Analytical Instrumentation & Maintenance Systems (AIMS)

ANALYZER IMPORTANCE IN AMINE

Presenter:

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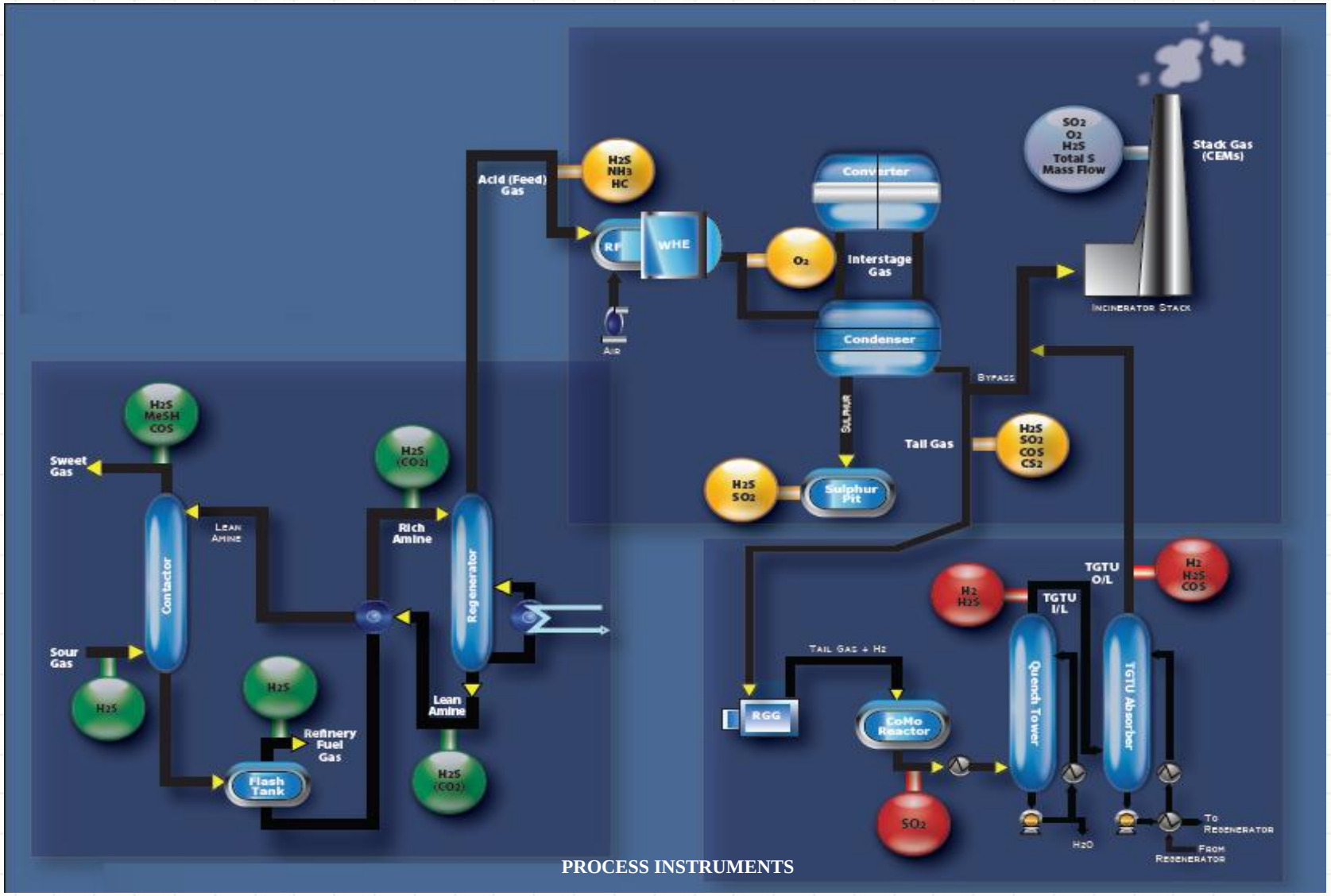
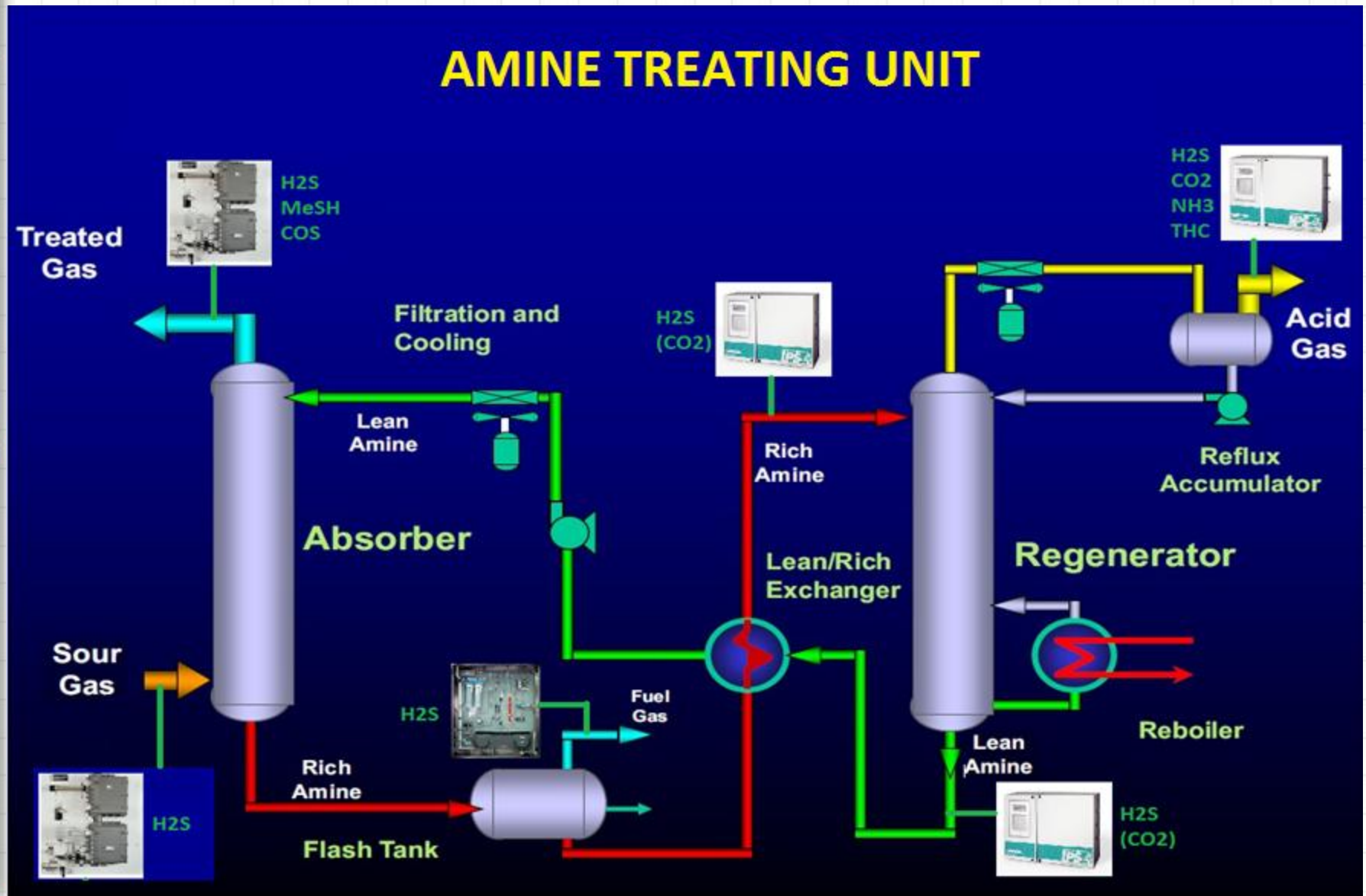
