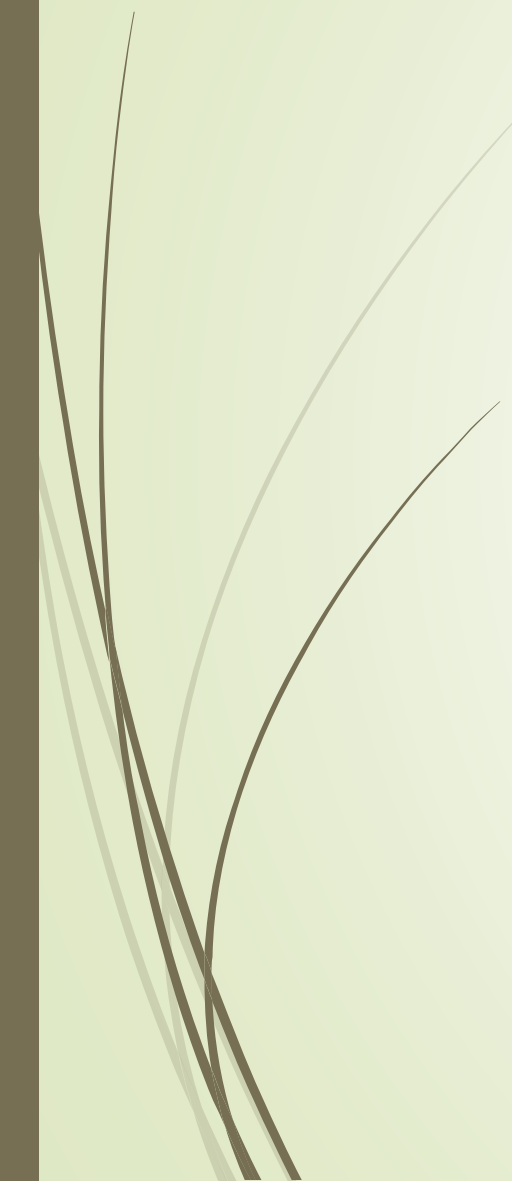


Ultrafast Simulated Distillation in the Refinery Laboratory: The Skeptics become the Believers

Shauna Teclemariam
US Oil & Refining Co.




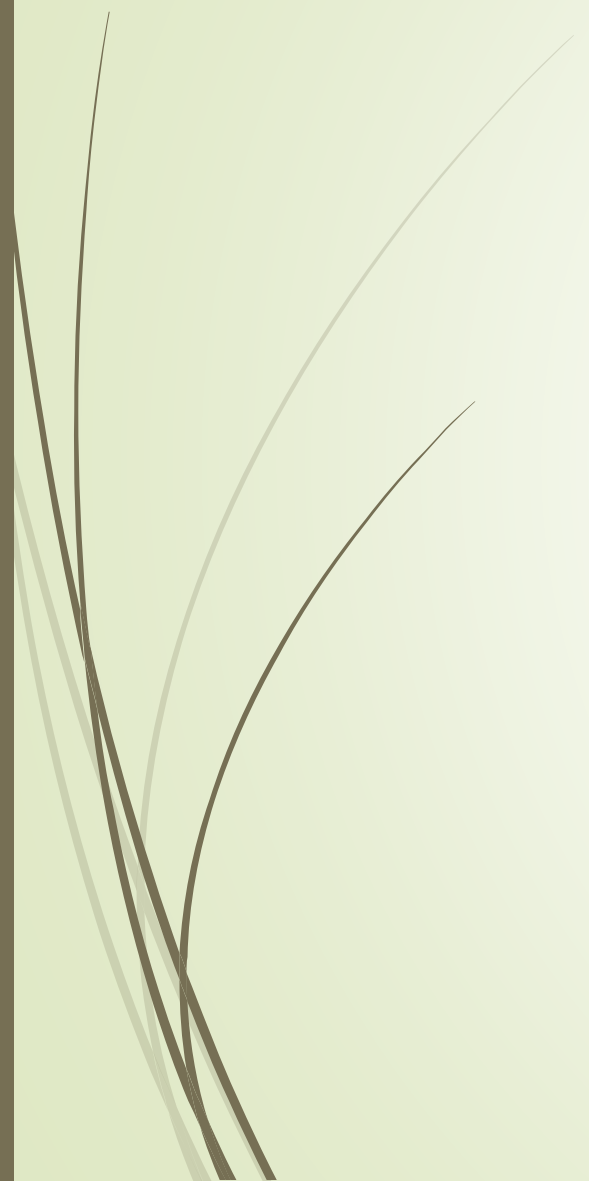
Ultrafast simulated Distillation

- Scope
 - General information
 - Data on products and how used
 - Maintenance, cost and QA/QC
 - What next
 - Questions
- 



