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	GASOLINE PROCESSES
Safety	
1	Do you have experience in isolating air-coolers to water-wash the process side while the unit continues to operate? What safety considerations do you consider before removing this equipment from operation?
2	What procedures do you use to test alkylation unit rapid de-inventory systems? Do you perform a functional test using acid?
3	What process safety management (PSM) factors do you consider when contemplating a reformer unit rate increase?
Theme	
4	The economic benefit for propylene and amylene alkylation is improving. What considerations do you use in the feed pre-treatment and alkylation unit operations before increasing these feeds?
5	What are the typical dispositions of coker olefins, coker light naphtha, and coker heavy naphtha that you employ in refineries? How are the sulfur contaminants, such as dimethyl sulfide and dimethyl disulfide, best removed from these streams?
Alkylation	
6	HF OPERATIONAL QUESTION
7	R SULFURIC OPERATIONAL QUESTION
ISOM	
8	Do you have experience with starting an isomerization unit (alumina chloride catalyst type) without first acidizing the reactor loop? What was the impact on catalyst activity?
9	Describe your experience and application of advanced separation technique,s such as DWC (divided-wall columns), to reduce capital investment and operating expense.
NHT	
10	What strategies do you employ to meet cycle length targets in naphtha hydrotreaters that are reaching catalyst activity limits due to capacity increases or feedstock quality decreases?
11	What is your acceptable limit for organic chloride concentration in a naphtha hydrotreater feed? What are the possible consequences if this limit is exceeded?
Reforming	
12	What operating strategies do you employ to successfully regenerate catalyst in a continuous catalyst regeneration (CCR) unit with a carbon content in excess of 10wt.%?
13	When the regenerator in a CCR unit is shut down for an extended period of time, how do you predict coke on catalyst with no catalyst circulation?
14	Do you have experience with CCR heel catalyst contaminating the circulating inventory during operation? How can this be prevented?

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Reforming Cont.	
15	How do you remove the CCR heel catalyst from the unit during an outage and under what atmospheric conditions?
16	What is your best practice for inspecting and preventing erosion in CCR lift lines?
17	What are your strategies for managing feed sulfur to reforming units? What are the pros and cons of the different approaches?
Tier III	
18	The increased production of light straight run (LSR) from crude units is likely to have an impact on refiners' plans for Tier III compliance. What strategies do you employ in order to manage this issue?
19	What range of sulfur targets for hydrotreated FCC gasoline do you anticipate for Tier III operation?
Town Hall Discussion Breakout	
A	TOPIC: Are there new drivers for reformer catalyst selection and determination of changeout timing?
B	TOPIC: What are the strategies for maximizing CCR unit turnaround cycle length? Is a ten-year cycle possible?
C	TOPIC: How are refiners managing naphtha oversupply, Tier III gasoline requirements, and increased octane demand?

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	HYDROPROCESSING
Safety	
20	When is it appropriate to neutralize austenitic stainless steel equipment to protect against stress corrosion cracking? What neutralization procedures and methodologies do you recommend?
21	What programs/systems do you employ to monitor hydrotreater furnaces and prevent tube failures/loss of containment? Can you share your experiences (including reliability) using technologies to implement online temperature monitoring of tubeskin temperatures?
Hydrocracking Catalysts	
22	Describe your strategies for optimizing the pre-treat and cracking catalyst cycles. How does this strategy vary when operating between maximum naphtha and maximum distillate modes? How does this impact catalyst selection for the next cycle?
23	How do you operate mid-distillate selective recycle hydrocracking units to generate more naphtha while minimizing fuel gas/ liquefied petroleum gas without catalyst replacement?
Operations	
24	How do you manage reactor maldistribution once identified?
Profitability	
25	For refinery complexes considering grassroots or brownfield expansion of gasoil conversion capacity, what are your typical capital expenditure (Capex) costs and relative refinery margin improvement between FCC and Hydrocracking? What are the key technology features that impact your economic decision? What are your crucial considerations if you include both technologies to allow for future integration and optimization, especially around changing gasoline/diesel ratio in the facility?
26	We are interested in minimizing our black oil production from the FCC by recycling heavy cycle oil and/or slurry to our FCC feed hydrotreater for aromatic saturation and further cracking. Do you have any experience with this operating mode or recommendations for reduced slurry make via optimization of an FCC pretreat unit?
Hydroprocessing	
27	What methods do you use to reduce particulate loading on or debottleneck of existing filtration equipment in a hydroprocessing unit without reducing catalyst cycle life?
28	Our hydrotreating unit continues to suffer from pressure drop issues. Multiple graded bed schemes have provided incremental improvements. What other successful solutions to further mitigate pressure drop buildup do you employ?
29	What level measurement technology do you use in the hydrotreater high pressure separator? Is your recommendation different if the unit runs in block modes (with feeds of varying densities)? What design considerations do you take into account when selecting a high pressure separator level control valve?
Mild-Hydrocracking	
30	What technologies do you use for mild hydrocracking of heavy gasoil over a range of conversions and product selectivities? Please elaborate on commercial experiences.

