Demethanizer column:
Replacement of internal components TA2025

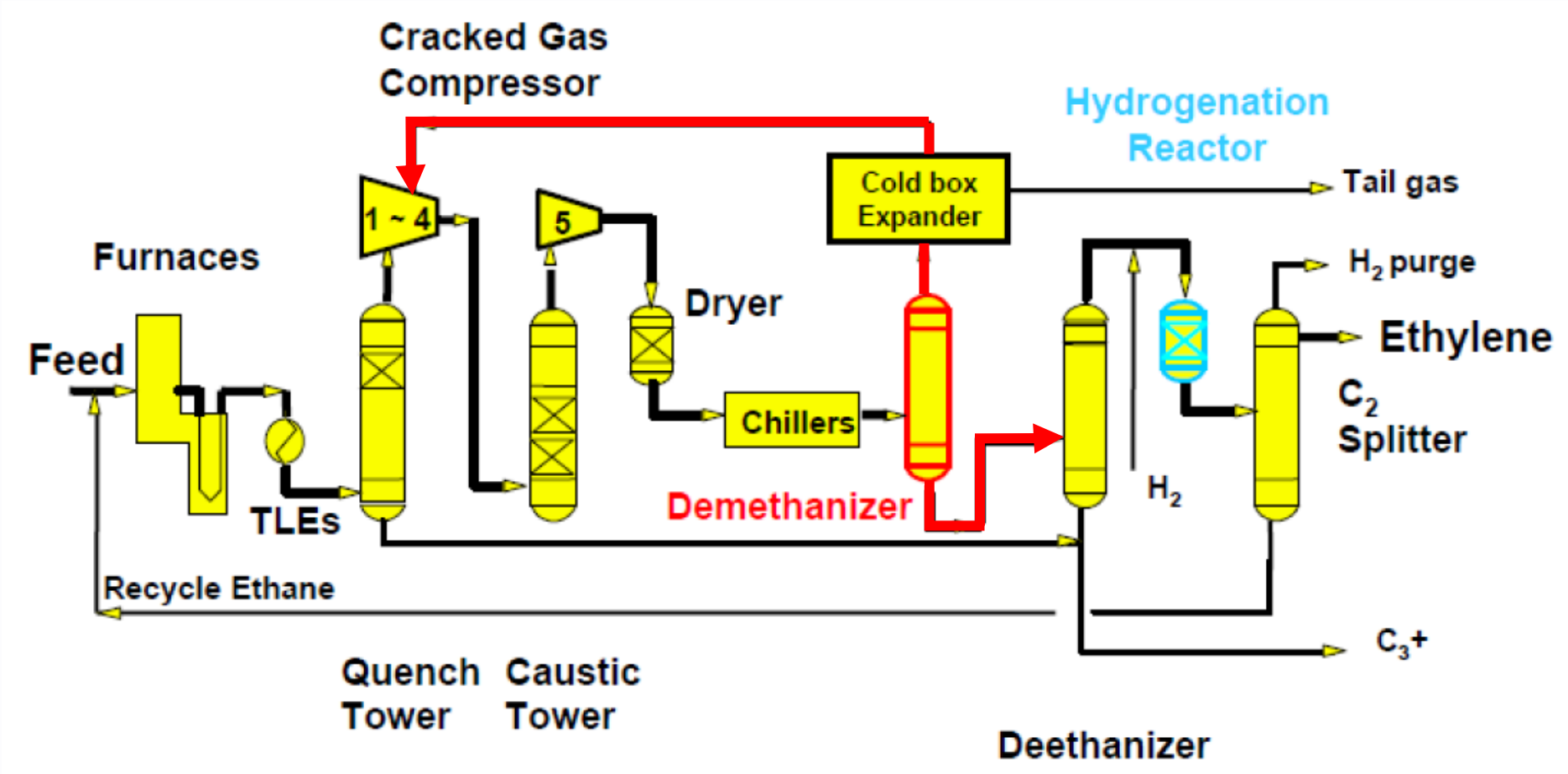
Braskem Idesa Cracker Site

Process Engineering - Ethylene and Utilities

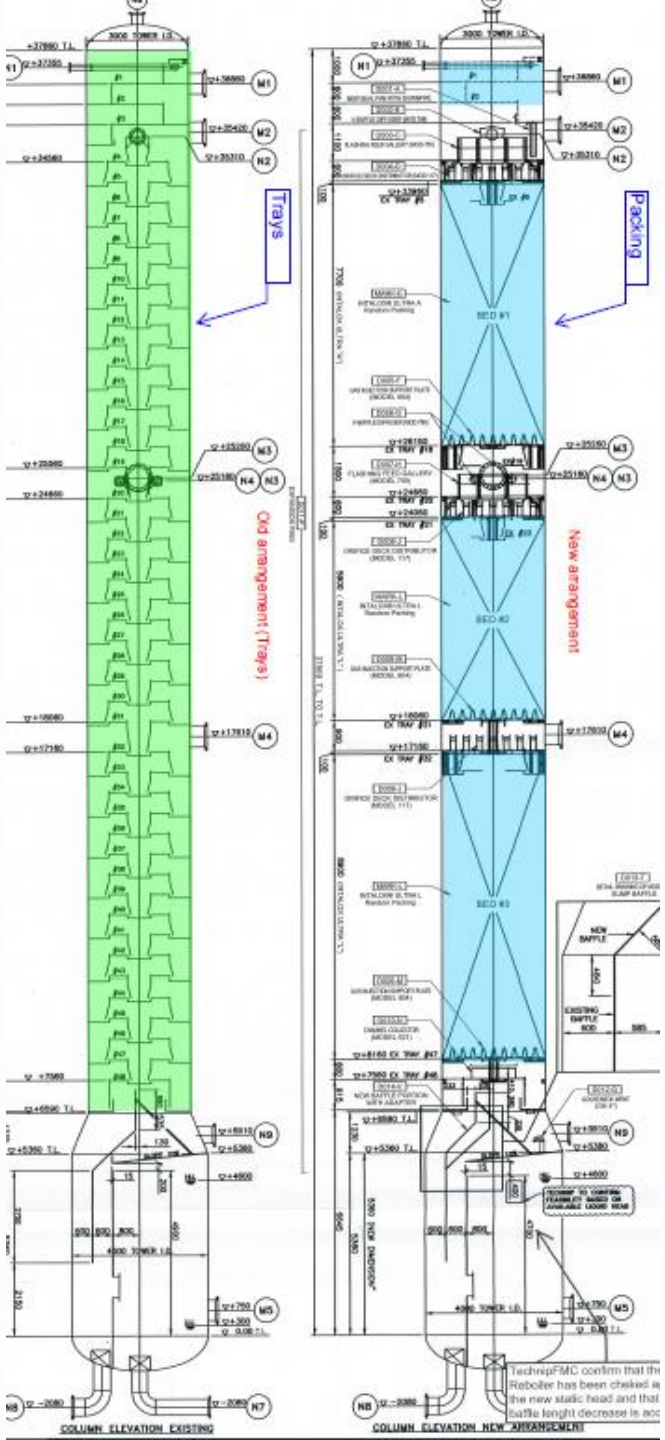
11/14/2025

Demethanizer column: Original design and first modification

In the ethylene plant, the cracked gas coming from the furnaces and hot section is sent to the demethanizer column (T-2401) to separate mainly methane and light components (CH4 and H2) as a top product and C2+ cut as a bottom product.