Scope

- **Our distillation units were getting old and the Gas Chromography was always running**
 - **We were looking for something faster, cheaper, small footprint in lab and easy to run**
 - **Need to be able to justify the purchase of whatever we decide**
 - **Need to have operations, engineering and economic agree to any change**
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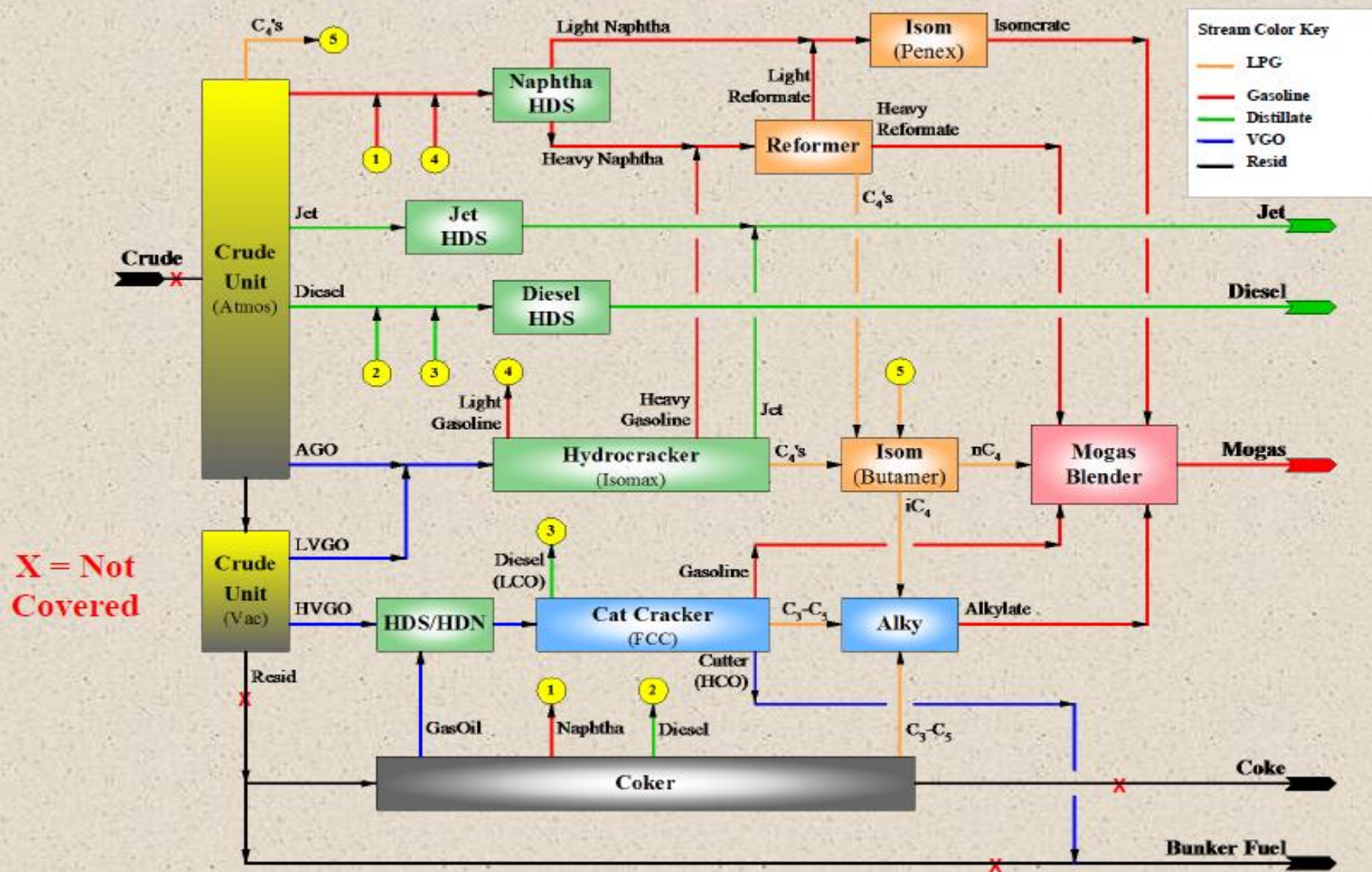


