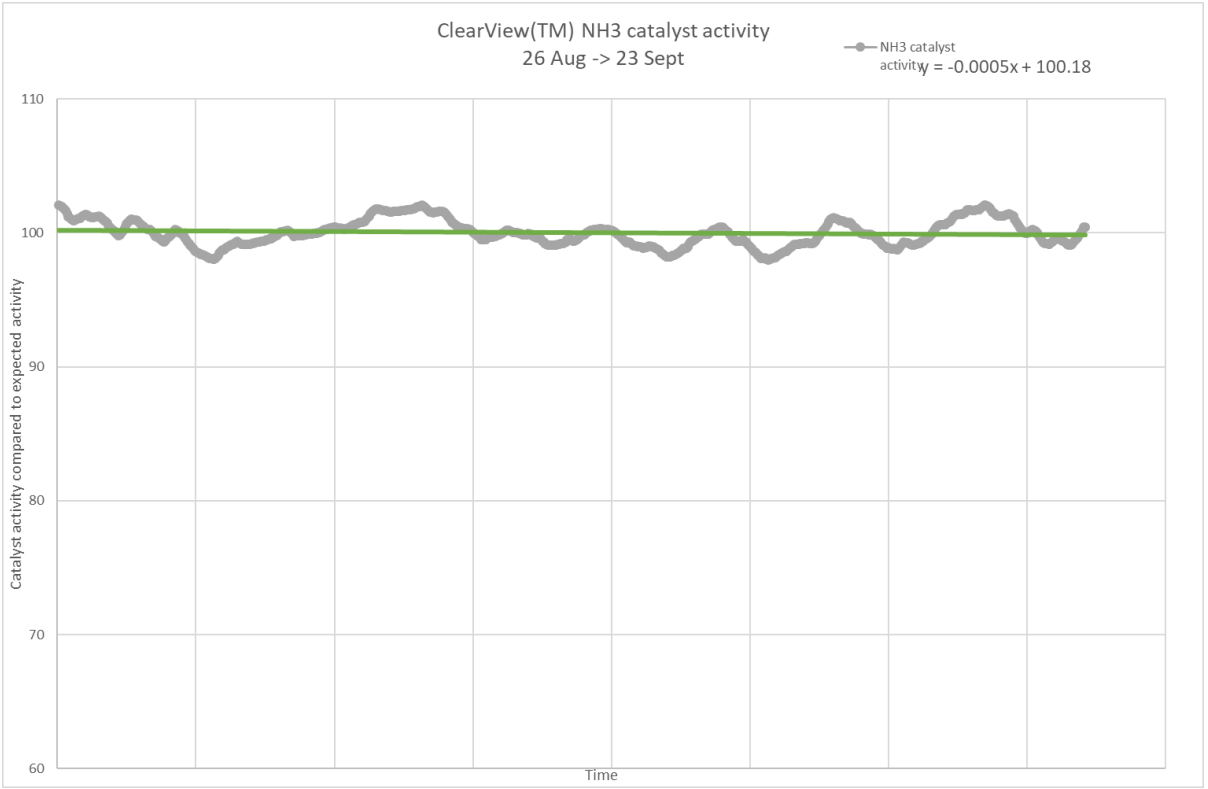
Loop pressure initially increased but remained stable afterwards.

Outlet ammonia concentration initially decreased and then remained stable.



DT of bed-1 initially decreased but improved to previous operating.

Convertor Performance cont.



Clearview™ simulation, Catalyst activity is fairly stable

Case Study-2: Conclusion

Based upon Stable catalyst activity in ClearView™, it is concluded that an Immediate shutdown of the plant is not required to fix this leakage.

Problem	Consequence	Benefit due to ClearView™
Leak across methanator effluent exchangers	CO entering NH3 loop	Immediate shutdown avoided. Plant operation sustained by ~4 months for leakage rectification in TA
	Risk of unplanned shutdown	

Remarks

- Haldor Topsoe digital solution, ClearView™, is now operational at Fatima's ammonia plant.
- The tool offers the closest possible collaboration (almost real-time) among Haldor Topsoe's highly experienced global team, their cutting edge know-how & softwares and Manufacturing Personnel which Topsoe believe will lead to significant cost savings to the licensees.
- Close collaboration has improved the stability and reliability of Simulation.
- Potential of savings is immense as witnessed in a few months of operation. FFL and HTAS stands committed to improve functionality of ClearView™ for Future as well.
- For More information
- www.topsoe.com/services/connected-services/clearview-ammonia
- http://fatima-group.com/ffcl/production_plant_detail.php/ammonia-plant-ffcl

Thank You!!!

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