This column was originally designed with 48 trays, but since the start-up of the plant's operation in 2016, it exhibited a hydraulic limitation that prevented it from reaching its nameplate capacity.



In 2018, the column's internal configuration was modified by replacing the original trays with three beds of random packing and retaining two trays at the top.

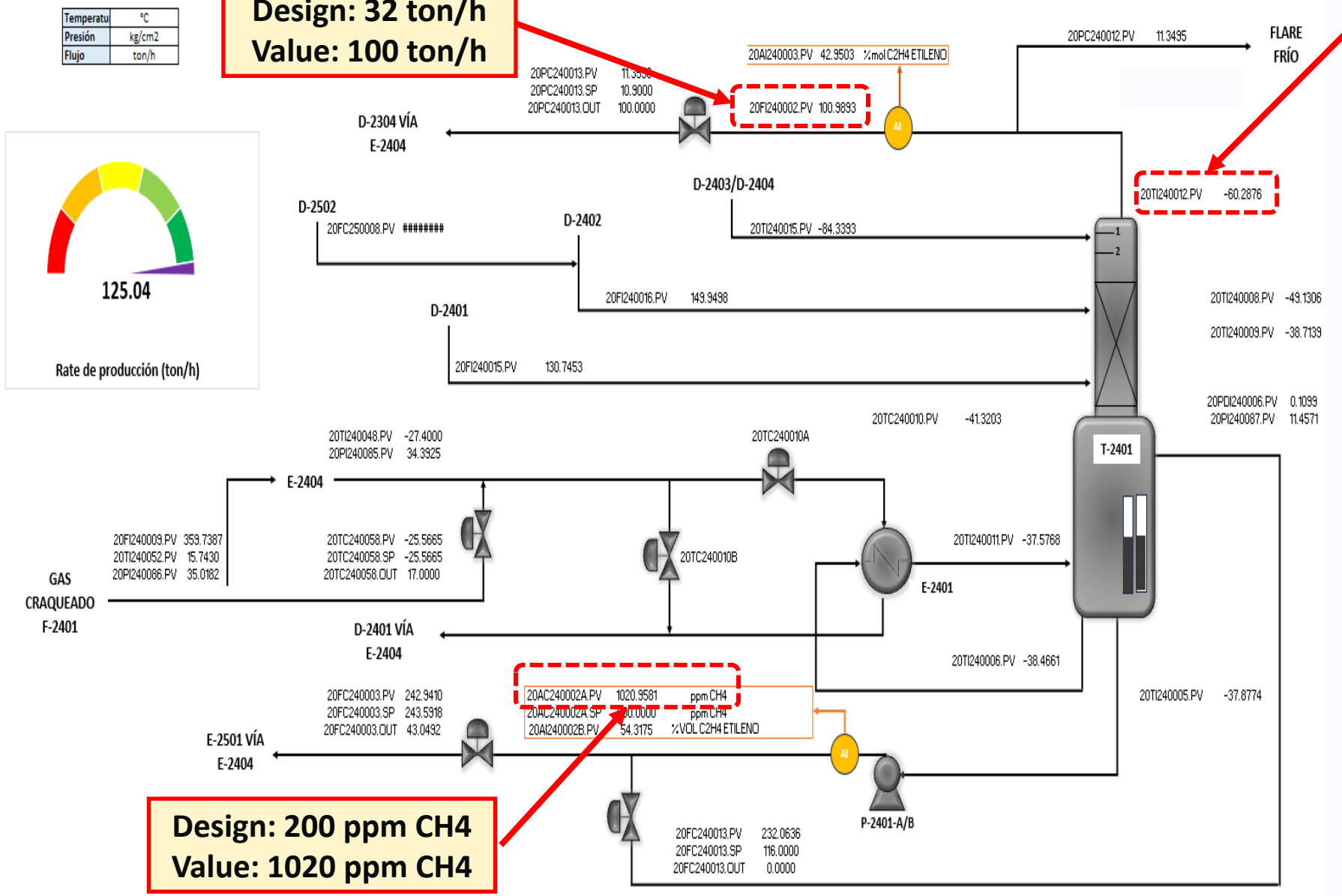
This adjustment effectively resolved the pressure drop (ΔP) issue previously observed in the column, thereby enabling the production rate to reach its nameplate capacity.