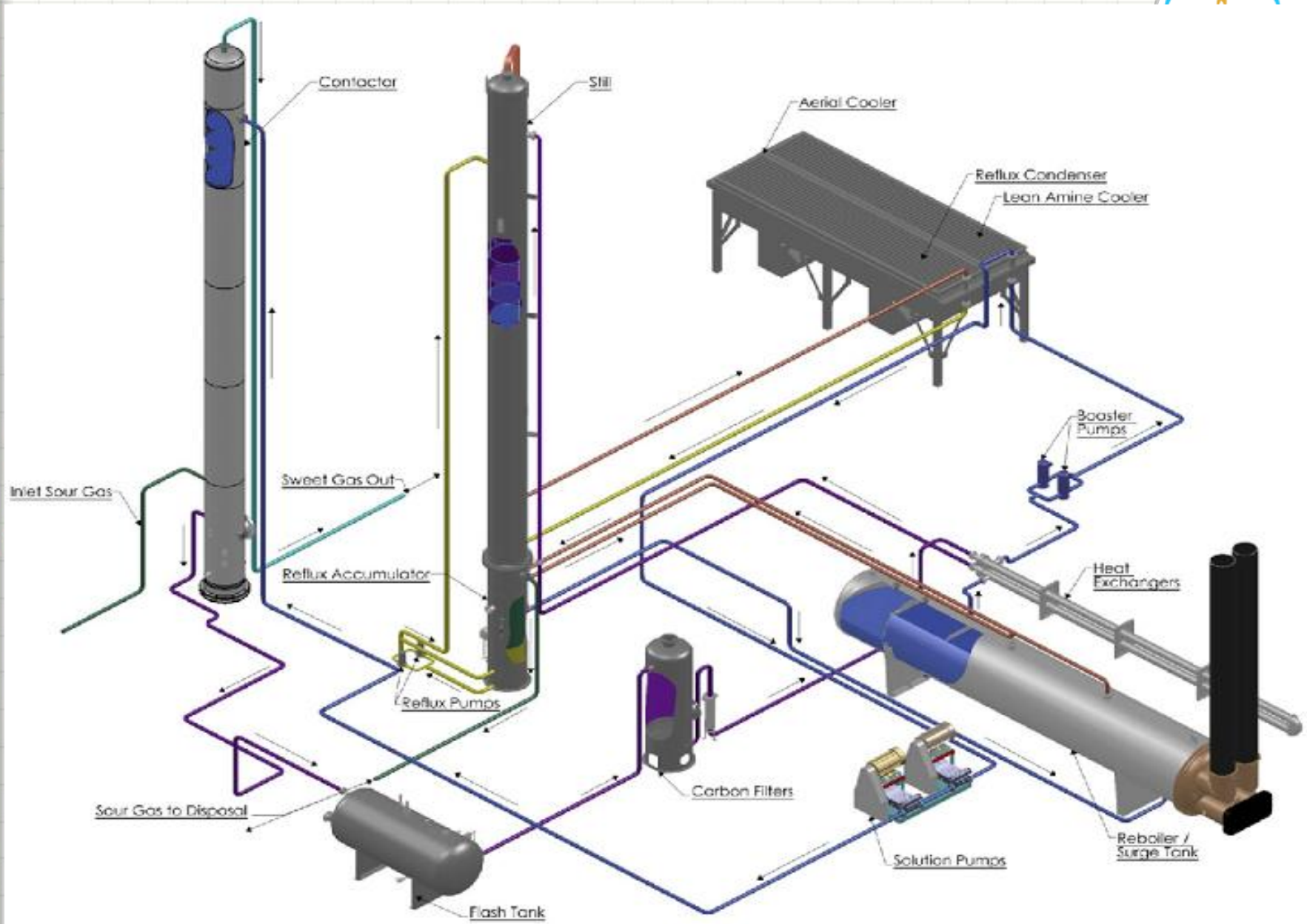
OVERALL – AGRP, SRU & TGTU



AMINE TREATING UNIT FLOW SCHEME



AMINE TREATING UNIT – 3D VIEW



Amine Absorber

Challenges

Presently the Lean Amine H2S is being analyzed through manual sampling and lab analysis.