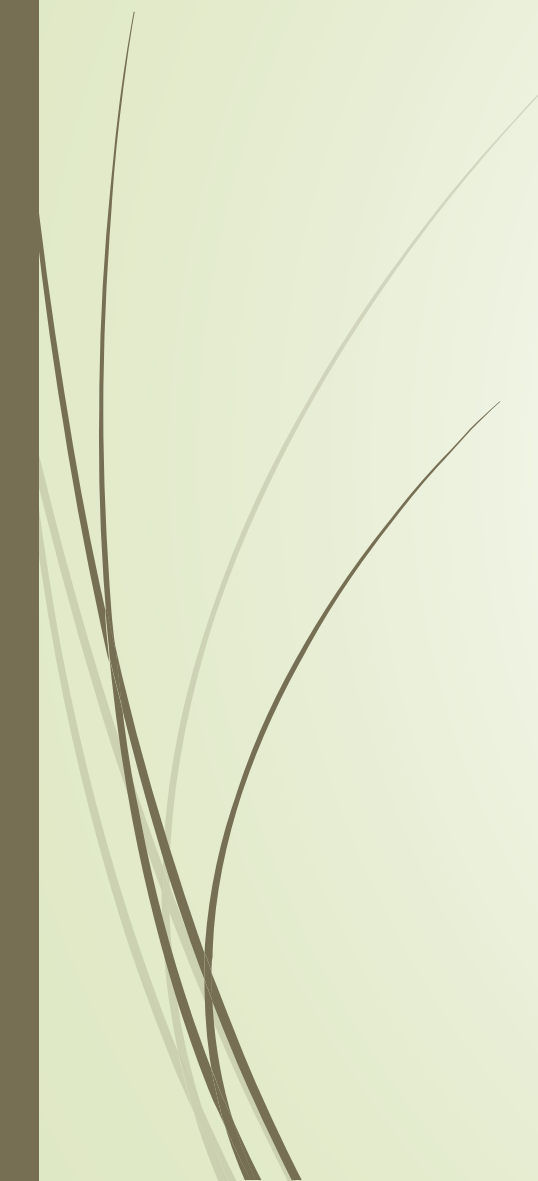
General Information

- US Oil & Refining Co. is an independent refinery
- Small refinery compared to majors
- Make everything from butane to asphalt
- Started looking at replacing an old distillation unit in 2015
- Purchased the Falcon in late 2015
- Early 2016 operations, engineering and planning accepted the results and the Falcon became our main instrument for “streams” samples.
- Run on average 3500 samples a month on the Falcon