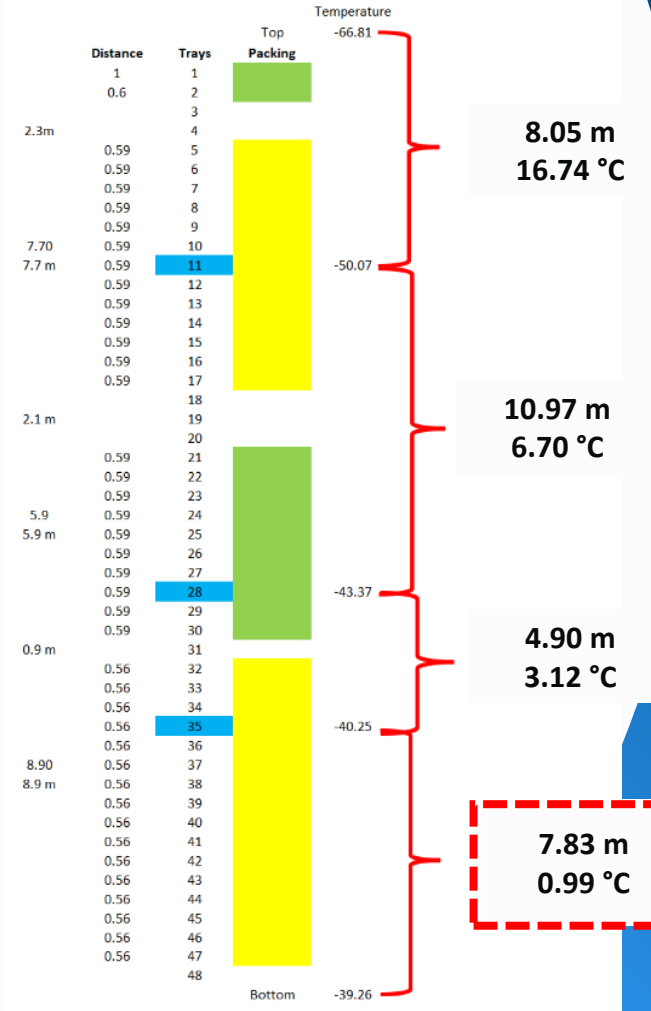
Demethanizer column

Design: -75 °C
Value: -66 °C

Design: 32 ton/h
Value: 100 ton/h

Design: 200 ppm CH4
Value: 1020 ppm CH4





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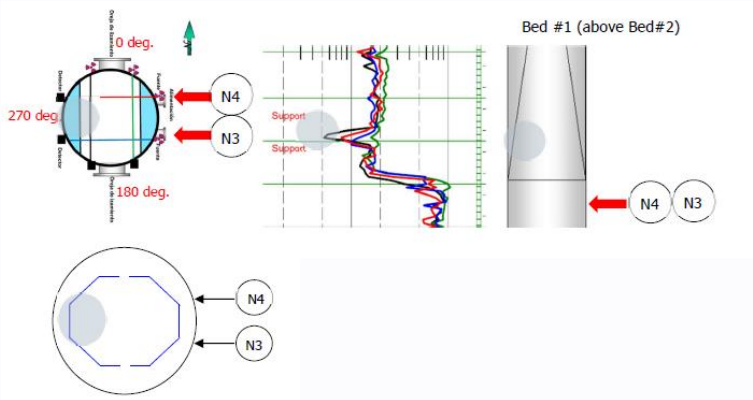
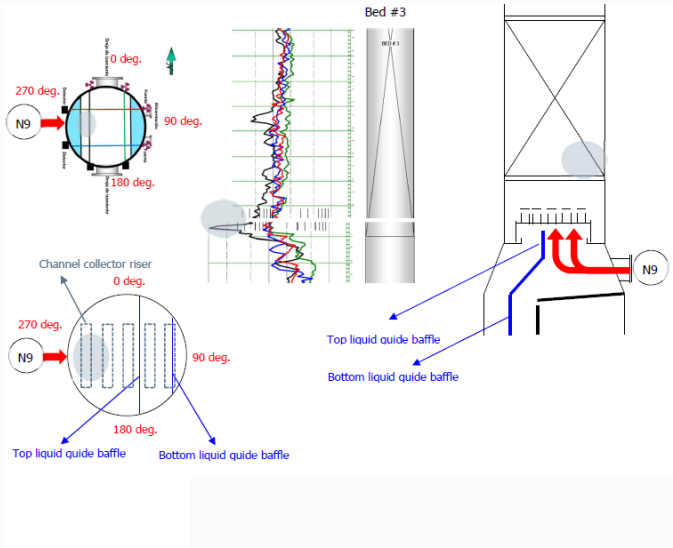
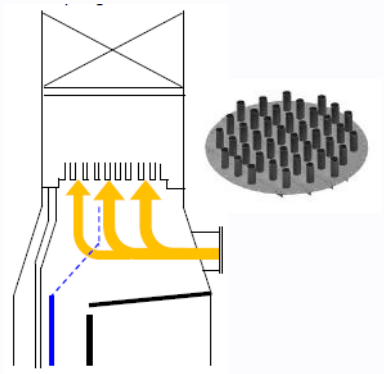
Demethanizer column: Second modification

During the turnaround of this year, a second modification was implemented following an in-depth study of the column. As a result, the following conclusions were reached:

- Liquid accumulation due to poor vapor distribution in the lower part of beds #2 and #3
- Poor distribution of vapor stream coming from the reboiler, so a more efficient distributor than the current one was considered
- Division of Bed #3 into two beds (new Beds #3 and #4) because, given the bed height (8.9 m), the packing at the lower section may be experiencing some compression. It was therefore decided to install a liquid redistributor and a vapor distributor between the new beds to prevent any anomalies in the natural distribution of liquid and vapor within a tall packing bed







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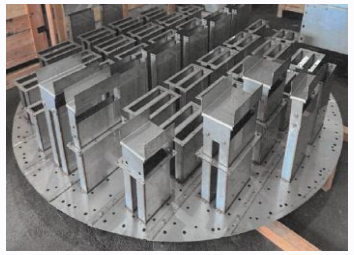
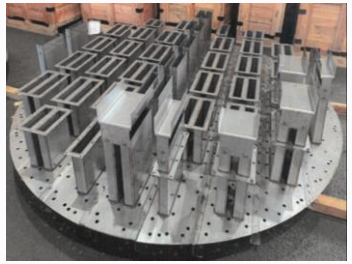
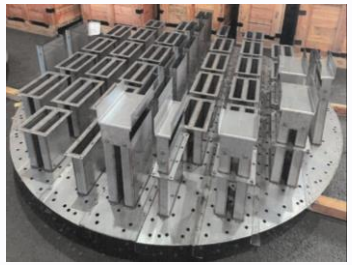
INTERNALS



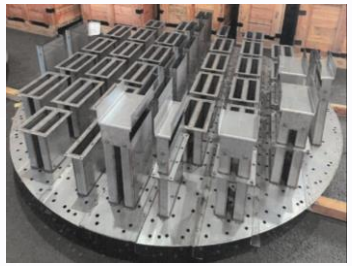
Deck Type Liquid Distributor, Newly Designed above Bed #1



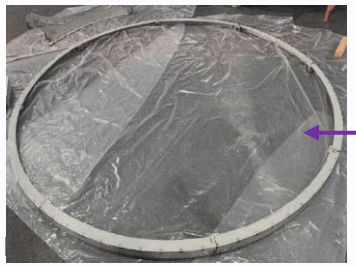
Deck Type Liquid Distributor, Newly Designed above Bed #2



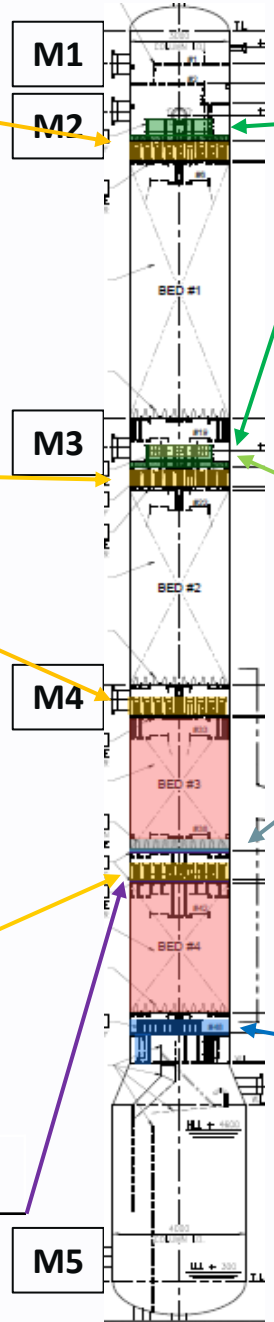
Deck Type Liquid Distributor, Newly Designed above Bed #3



Deck Type Liquid Distributor, Newly Designed above Bed #4



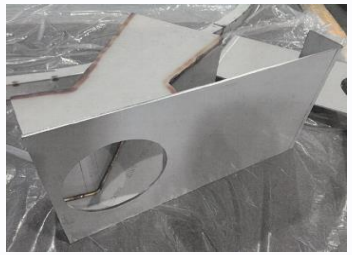
Expansion rings



Flashing Feed Gallery, Newly Designed above Bed #1

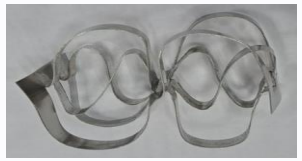
Flashing Feed Gallery, Newly Designed above Bed #2

Vee-Baffle (behind the gallery from this point)