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31	With heavy gasoil hydrotreating and mild-hydrocracking units producing diesel product with 30-50 ppm sulfur, what options do you employ to recover maximum volume of ULSD? Are there other diesel quality concerns and how are they resolved? How does the yield and quality change over the cycle?
Operations	
32	What are your current practices for and experiences with performing on-line cleaning of heat exchangers vs. offline cleaning?
33	Can you share your experience with chemical additives to prevent fouling in the naphtha hydrotreater feed side of the feed/effluent heat exchangers or to resolve reactor pressure drop issues?
34	The cycle life of a high pressure ULSD unit operating for maximum aromatic saturation and liquid yield is limited by aromatics equilibrium at elevated temperatures. What strategies or solutions do you employ to extend operation with maximum liquid yield?
Hydroprocessing	
35	What are possible causes of high product nitrogen that you see in a naphtha hydrotreater processing coker naphtha? Please include monitoring, identification, and troubleshooting techniques, inside and outside battery limit considerations, and mitigation options.
36	Which refinery water sources do you accept for hydrotreater water wash (e.g. stripped fractionator overhead water, stripper sour water, etc.)? What are typical water quality guidelines?
37	What is the impact of CO and/or CO2 on noble metal catalyst performance?
Resid Hydrocracking	
38	What do you see for the future of ebullated bed technology considering changes in crude quality and availability?
39	Please summarize the current status of slurry hydrocracking technology commercialization.
ULSD	
40	As it relates to overall catalyst cycle life management, please address the following issues: 1. What are typical cascading practices that you employ for catalyst reuse after regeneration and eventual disposal? 2. What quality control, catalyst properties and performance specifications, and/or warranties do you have in place for regenerated catalysts? 3. What are some of the key decision criteria you use in determining whether to send a catalyst for metals reclamation, regeneration, or disposal?
41	What are the considerations you use for extending hydrogen plant catalyst life cycles (i.e. lower production rates, furnace tube failure, etc.)?

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	CRUDE/VACUUM DISTILLATION & COKING
Safety	
42	For heavy oil fractions being transported via truck, rail, or barge, what are your typical H_2S detection and monitoring methods? What are the mitigation options you employ?
43	Have you experienced high corrosion rates in carbon steel piping in resid service operating below 500^{o}F? Please comment on corrosion mechanisms.
Crude Distillation	
44	What issues do you consider to establish purchased crude oil custody transfer best practices from various sources?
45	What criteria and requirements do you use to determine mixing equipment for crude tankage? How do you map the sludge level? What methods do you use for sludge removal to shorten time to clean?
46	What measurement methods (i.e. analytical, inferential, online analyzers) do you use in crude and coker units for feed, process and product quality management? How do you use the information to improve unit reliability and profitability?
47	Given the increased volatility of crude and product prices, what additional steps do you take to adjust their crude unit cut points to maximize profitability?
Crude Coker	
48	What are your important considerations when evaluating the methods used for fouling detection and mitigation in preheat exchangers and furnaces in crude and coker units?
49	What are your materials of construction criteria for structured packing at the different sections of the crude, vacuum and coker towers? What criteria do you use to replace packing during turnaround?
Coker	
50	In the absence of individual dip-leg sample points, how do you manage corrosion in the vacuum overhead system?
51	What key parameters of coker furnace tube design and metallurgy have you seen that can impact run length? What metallurgy do you use specifically to increase run length and tube life?
52	What are your best practices for a water wash system to control corrosion in delayed coking fractionator overhead and light-ends systems?
53	What operational improvements do you make to reduce silicone from antifoam agents in coker products?
54	When using coker LPG for propylene production, what contaminants are a concern for you and how do you mitigate them?
Answer Book Only	
55	What ways have you found to be effective to measure vacuum overflash flow in a gravity seal loop (not pumped)? Please comment on overflash measurement for controlling wash oil flow.