Calidus GC Applications Cover Most Refinery Streams

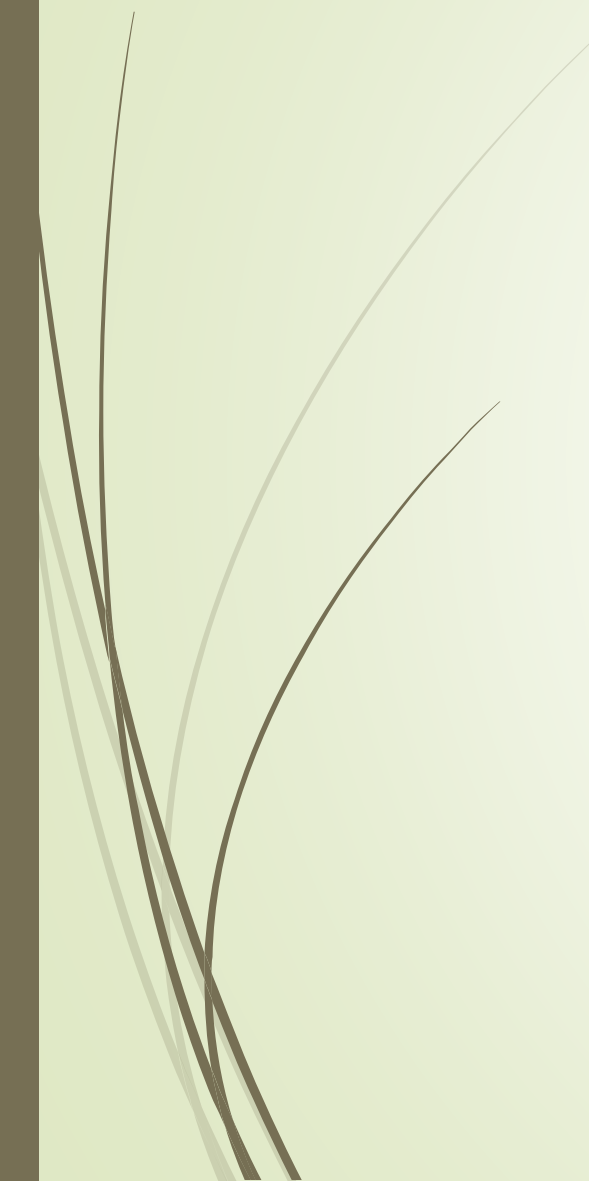
Feeds, Intermediates and Products





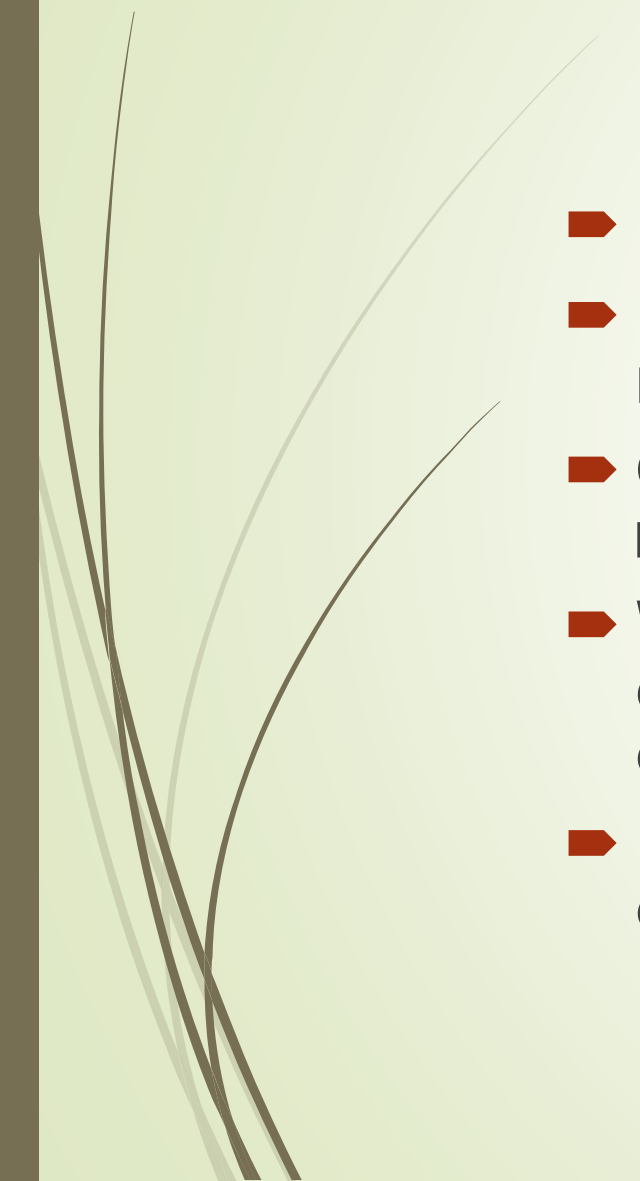
ADA SUPPLIES

FALCON SUPPLIES