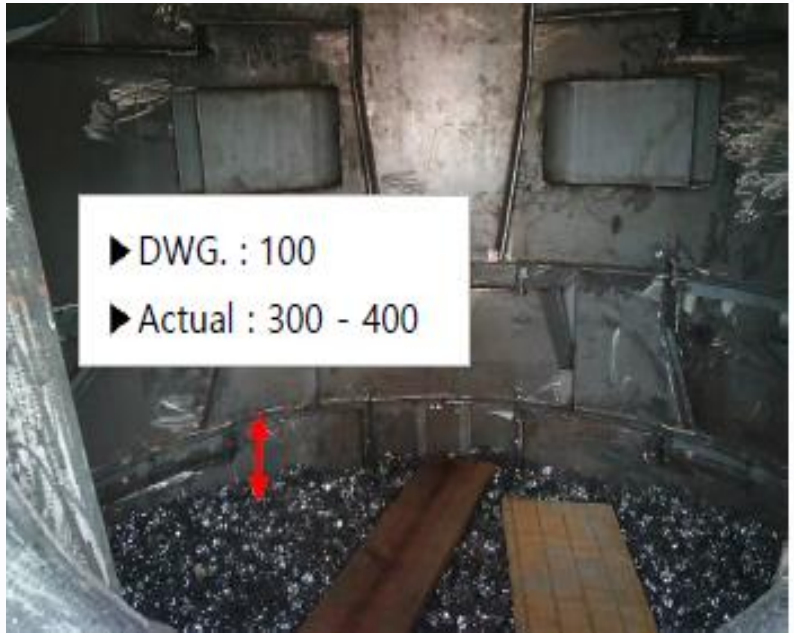
Gas Injection Support Plate for Bed #3

Model DCT-210 Riser Collector integrated with vapor distribution plate below (including downcomer extended down inside sump baffle)

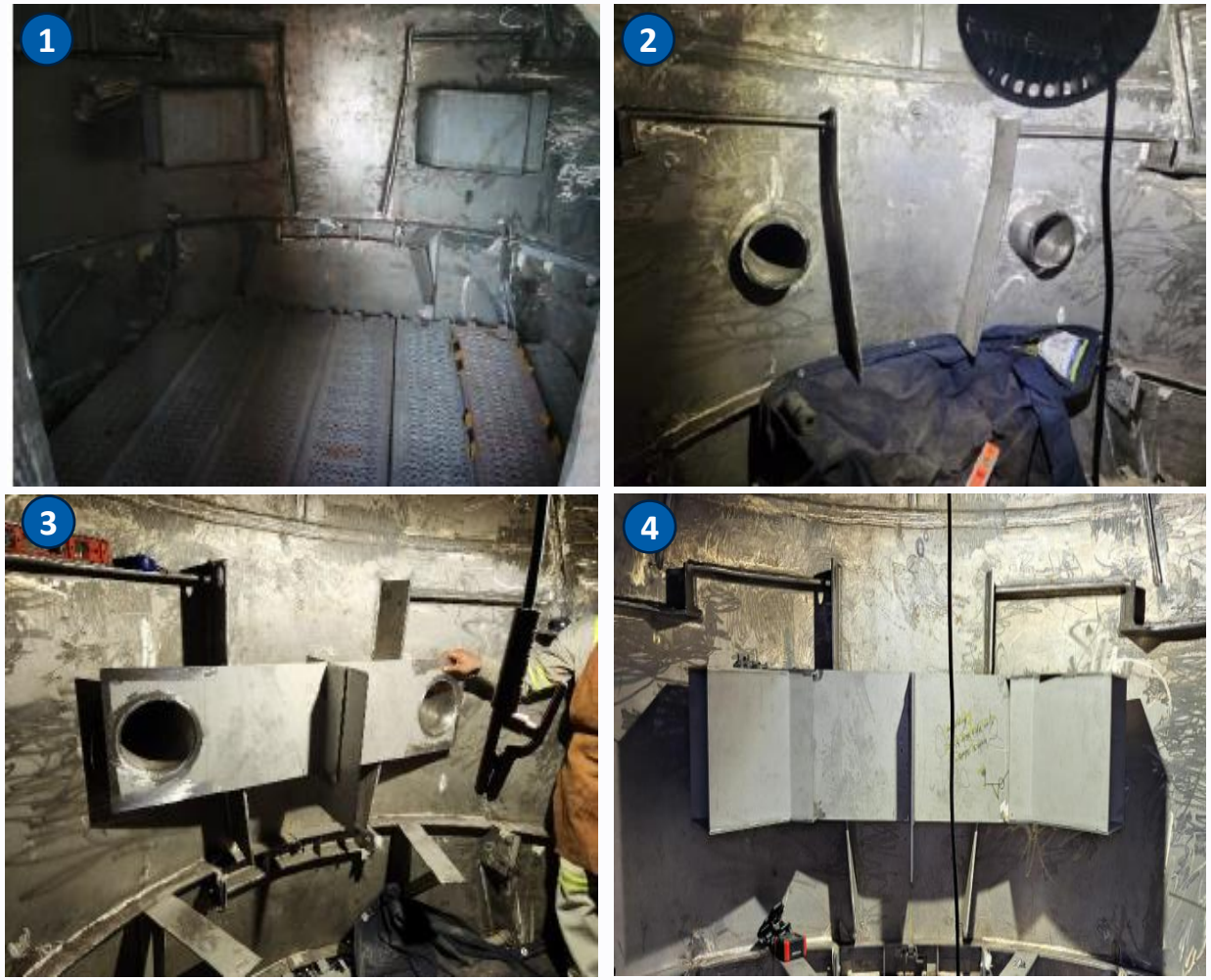


G-SR #1.5 Metal Random Packing for Bed #3 & #4
Height for each bed: 4,000mm (28.3 m3)

Main activities and findings in the demethanizer column opening: Manway M3



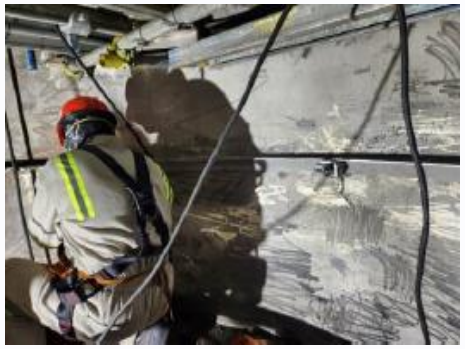
The packing height in bed #2 is slightly lower than expected. Since the packing material is the same (Intalox Ultra L), it is filled with the material removed from bed #3.



