NPRA 2010 Q&A and Technology Forum

	HYDROPROCESSING
Safety	
1	What is your experience with emergency isolation equipment (such as a check valve or actuated valve) on the outlet of reactor charge heaters to prevent loss of containment of the reactor loop in a tube rupture scenario? What are the advantages and disadvantages of having this type of equipment?
2	Please discuss your experience regarding the need to add an emergency shutdown (ESD) valve between the cold high pressure separator and the product stripper. The typical design for vapor blow through is to size the stripper relief valve for this case.
Hydrogen Production	
3	Please discuss your best strategies to prevent overheating of steam reforming furnaces?
4	In your experience, what options are available to debottleneck existing hydrogen systems and increase hydrogen production? Is hydrogen recovery from refinery off gas an economical option?
5	Does anyone have proven experience using promoted zinc oxide products for sulfur removal upstream of the reforming section? What improvement have you measured in the downstream catalyst performance?
6	The use of infrared pyrometers for monitoring tube temperatures in steam reformers is a well known practice. What is your recommended frequency for use of these devices (how many times per week)? Can you offer any recommended alternate devices or methods available such as fixed infrared pyrometer skin thermocouples or infrared imaging?
7	What is your experience with reusing molecular sieves in pressure swing adsorption hydrogen purification? What is your recommended inspection criteria for the molecular sieve to be reloaded?
8	With respect to hydrogen purification pressure swing adsorption vessels, what are the best practices regarding inspection? Can their working life be extended beyond design with vessel inspection?
Process	
9	What experience do refiners have regarding fired heater stainless steel tubes OD/external polythionic acid attacks due to sulfur in fuel gas such as the ones in hydroprocessing units? What criteria are refiners using to decide when to neutralize the external side of the tubes with soda ash during turnarounds?
10	What are refiners' experience with respect to unit availability, catalyst performance and product quality when co-processing "renewable" feedstocks in a ULSD unit? Is there a big variation in operability with different sources of renewable feedstocks?
11	Are any operators still using salt dryers for ULSD or Jet? If so, do you have any related product quality or corrosion issues?
12	Now that ULSD production has seen several cycles, what are the SOR and EOR operating conditions? What catalyst formulations are you using (NiMo, CoMo, regen, various blends)?
13	Severe fouling of diesel and gas oil hydrotreating preheat exchangers has been a growing problem. In your experience, what are the causes and how can these be prevented? Have you tried antifoulant injection in this service?
14	How do you ensure that the reactor effluent stream is evenly divided when going to parallel exchangers?
15	ULSD reactor feed/effluent heat exchanger leaks can be a big problem meeting product specifications. What are best practices for detecting and preventing leaks? Are there new technologies or mechanical specifications to prevent cross contamination?
16	In your experience, are there documented cases of organic chlorides coming in with certain crudes? If so, what is their impact on hydrotreating units?
17	What are the best practices to manage ammonium chloride fouling ? What methods are used to set wash intervals? What are the potential pitfalls?
18	What are your key strategies to maximize the heavy diesel barrels in the diesel pool without cracking? Do you consider blending and dewaxing etc. to meet product specifications?
19	In your experience, what are the effects on ULSD hydrotreaters when FCC operation is adjusted to maximize diesel?

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Catalyst	
20	How do refiners quantify the impact of sodium on hydroprocessing units, specifically those processing either residuum or VGO feeds?
21	How low can the benzene content of the reformate go just by tailoring the feed (e.g. prefractionation)? How does the quality of feed fractionation, feed composition, and type of reformer affect the ultimate benzene level? Given all of the variables, what is the lowest design level you would recommend?
22	In your experience, how are ULSD units maximizing catalyst life/ cycle length? Do you use feedstock or catalyst analysis to locate sources of contaminants, especially arsenic?
Hydrocracking	
23	The liquid recycle rate to a second stage of a hydrocracker can shift conversion, light end yields, cycle length and/or the required temperature to achieve a desired conversion. What strategies do you employ to reach optimum conditions?
24	For a hydrocracker with a debutanizer/stabilizer column, what corrosion issues do refineries experience in the feed and/or overhead systems? What have you done to mitigate the corrosion? What are your key considerations in optimizing these parameters?
25	Besides high reactor temperatures and flow maldistribution, what are other causes of high gas and LPG yields in a hydrocracker have you experienced?