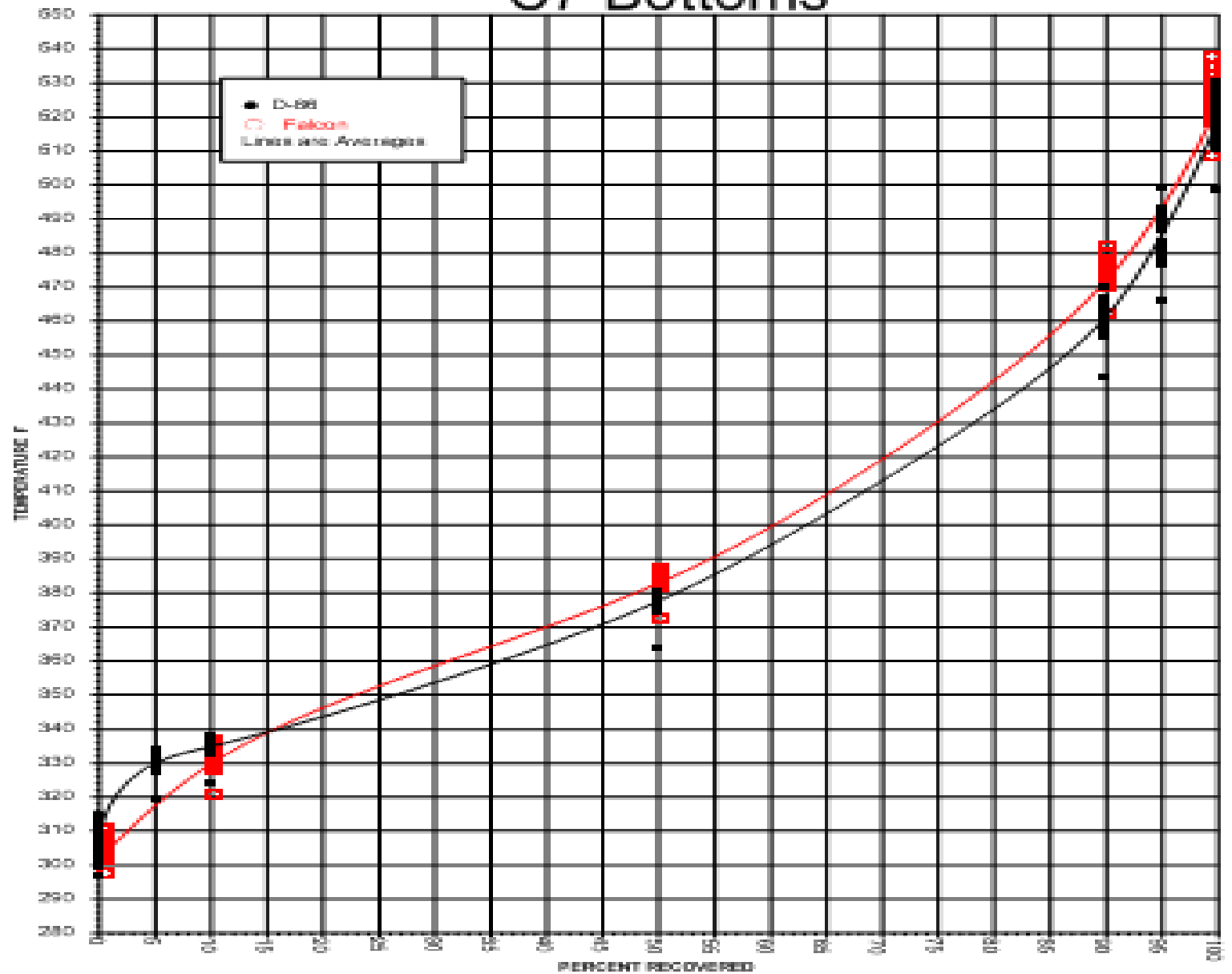




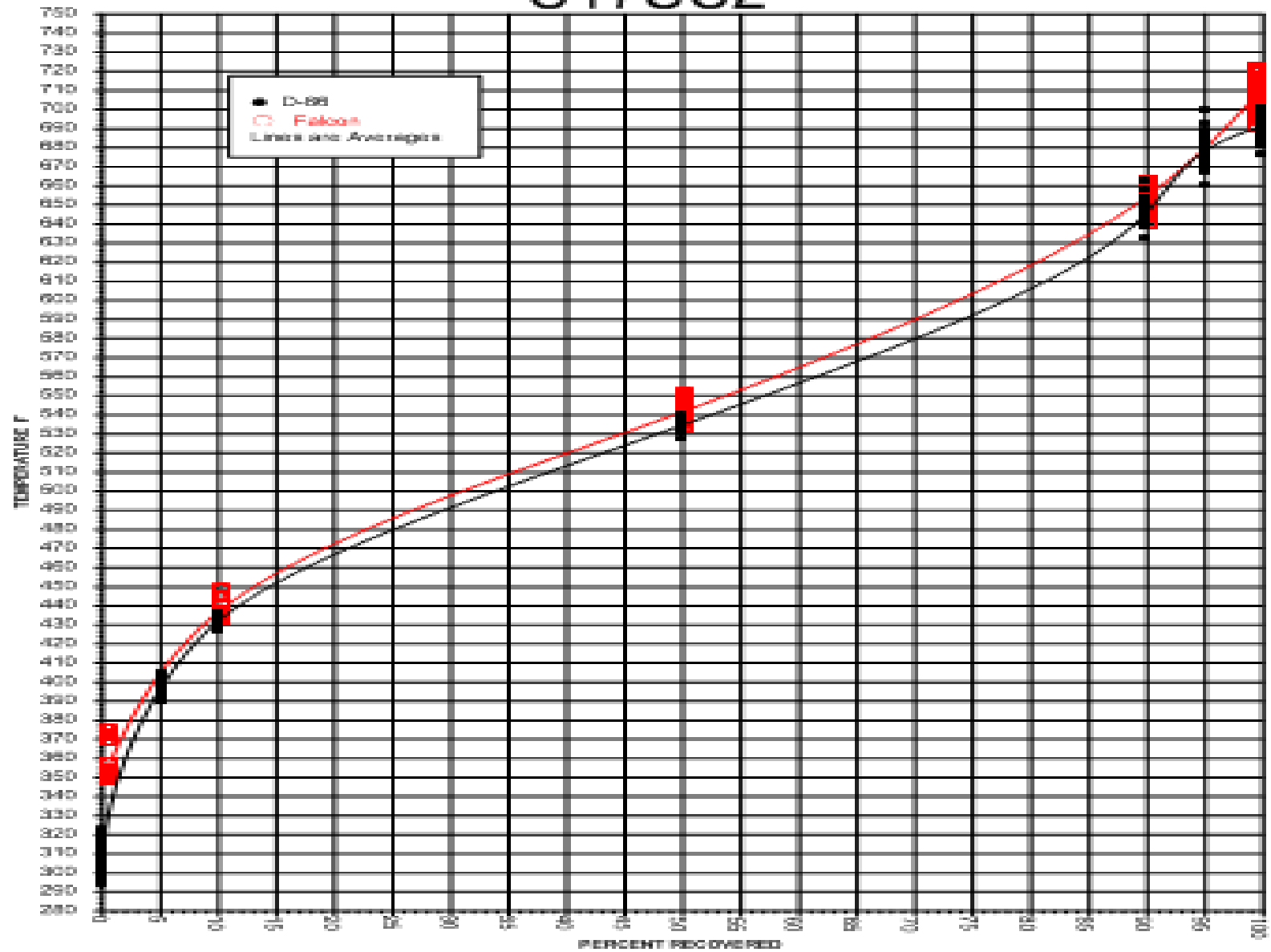
STUDY

- Use four stream sample for comparison to start
 - Ran the standard test and Falcon every sample for month
 - Compared the standard test method to the Falcon result (grapy on next couple of slides)
 - Wrote paper telling saving, speed, standard deviation and what the new quality control points would be on each sample
 - Had buy in from operations, economics and engineering
- 