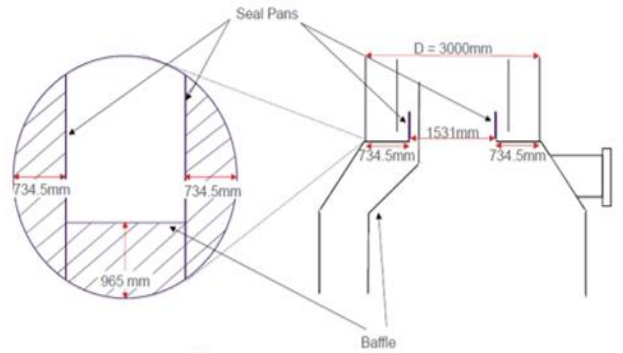
The old feed distributor is removed and the new vee-baffle is installed for the distribution of vapor and liquid above bed #2

Main activities and findings in the demethanizer column opening: Manway M4

Parts of the original tray supports are cut away because they interfere with the installation of supports for the new liquid and gas distributors between beds #3 and #4

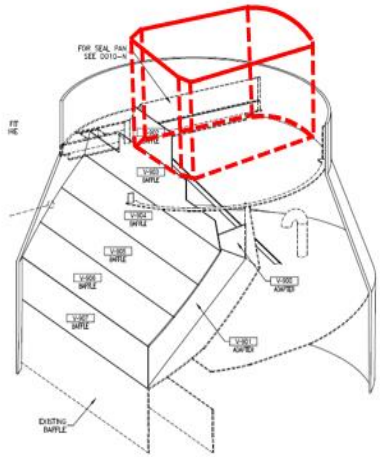


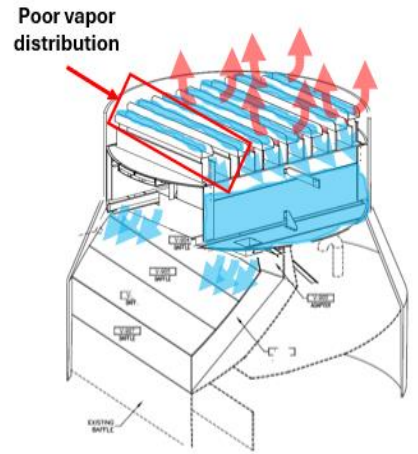
The supports for the new liquid and gas distributors are installed between beds #3 and #4



- Total Area = 7.1 m²
- Open Area = 3.1 m²

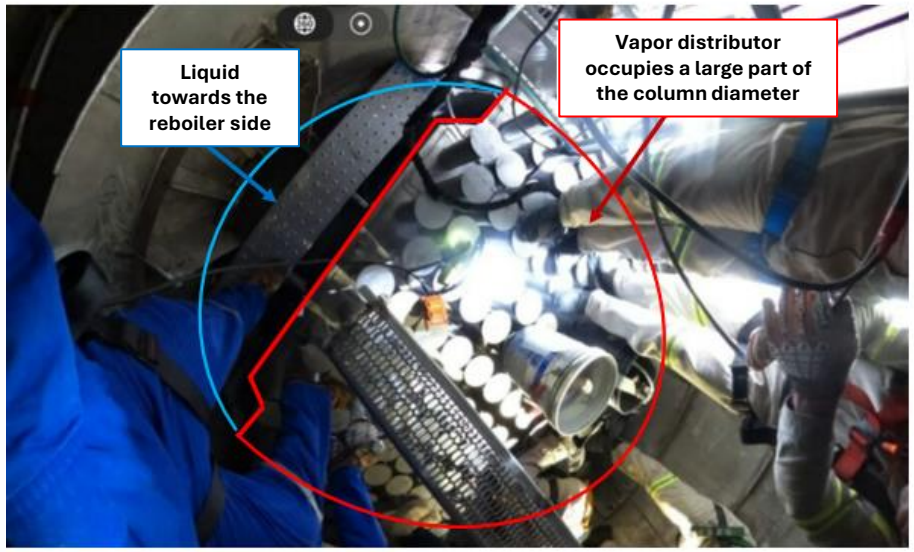
44% of the total area is open to the vapor

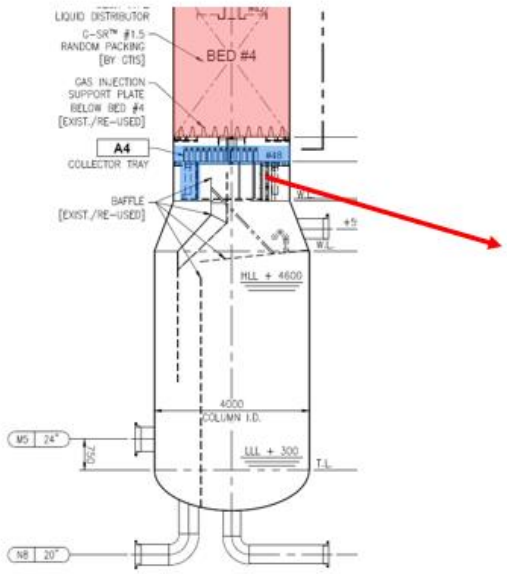


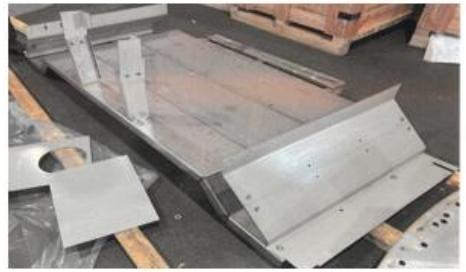


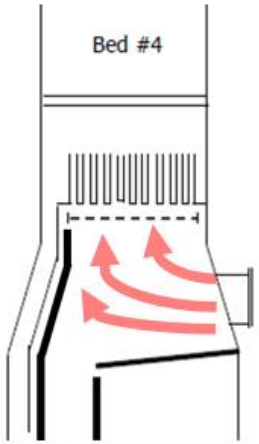
The installed vapor distributor is removed, and the supports and seal pan are cut away because they interfere with the installation of the new liquid collector tray integrated with vapor distributor

Inspection of new liquid collection tray integrated with vapor distributor









Below Bed #4:

Newly designed liquid distributor will be supplied.

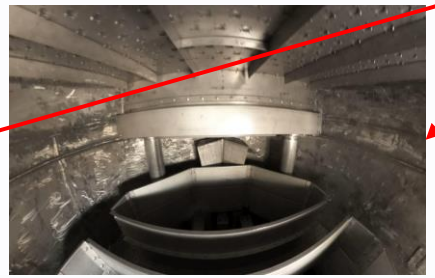
Model DCT-210 Riser Collector with vapor distribution plate will be supplied in place of existing channel collector to further improve vapor distribution.

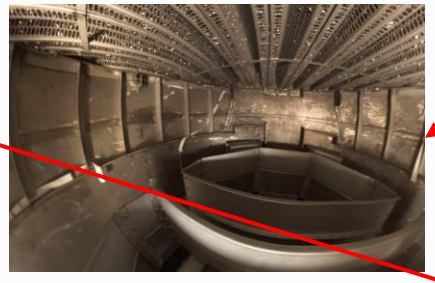
Side downcomer will be extended down inside the sump baffle.