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	GASOLINE PROCESSES
Safety	
26	What are the best practices for entering the vapor space above an internal floating roof in a gasoline tank?
27	It has become increasingly common to chemically neutralize / passivate refinery towers and vessels prior to entry. What are the recommended practices for implementing these tasks? In your experience, what conditions trigger the need for chemical treatment?
Environmental	
28	The Clean Air Act required refineries to develop and implement a Leak Detection and Repair (LDAR) program to control fugitive emissions. What is the current status of this implementation and who is responsible for it in a typical refinery management structure: production, maintenance or EHS?
29	What technologies do you use for treating or recovering VOCs from small-scale truck loading terminals? Discuss the merits associated with each?
Alkylation	
30	What process parameters can affect alkylate T90? What are the critical variables you monitor in both sulfuric and HF units? Discuss processing schemes, feed impacts and operating variables.
31	In your experience, when sampling the HF Alky iso-recycle stream, how and where is the sample neutralized prior to analysis? Can this approach be used for online GC analysis as well?
32	In your experience, what contributes to monel denickelification in the HF Acid Regenerator circuit? What are the potential problems associated with this?
33	How do refiners avoid De-isobutanizer (DIB) column/reboiler fouling in sulfuric acid alkylation? What process conditions on the column do you use to detect this fouling? What process modifications do you take to minimize the impact of this fouling?
NHT	
34	What has been the experience of refiners operating selective hydrotreating of FCC naphtha regarding gum formation potential of the low sulfur gasoline? Is gum inhibitor addition a recommended practice?
35	What experiences do the panelists have with naphtha hydrotreater combined feed exchanger fouling? How do you monitor fouling in this exchanger service?
36	What are the best practices for maximizing catalyst run length in NHT units that are limited by reactor pressure drop?
37	Silicon poisoning of NHT catalysts has been observed in refineries without coking units. In your experience, what are the potential sources of silicon and what are the best practices to manage risk of such poisoning?
Reforming	
38	What measurements and criteria do you use to decide when to change your gas and liquid chloride absorber material? How do you determine the selection of absorber material?
39	With lower severity requirements due to ethanol blending and corresponding reduced coke make in the reformer, what changes are you making in regards to reformer operation? What opportunities does this evolution present for both CCR and semi-regen units?
40	Has anyone experienced high chloride levels in off gases from the lock hopper of a pressurized regenerator? What are the consequences of the high levels (i.e. fouled burner tips)? What are ways to mitigate the problem?
41	Do you have any experience with plugging of chloriding agent injection points in regenerators? How has this been overcome?
42	In your experience, what are the typical causes of damage to the top of the regenerator inner screen?

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Aromatics	
43	In both Extractive Distillation and Liquid-Liquid Extraction units, foaming in the Extractive Stripper column leads to solvent carryover and unit upsets . What are the determinants of foaming, and how do you determine foaming risk? Is continuous antifoam injection necessary? What are the countermeasures do you take to minimize this risk?
44	Contaminants in aromatics extraction unit feeds such as chlorides and oxygen are difficult to measure, and can lead to operational issues (such as fouling / corrosion / erosion, etc) in the extraction unit. In your experience, what are the primary effects of these contaminants, and how can one manage these impacts?
45	In Udex extraction units, what options (process variables / solvent composition / solvent type) do you employ to improve aromatic recovery without compromising unit capacity?
Blending	
46	What is the panel's experience with in-line blending and in-line certification? What are the main differences between in-line blending and certification?
Corrosion	
47	What are the best practices for corrosion probe selection, installation and reliability, especially in high temperature and/or high H2S environments?
48	In your experience, what is the preferred online (non-destructive) method to identify risk of HIC (hydrogen induced cracking) in gasoline processing units?