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56	What mechanical / design alterations to the "standard" crude furnace design do you require to prevent fouling when processing LTOs?
57	Please discuss desalter level control equipment and its effectiveness at detecting and controlling rag layer, oil under carry and water carry over.
58	What techniques do you use to rapidly detect fouling in the top section of the crude tower besides top section differential pressure?
59	What is the contribution to salting in crude fractionators and overhead systems due to steam condensate amines and what are your mitigation strategies?

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	FCC
Process	
60	When is your return on investment adequate enough to justify installing a desalter to treat purchased FCC feeds? What is the ROI based on (i.e., FCC catalyst impact, unit corrosion, etc.)? How do these desalters differ mechanically and operationally from a conventional crude oil desalter?
61	How many inside/outside operators staff your FCC plant? What other processes are included in their scope of responsibility?
62	We have run a full burn FCCU for many years. We are considering processing more resid and operating in a partial CO combustion mode. What is a carbon runaway and how can it be addressed?
63	What methods do you currently use for regenerator cyclone temperature control? Do you use water sprays or steam injection?
64	What are your typical operating guidelines to prevent compressor surge episodes? How close to the actual surge line of a compressor do your FCCU operators go before adjusting operation?
65	Please comment on which FCC feed types you are currently processing and what chemicals you are using for gas plant corrosion prevention. Is water washing sufficient to sustain adequate unit reliability?
66	In your experience, how does changing the feed cut points impact FCC conversion and product yields? How does the LP determine where to make these cut points?
67	As distillate demand has decreased, current economics favor maximizing gasoline and octane. What operating and catalyst changes do you recommend for increasing octane barrels?
68	What is your experience with processing raw crude in the FCC? What types of crude have you tried to process in the FCC? What are the yield impacts? Any corrosion issues associated with this mode of operation? What additional corrosion monitoring is needed?
69	Our FCC unit is limited by coke burn and high regenerator temperatures. What catalyst and operational changes have you implemented to maximize the conversion of heavy feeds and increase the amount of resid that can be processed without running into your regenerator limits and without increasing dry gas production?
70	What is your method for measuring naphthenic acid (TAN) in FCC feed? Is this method affected by VABP or con carbon content? Do you have data that validates an appropriate Integrity Operating Window (IOW) trigger level? If above the trigger level, what is your recommended corrective action (extra inspection, change crude/slate, etc.)?
Safety and Environmental	
71	In your experience, what factors affect NOx emissions for a partial burn FCC with a CO Boiler? How do you achieve 50 ppm CO emissions while simultaneously minimizing NOx emissions through the stack?
72	Recent drone technology advancements have enabled refiners and contractors to improve the efficiency of maintenance and inspection activities. With this, how are your hot-work permits and general safety policies evolving to sustain adequate asset and personnel protection at all times? For instance, what additional safety permits or considerations would apply for drone use and aerial inspections?

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73	What criteria do you use to justify sealless pumps in place of conventional double seal pumps in LPG services? What are the operational and reliability issues associated with these types of sealless pumps?
Catalyst	
74	In your experience, what are the effects of different Ni passivation technologies on the performance of CO promoters and stack emissions?
75	In your experience, how does the shape of an FCC catalyst particle impact the fluidization properties of the catalyst? What other properties are important to monitor?
76	What FCC operating and catalytic changes can lower gasoline sulfur while retaining octane? How would feed hydrotreatment impact these options? How would the FCC operating and catalytic changes impact gasoline post-hydrotreating?
77	What are your best practices for mitigating operational or performance risks throughout a catalyst changeover?
78	What operational and catalytic changes have you implemented to optimize C4 olefin yield for the alkylation unit?
Mechanical/Reliability	
79	What methods do you use to detect and monitor coke deposition in FCCU risers? What prediction methods have been successful?
80	What is your best practice for removing feed nozzles during turnarounds when only the tips are planned to be replaced? Are there any pros/cons or advantages/disadvantages of removing the nozzles while the system is hot or after it has cooled?
81	What are your inspection best practices for Third Stage Separator (TSS) systems throughout a scheduled turnaround? What types of issues or equipment damage would you proactively anticipate in order to mitigate potential turnaround delays?
82	Have any of your FCC units observed extensive corrosion in carbon steel piping operating below 500^{o}F - particularly in the slurry circuit? What are your typical corrosion mechanisms? What metallurgies would you deem acceptable for high-temperature, high-sulfur streams?
83	What are the variables that impact slurry oil pump life? What is the typical slurry oil pump life that you have experienced in normal service?
84	What effects, if any, have you observed concerning slurry pumparound exchanger fouling when processing shale oil/tight oil feeds?

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