Demethanizer: Old and new configuration

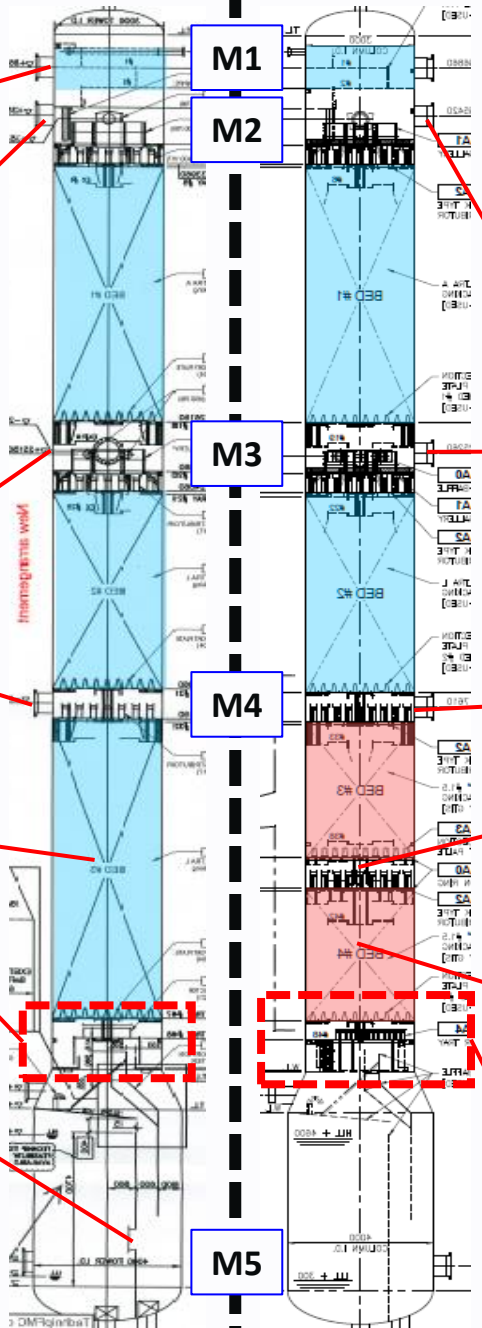
BEFORE

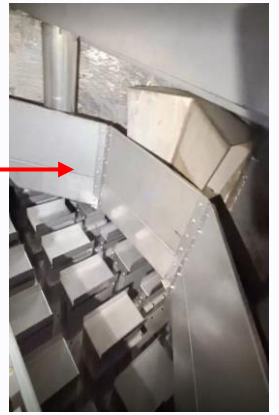
AFTER

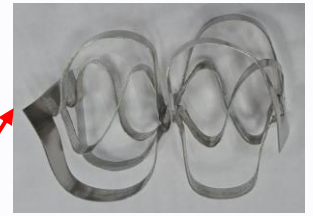
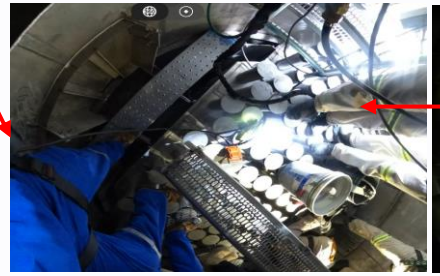