The lab analysis of the lean amine showed very low H2S levels in the lean amine, often less than 200 mg/ liter of solvent.

It is not necessary to reach these levels of solvent regeneration to achieve the treated gas specification. These condition will lead to over consumption of steam in the re-boiler.

Amine Absorber

Challenges

-H2S content reported in the lean amine reported by analysis seems very low according to the operating conditions of regeneration section of the unit. Operations reported decreasing the steam flow rate to the regenerator leads to the an increase of the H2S content of the treated gas without a higher H2S loading in the lean amine. Hence there is a concern in the analysis method that is being practiced.

The lean amine H2S is checked to monitor and control the regeneration of the solvent (MDEA) used, therby maintaining the further absorption of the acid gases from the sour feed at an optimum level.

Amine Abserber

Challenges

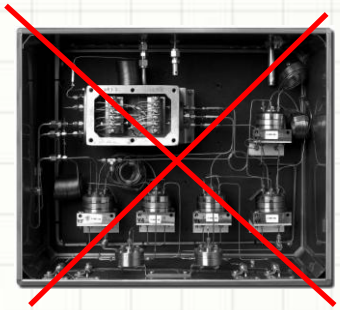
-The frequency of analysis is once in a day. This method provides only single data to optimize the regeneration of the solvent which is being carried out continuously. Increasing the frequency of monitoring will give better control / optimization of the solvent regeneration process and the energy requirement for the same.

THE SEVEN SERVING POINTS OF PROCESS ANALYZER IN AMINE UNITS

1. Faster Measurement of Mercaptans in Treated Gas

Traditional GC is used for measuring Mercaptans along with H2S, COS. This obviously results in delayed response with due limitations of Technology

Power Optics defines to enhance the measurement capabilities. UV Technology is being used resulting response in seconds



2. H2S Measurement in LEAN AMINE

Challenges

- **Presently the Lean Amine H2S is being analyzed through manual sampling and lab analysis.**
- **The lab analysis of the lean amine showed very low H2S levels in the lean amine, often less than 200 mg/ liter of solvent.**

NOTE: It is not necessary to reach these levels of solvent regeneration to achieve the treated gas specification. These condition will lead to over consumption of steam in the re-boiler.

The lean amine H2S is checked to monitor and control the regeneration of the solvent (MDEA) used, therby maintaining the further absorption of the acid gases from the sour feed at an optimum level.

Importance of ONLINE Analysis of H2S in Lean AMINE

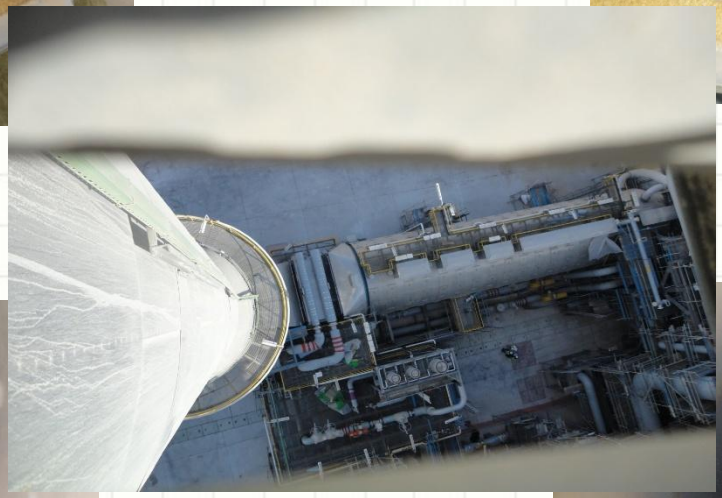
- Provide Online H2S analyzer for Lean Amine to optimize steam consumption.
- An Online Analyzer with properly designed sampling system can contribute in Steam Consumption optimization and Energy Saving
- H2S in LEAN AMINE

