

# 2016 Cat Cracker Seminar Questions

## Process/Operations Panel

### Process/Operations

1. We are considering recycling various streams to the riser as an opportunity to increase propylene yield. What streams are good candidates? What are the lightest and heaviest boiling streams worth considering?
2. Share your experience with the various locations along the riser (below feed, above feed, intermediate riser, upper riser) where you have recycled slurry oil. What was the impact on the yield pattern, coke make and heat balance for each location?
3. What constraints do you place on the asphaltene and iron contents in your slurry circuit? What are the impacts of exceeding these constraints?
4. How does Arsenic in the FCC feed impact operation and catalyst performance? What testing do you apply to monitor Arsenic?
5. Share your experience with injecting emergency steam into the regenerator air distributor following the loss of combustion air? What is the purpose of practicing this procedure? If you do not practice the procedure, how do you protect your unit from potential catalyst back flow which could plug the air distributor or damage the air blower if the check valve does not hold? What guidelines are followed for steam purging the regenerator before air blower restart?
6. How do you account for the value of coke in your FCC economic calculations? Describe your approach when the coke yield changes due to a catalyst change, a feed type change, a feed rate change or a unit constraint change? Do you distribute the coke yield shift between additional riser feed cracking and additional steam generation at the waste heat boiler, CO boiler or cat cooler? What approach do you use to estimate the incremental heat release for the additional steam generation? How do you handle this issue in your LP model?
7. What are the best practices to minimize risk when choosing to process an opportunity FCC feedstock?
8. Describe your philosophy for withdrawing catalyst from the regenerator. How often do you withdraw? What operating challenges or withdrawal system constraints must be overcome?

### Catalyst

9. What catalyst properties/characteristics impact FCC catalyst losses?
10. What operational and catalytic changes can be implemented to optimize C4 olefin yield for the alkylation unit while producing lower sulfur FCC gasoline?

### Gasoline Quality

11. What FCC operating and catalytic changes can impact gasoline sulfur while retaining octane? How would feed hydrotreatment impact these options? How would the FCC operating and catalytic changes impact gasoline post-hydrotreating?

## 2016 Cat Cracker Seminar Questions

### Emissions Control Equipment

12. We experience continuous afterburn even after a wide variation in air rates. With heavily hydrotreated feed stocks, we have difficulty meeting CO levels. What process and equipment constraints may be contributing?
13. In response to the Refinery Sector Rule, what options are you considering for managing stack opacity during blower startup and catalyst loading? How are electrostatic precipitators or cyclone operating conditions part of your strategy? What safeguards must be considered or added to operate safely under these scenarios?
14. How often are SCR catalyst beds changed out? What is your experience with using NO<sub>x</sub> reduction additives to achieve the end of run prior to SCR catalyst replacement?

# 2016 Cat Cracker Seminar Questions

## Mechanical Panel

### Inspection/Turnaround Activities

15. Comment on centralized confined space monitoring and the benefits that mobile cameras and intercom systems provide to help with rescue planning during FCCU outages.
16. What are the critical areas for inspection during normal operations?
17. What are the main focus areas and surprises found during a turnaround in a FCC unit?
18. What is the methodology and frequency for RX-RG Cyclone inspection, specifically crossover inspection?
19. What are the fast and safe ways for residual catalyst unloading from regenerator bottom during turnaround so as to minimize the handover time for initiation of maintenance activities?

### Reliability

20. What is the best metallurgy and operating philosophy to achieve feed riser injector life of over 10 years? What are typical expected cycle lengths for complete replacement due to erosion?
21. Are you upgrading from carbon steel to 1-1/4 Cr metallurgy when replacing reactor cyclones? If so, why the change in metallurgy?
22. What criteria are you using to replace reactor cyclones? For example, some NACE participants indicate they are taking physical samples of the reactor cyclones or hangers to evaluate the metallurgical condition.
23. For FCCU's that have flue gas coolers with the flue gas on the tubeside and water/steam on the shell, have you experienced any failures due to caustic corrosion/cracking? If so, what design and operational changes have you made to mitigate the failures?

### Refractory

24. What is your experience with utilizing 317 stainless for hex steel to mitigate the hex corrosion problem? During a recent turnaround, I observed 317 hex installed next to 304 hex in a FCC regenerator. The 304 had signs of corrosion and discoloration where the 317 still looked new after a 4 year run. What is the latest on hex corrosion?
25. What diagnostic tools are you using to determine whether a piece of refractory has come off either in the regen or Rx? Refractory?
26. What is your experience with problems in the FCCU regenerator overhead system including erosion of the orifice chamber holes, hot spots in the flue gas line, damage of the refractory downstream of the Doubled Disc slide valves, and valve erosion? How have these problems been mitigated?

### Emissions

27. What are your ideas of best practices for maintenance, turnaround, repair and operation of air emission control devices (e.g., ESPs, WGS, cyclones, etc.) to ensure consistent high pollutant removal performance?