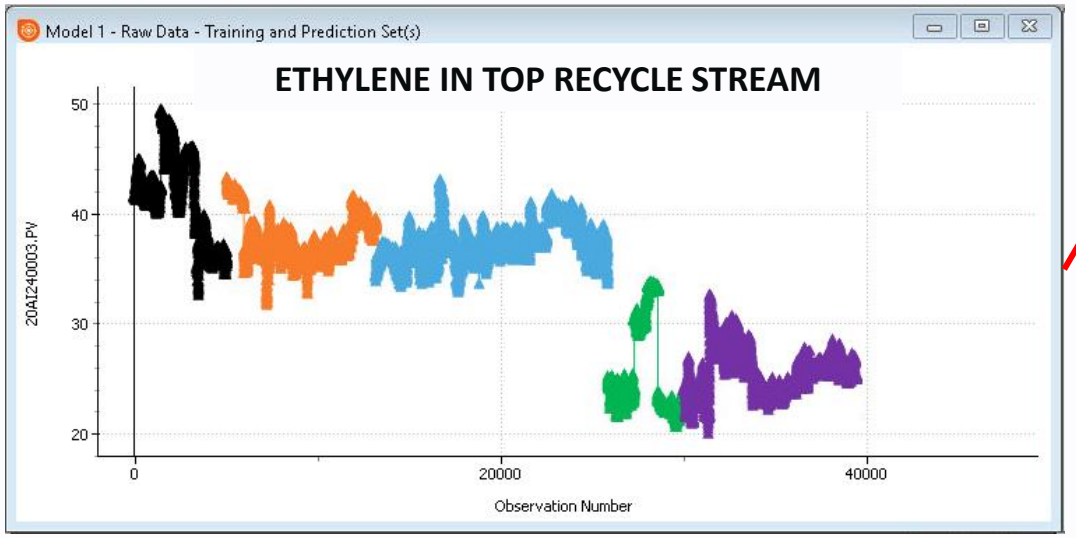



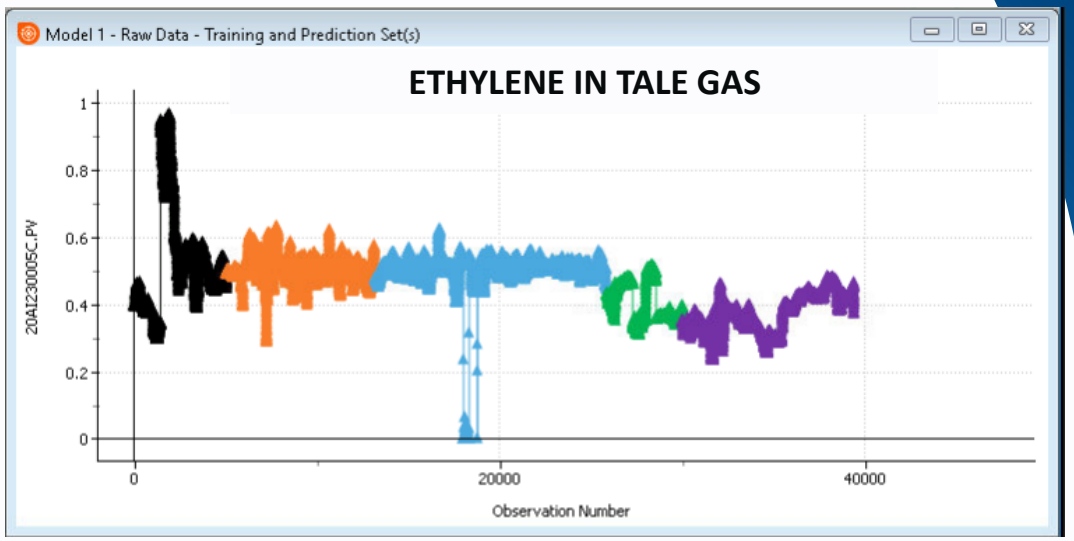


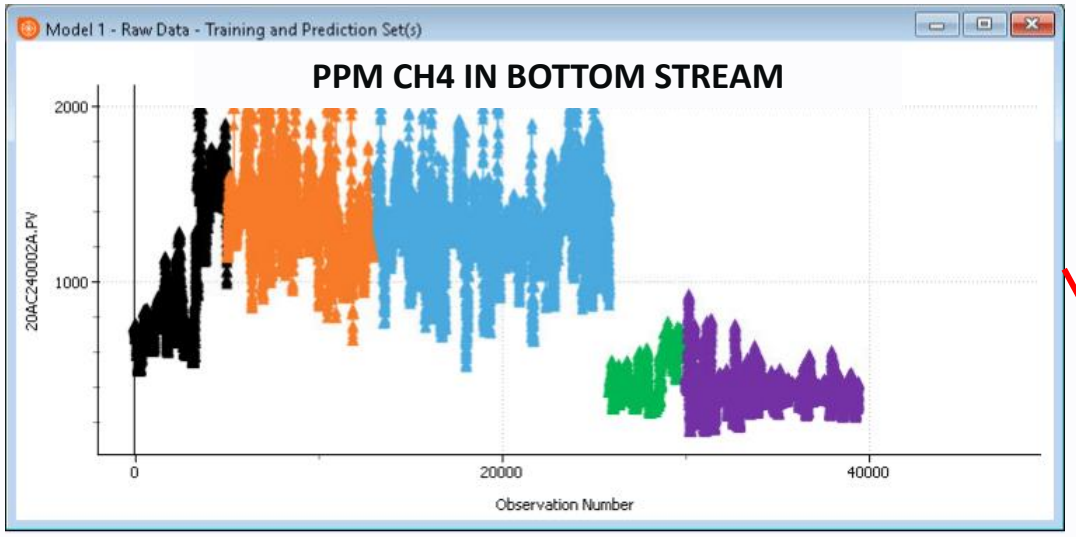




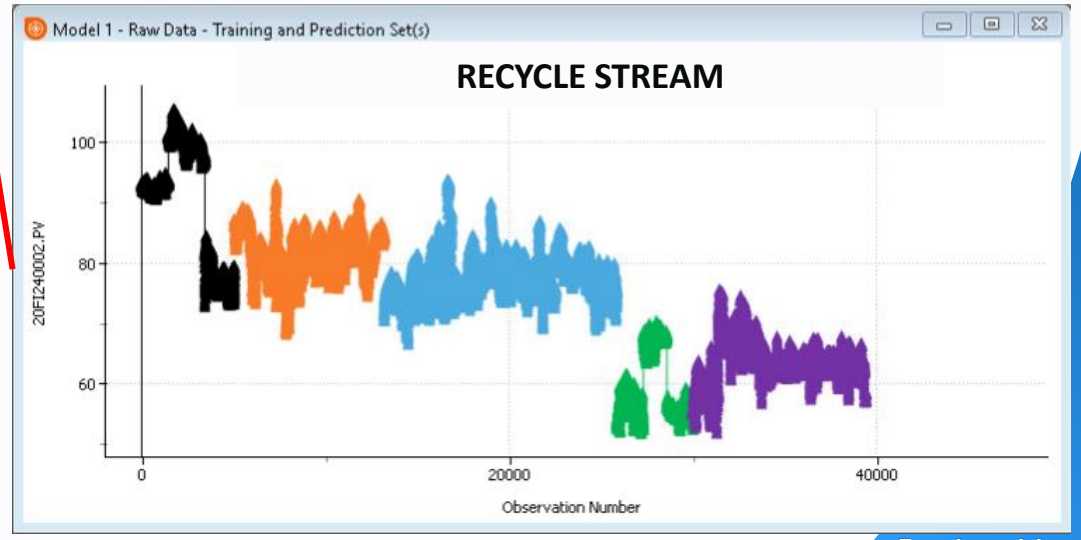

Note: No changes were made to M1 or M5

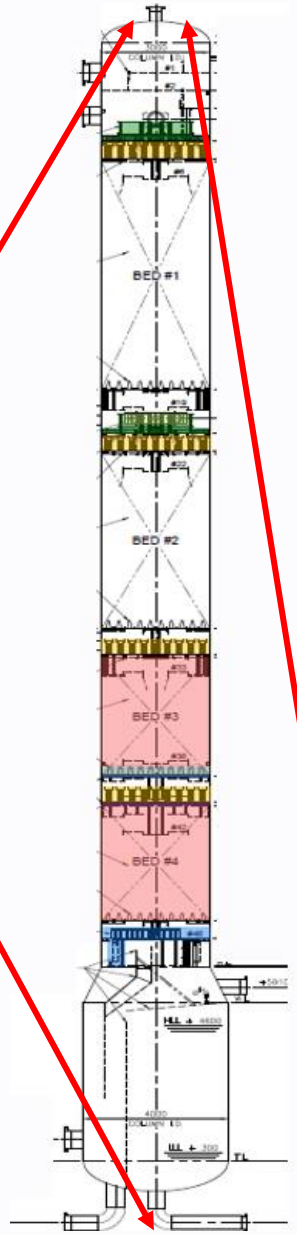
Evaluation of new performance











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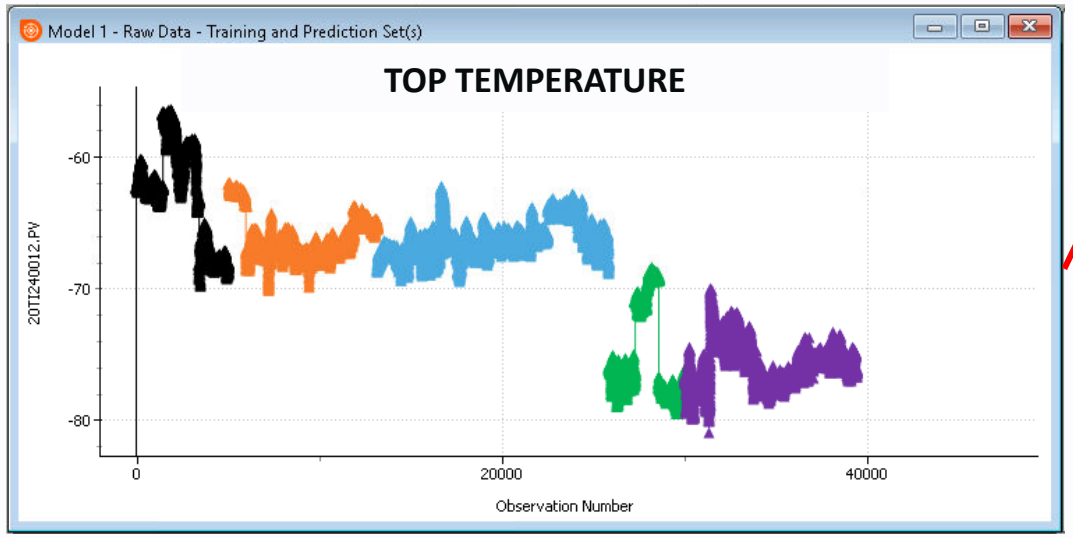