2. H2S Measurement in RICH AMINE

Where I am…. when sampling

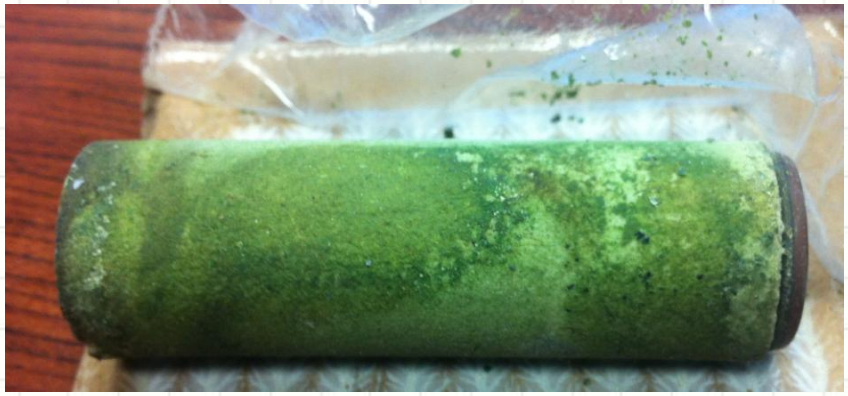
PROBE MAINTENANCE MISTAKES

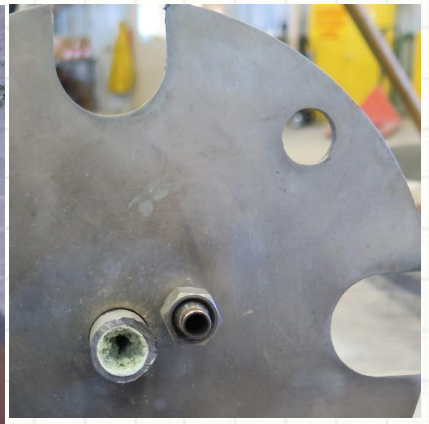
PROBE MAINTENANCE MISTAKES

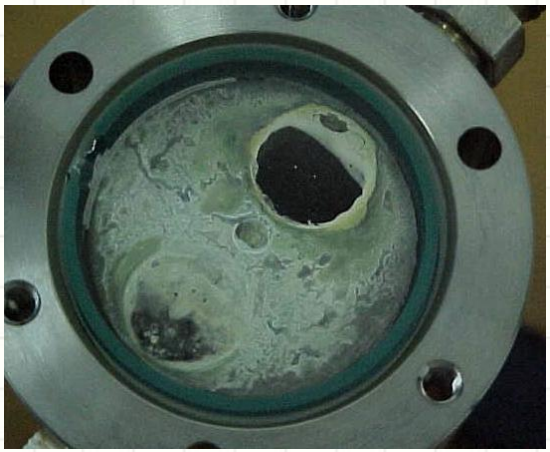


PROBE MAINTENANCE MISTAKES

Acid Mists, Salts and Corrosion







Probe Side H2SO4 Formation

How to be Correct on Sample Probe

Proper Location for Tapping Point

Mistake No accessibility to Sample Probe	Correct Action
	

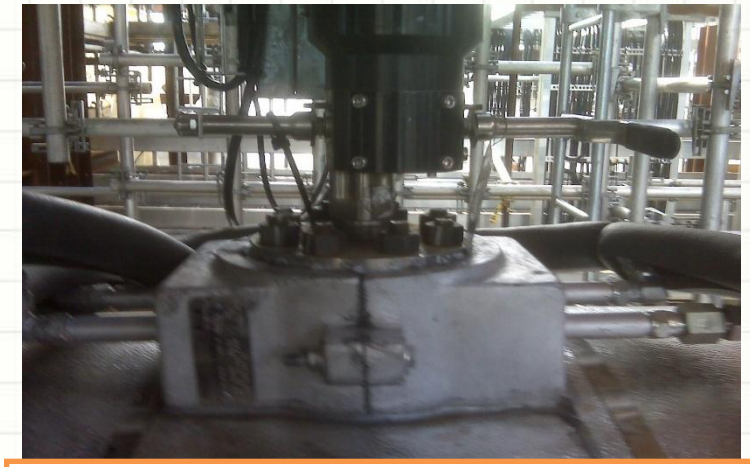
Application based Selection

No Heating – Heating is Must!!!!

Example 1 - Sulphur recovery unit

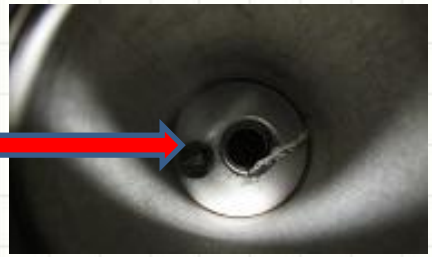
1. **Probe must be heated Probe, Heated above dew point Temperature of Sulphur 130 degC, but not more then 150 degC.**

Proper Probe Heating with Jacketing



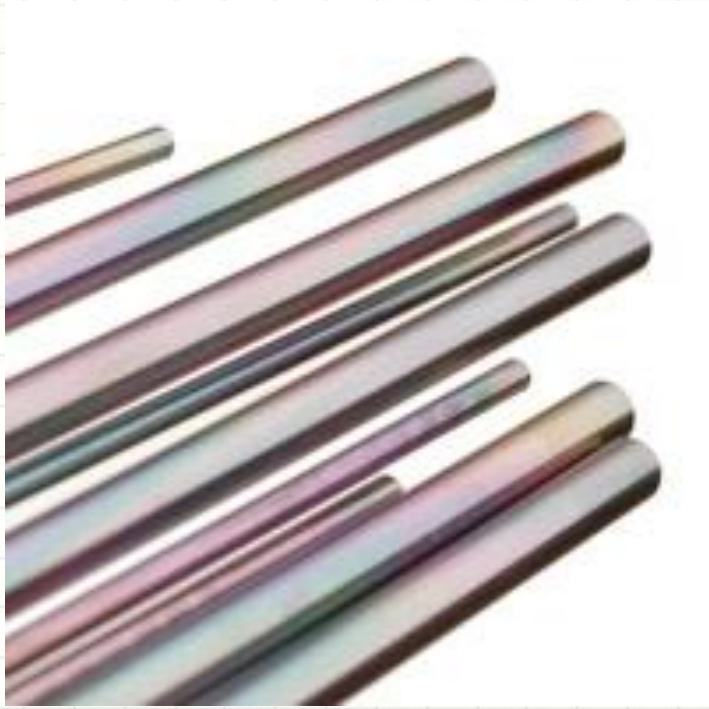
Steam Jacketing on Sampling Heated Probe Process Connection

Vibration and fluctuation in velocity

Wrong - Open tube probe was used as threaded type due to vibration and fluctuation in velocity	Correct - Welded support for probe extension has considered.
  	