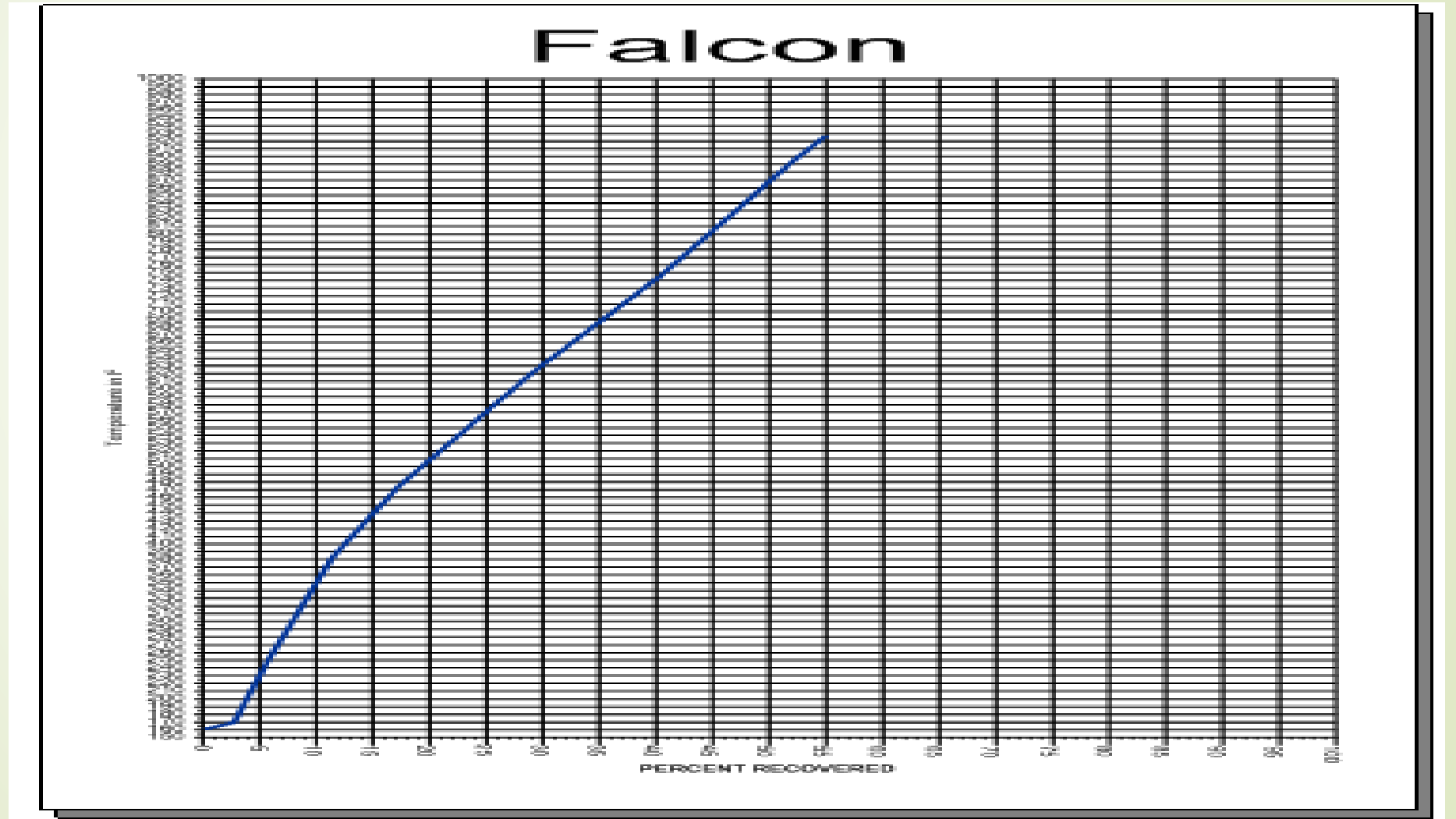
C7 Bottoms



C17SC2



Crude Distillation using Falcon minus residual





FIRST UNIT START OR UPSET

- Operators were amazed at the speed of results
- They were asking if the Falcon was up and running
- They were not questioning the results after we explained how we run standards everyday to make sure everything is being identified correctly
- Some of the pumpers were then asking if they could pull smaller samples or not as many
- We have reduced the amount we are getting for each sample
- Every stream combination is a test method



Standards

- There are two standards for the method
- One is the D2887 RT and RF Standard which we get from Separation Systems. We run this one with every sample
- The second is D2887 Reference Gas Oil which we purchase from the same place. We run this one once a day on the first stream samples of dayshift
- We use a 1cc syringe with blunt needle to withdraw the standards. We get almost all of it that way. The syringe and needles are one time use.
- We replace the lid on the standard vials once a day to reduce evaporation



Maintenance

- Only two people do the maintenance on the instrument
- It is easy to over tighten the screw for the septum and that breaks the small line
- Septum is changed twice a week. Monday and Thursday that way we know we will not have any issue over the weekend.
- We use to do it once a week but then determined that we were having septum failure during the weekend and we would be called in to fix it
- We refill the Carbon Disulfide once a week. We found that the caps are not very good for the vials used for carbon disulfide. We put electrical tape around the bottom of the cap and it stopped the high evaporation we were seeing with the Carbon Disulfide. Currently we go through 500 milliliters a year of Carbon Disulfide




Items to improve

- The safety glass around the auto-sampler could be smaller
- Dragon software needs more instruction
- There needs to be a security system on method
- They need manuals for the dragon and Calidus



What next?

- **We are studying more streams to be run on the Falcon**
 - **We are willing to work on getting this method in specifications**
 - **We are going to link it to the LIMS**
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QUESTIONS