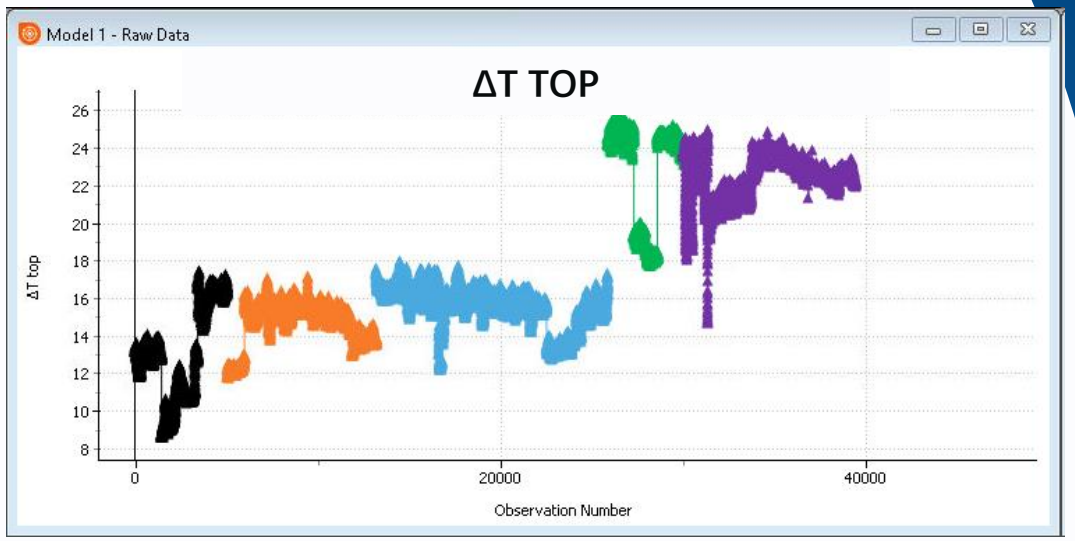

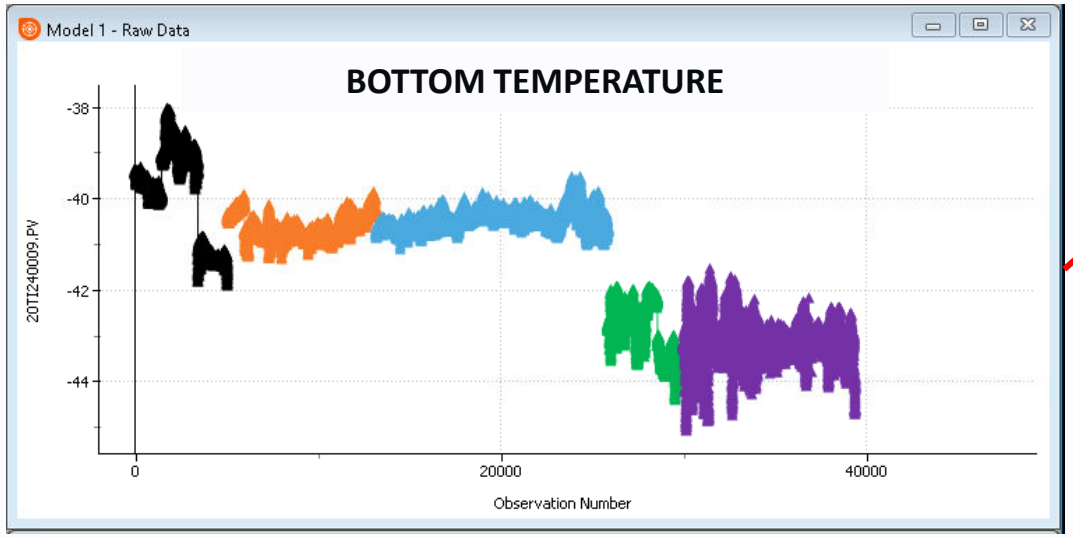

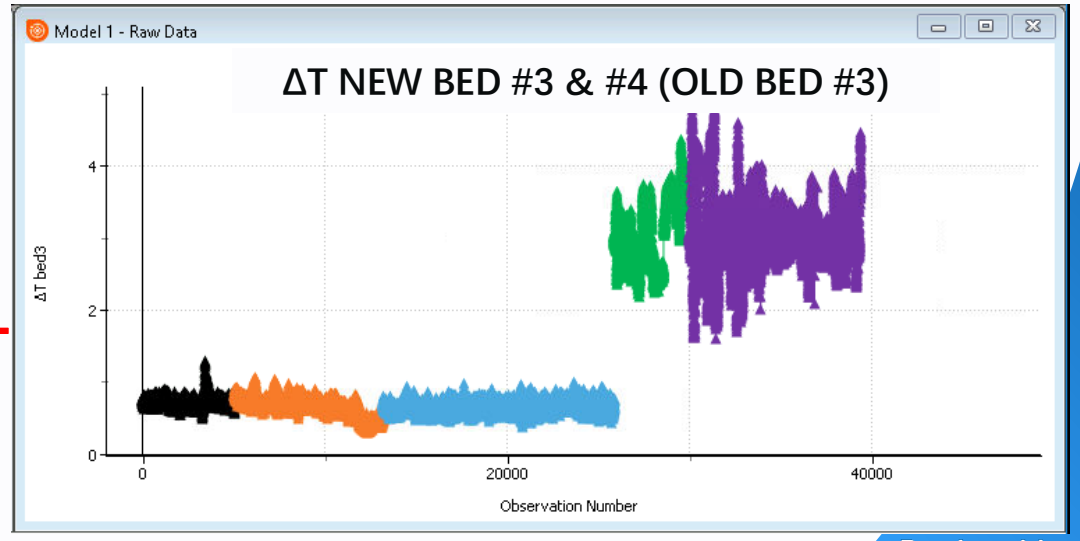

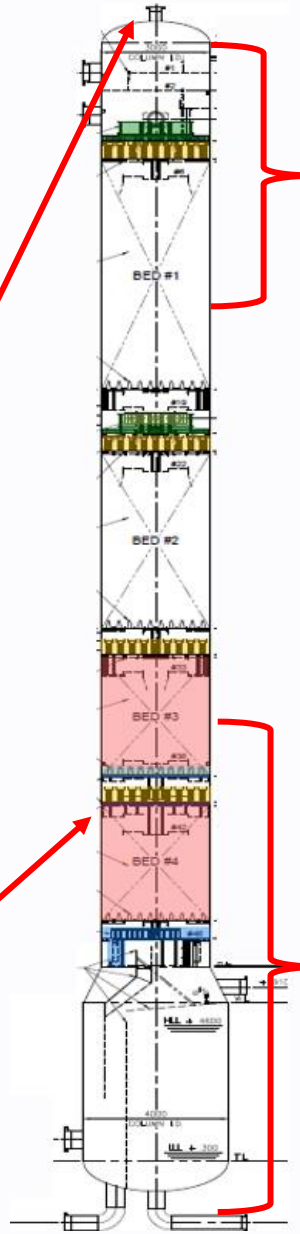

Conclusions

- The column temperature profile improved
- The top temperature reached the design value (-75°C)
- The top ΔT increased from 16°C to 25°C
- The bottom ΔT of bed #3 increased from 0.9°C to 3°C
- The percentage of ethylene in the recycle stream decreased by 38%
- Bottom impurities decreased by 65%
- The recycle rate decreased by at least 33%

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CARBONO NEUTRO
PARA 2050.

¡Thank you!