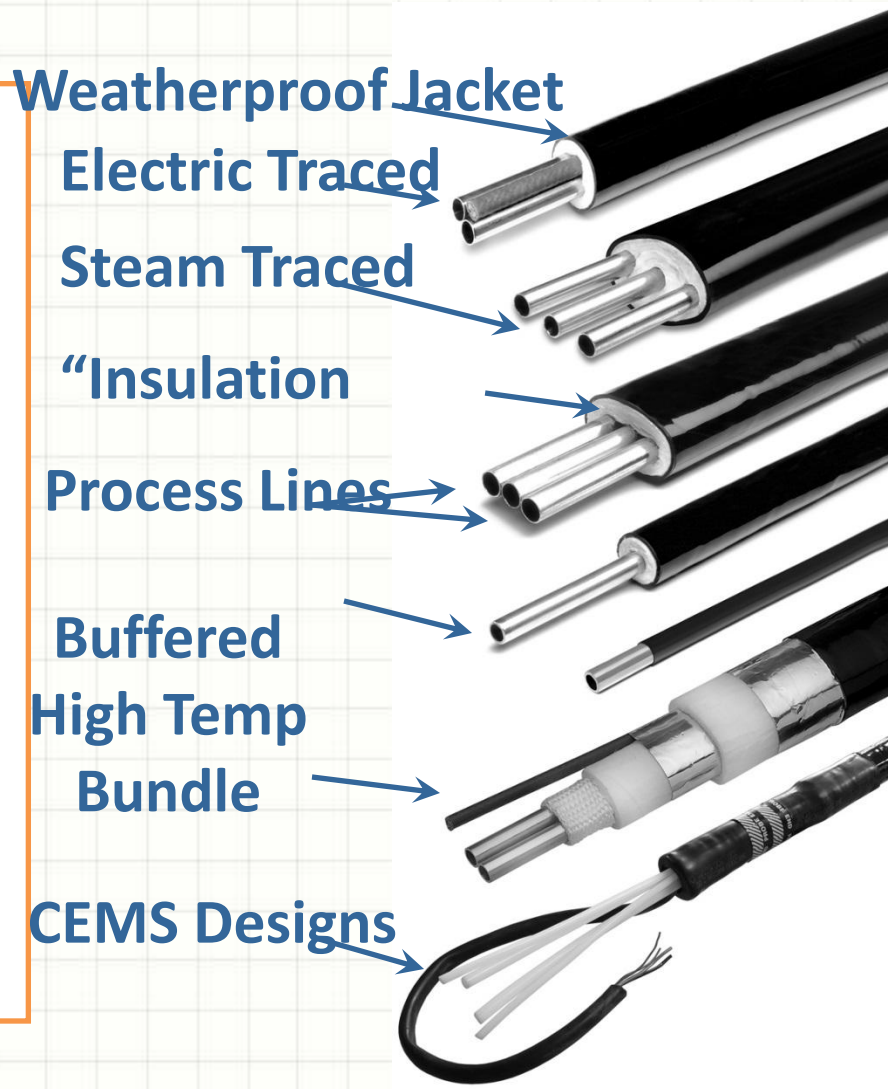
Ignorance of sample composition during selection of sample tube

Example – Sulphur Presence in Sample

Mistake - Adsorption of volatile sulphur components on the inner surface of sample tube	Correct Action - Installed sulfinert treated sample tube for better performance
	

Correct type of Heated Sample line selection

- **Teflon:** Inert but temperature limitations (dewpoint temperature), permeation
- **Stainless Steel:** welded, seamless but cleanliness and adsorption problems with some applications
- **Electro Polished:** improved surface finish for improved absorption resistance
- **ElectroPolished/Coated:** for a product that is inert as Teflon but strong as steel



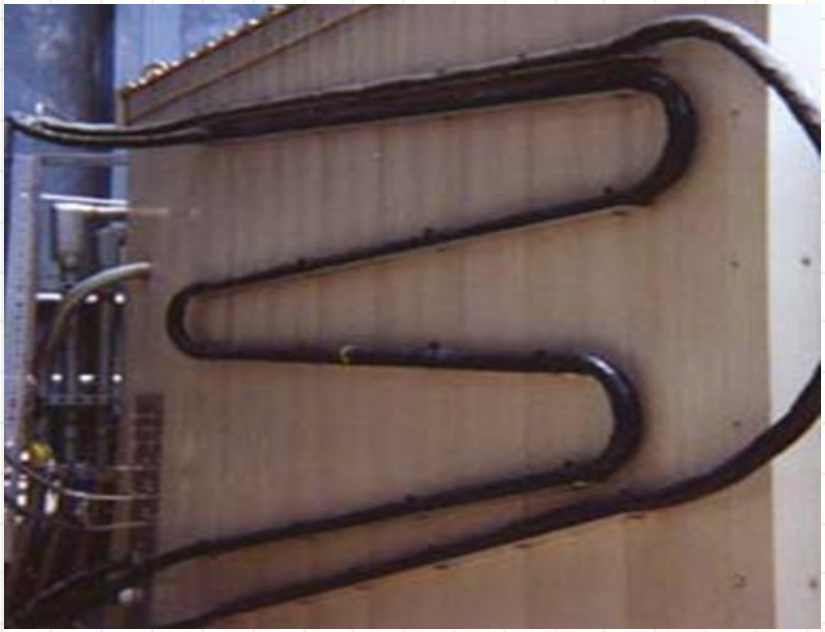
How to be Correct on Sampling Handling System

Proper SHS design

- Analyzer Safety is must.
- SHS design must be done according to Analyzer engineering Design.
- Design knowing the process condition, normal and Abnormal operation.
- Selection of filters depending on Process Composition.
- Proper Fast Loop Design.

GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Condensation staged in the HTL	Installation of HTL have the low spot	Re-Installed the HTL with proper slope from tapping point to analyzer

Before	After
	

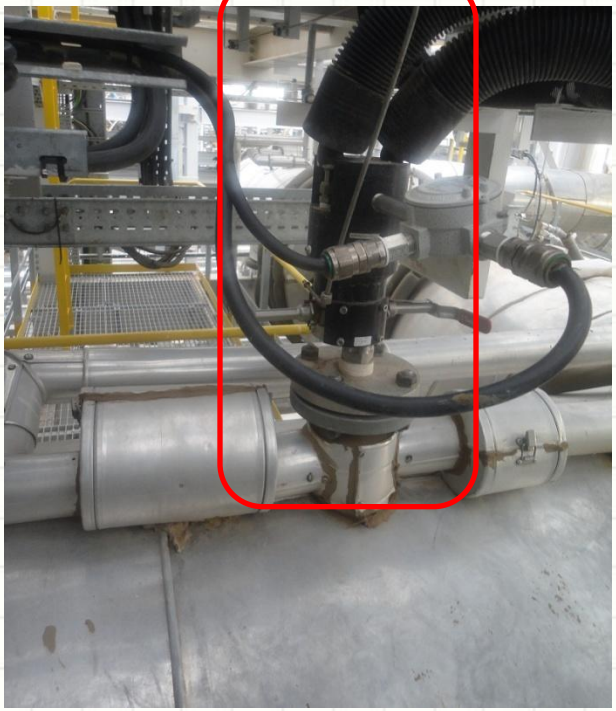
GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Probe extension detached from counter flange	Open tube probe was used as threaded type due to vibration and fluctuation in velocity	Welded support for probe extension has considered.

Before	After
	

GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Increased in Nozzle length	due to insufficient insertion of probe length in process line fresh sample is not extracted	Contactor to ensure the EPC document prior to job execution

Before	After
	

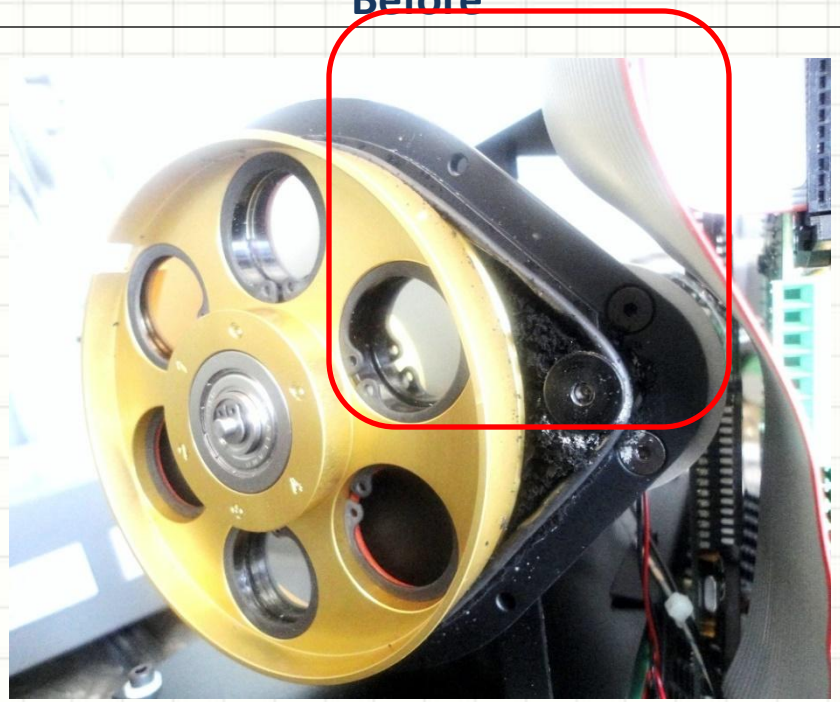
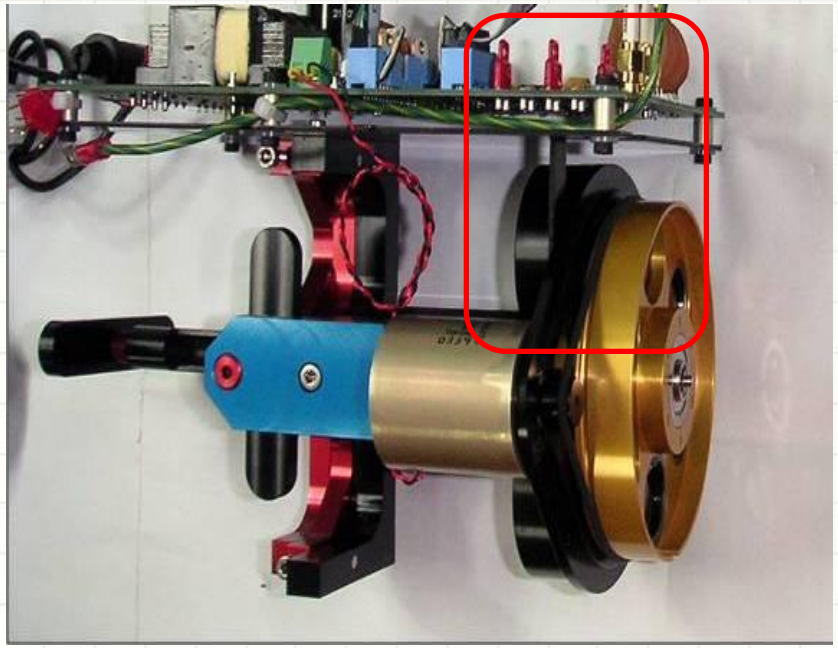
GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Analyzer failure	due to wrong installation of key components in analyzer by others	EPC to ensure that installation and commissioning shall be done in presence of OEM/Vendor supervision

Before	After
	

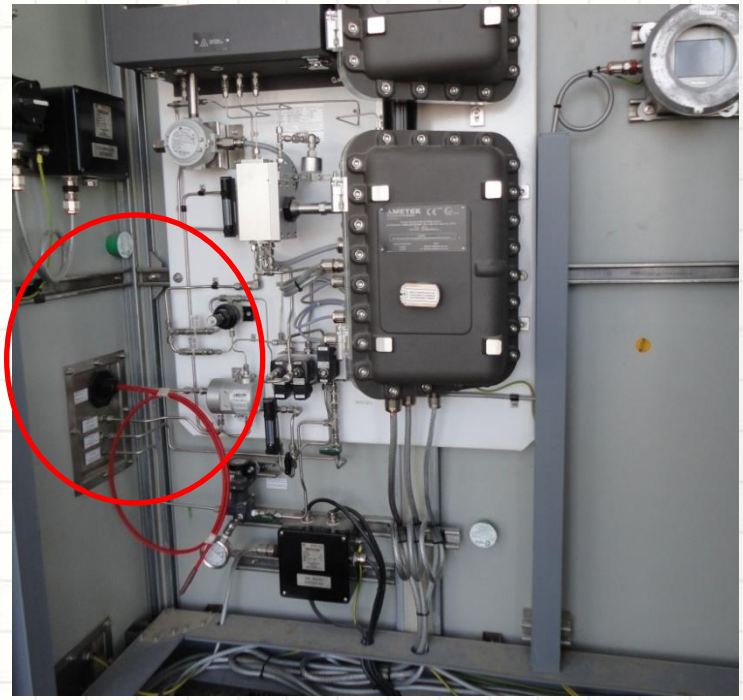
GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Analyzer component failure	Not following the storage specifications as prescribed by OEM vendor	Ensure to follow the Storage specifications prescribed by the OEM vendor

Before	After
	

GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Excess heat dissipation causing over load on Air conditioner	Excess looping of HTL cable and improper insulation	Suggested EPC contractor to consider the installation guidelines from OEM/Vendor

Before	After
	

GENERAL

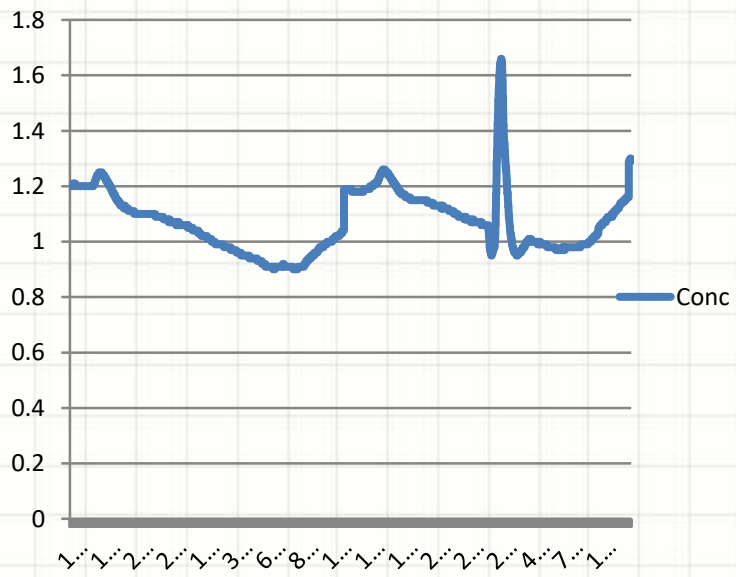
Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Selection of SHS components	Over looked on selection of a - Flow meter compatible with process application which causes leakage and damage to SHS. b - Frequent Clogging of filters due to wrong selection. c - Selection of right relief valve.	a - Flow meter selection shall be based on the process data. b - Filter shall be selected based on analyzer requirement. c - Relief valve set point shall be selected with respect to system design pressure.

Before	After
  	➢Flow meter shall be calibrated as per process data. ➢Filter selection as per analyzer requirement. ➢Relief valve selection and calibrated as per design pressure. 

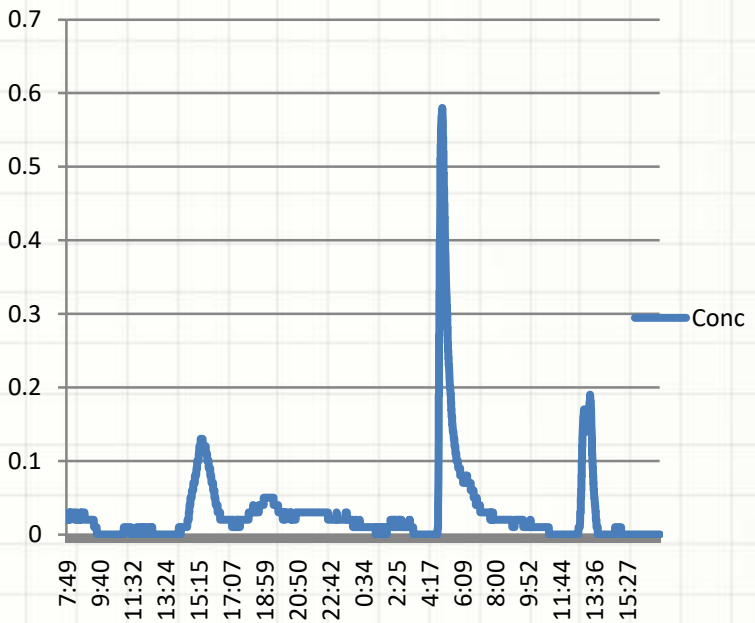
GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Distance between takeoff point to analyzer	Increase in response time	Installation of analyzer as close as possible to takeoff point.

Before

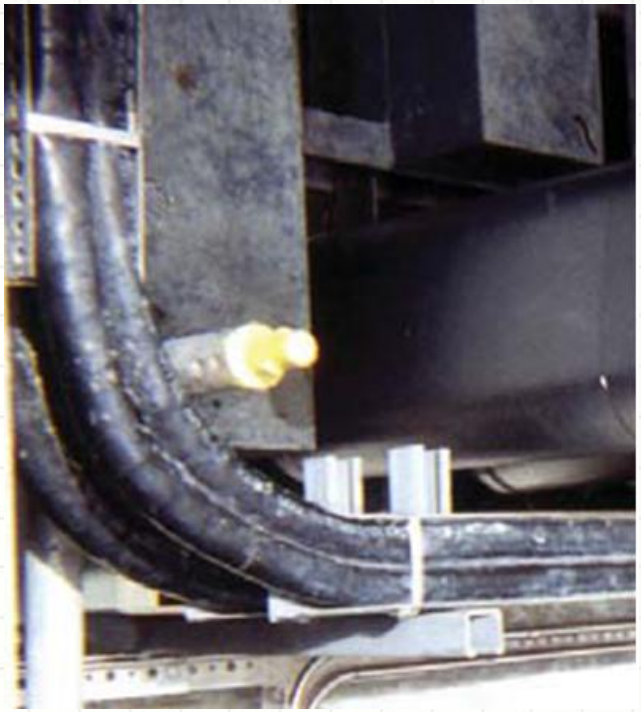


After



GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Laying and Routine of sample lines	Due to excess length increase in a. Response time b. Power consumption c. Adequate space	Installation of sample line shall be done in presence of OEM/Vendor

Before	After
	

GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Non accessibility at tapping point	Non availability of platform at tapping point	Based On OEM suggestion Customer has arranged permanent platforms for critical identified tapings

Before	After
	

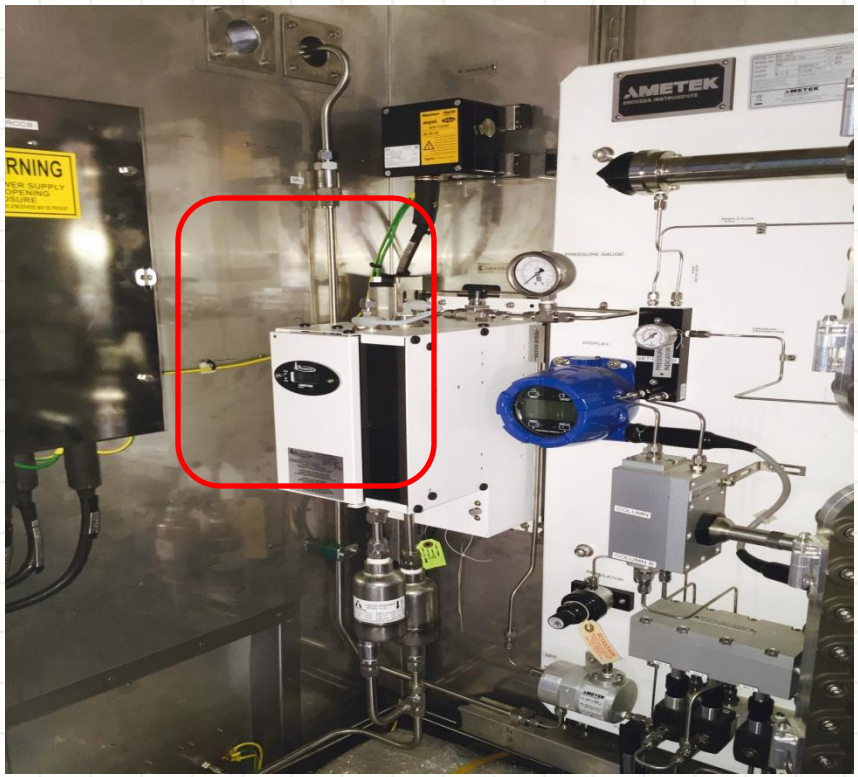
GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Probe fractured due to process stress/strain	Due to over look of wake frequency calculation	Probe selection shall be based on wake frequency calculation

Before	After
	

GENERAL

Potential Flaw	Root cause of Potential Flaw	Mitigation Action
Sample Condensation in the Analyzer during Abnormal Process conditions	Presence of excessive Heavier HC in the Sample.	Install sample cooler at the inlet of the analyzer before 3 stage filter and drain the HC condensate.

Before	After
	

Conclusions & Recommendations


Thank you
谢谢
Спасибо
nuqneH
Děkuju
Ευχαριστούμε
terima kasih
Дякую
ありがとう
شكرا
Merci
Aitäh
Благодаря
Ďakujem
תודה
Köszönöm
Ua tsaug
Paldies
Dziękujemy
Obrigado
Bedankt
Gràcies
Kiitos
Ačiū
Teşekkür ederiz
Hvala
Grazie
Cảm ơn bạn
Terima kasih
Mèsi
Vielen Dank
감사합니다
grazzi
Tak
vă mulţumesc
متشكرم