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	CRUDE/VACUUM DISTILLATION & COKING
Safety	
49	What testing procedures do you use for emergency shutdown valves? What are the parameters you measure and what are acceptable values?
50	Chemical cleaning of towers and vessels prior to entry is being used to reduce time to entry. What practices are you employing and how much time is saved?
Coking	
51	In your experience, what are the implications on coker heater run length and coke drum operations with the following feedstock quality: Contaminants (Na, Ca), low saturates or high asphaltenes, crude compatibility, solvent deasphalt (SDA) pitch, low asphaltenes and high saturates?
52	What areas of a delayed coker are susceptible to naphthenic acid corrosion? How do you determine the maximum allowable TAN for these areas?
53	During the coking cycle, how are drum skin temperatures used to monitor drum wall condition?
Coking/Heavy Oil	
54	What is the current best practice for number of feed nozzles, angle, and location on coke drums considering the use of slide valves for the bottom unheading device?
55	What is considered the best-in-class design for coker main fractionator wash zones? Have refiners seen good performance and target run lengths using grids in this service?
Corrosion Control	
56	Some crude tower overhead deposition appears to be linked to corrosion treatment programs (i.e. filming corrosion inhibitors and neutralizers). Have you confirmed this and what are the potential mechanisms that can lead to this deposition?
57	Do you experience any corrosion and fouling in the preflash or crude towers as a result of running at dew point temperatures or below in the top of the towers? If so, what steps do you take to mitigate and control this problem?
58	In your experience has a non-phosphorous corrosion inhibitor been successfully used to mitigate naphthenic acid corrosion? In what circumstances and under what conditions are non-phosphorous corrosion inhibitors used?
59	What are refiners using to define the corrosivity of high acid crude oils and how is this data obtained?
60	Please discuss advanced methods you use to monitor corrosion in operating units. Are any of these used in conjunction with the DCS for continuous on-line monitoring?
Desalter/Desalting	
61	In your experience, what is the effect of crude oil compatibility on crude unit preheat exchanger fouling? Are there any correlations used to predict fouling?
62	What are the refiners experiences using static mixers in place of, or in conjunction with, traditional mixing valves at the desalter?
63	Certain crudes are treated with H2S scavenger to meet a 10 ppm or less specification in the vapor space. In your experience, what is the disposition of the reacted and unreacted scavenger additive through the crude unit? Will this product and/or associated byproducts create corrosion or product quality issues in the crude unit or downstream units?
Distillation	
64	Please discuss the latest tray and packing technologies for improved fractionation efficiency in existing crude and vacuum units. In particular, what is the effectiveness in terms of fouling/plugging and resulting run length?
Energy and Loss	
65	What methods do you use for heat recovery from furnace flue gas equipment at ~260°C (500°F)?
Flaring	

66	Flare gas recovery systems are currently being engineered and installed in refineries. Please comment on your experience with these recovery systems, particularly with their reliability and maintenance.
Naphtha	
67	Have you experienced coking or other fouling of reboilers in naphtha distillation service (splitter, debutanizer, etc.)? If so, what operational or design changes did you implement to eliminate this problem?
Vacuum	
68	Do you see any benefit in continuing to steam strip crude tower distillate cuts since these side streams require further processing in down-stream hydrotreaters?
69	What do you see as the critical considerations for wash bed design in high C-factor vacuum columns? How does one determine bed type, depth, and appropriate wash oil distributor design?

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	FCC
Safety	
70	How can you minimize the possibility of ignition and fire in the structured packing of main fractionators after they are opened for maintenance? Do you use chemicals to improve this procedure?
71	For the main column, "tri lines" can be utilized to monitor bottoms level. When other level instruments are being verified or have failed, what are the best operating and safety practices being employed to verify the level? What do refiners use to monitor and control level in the bottom of the main column?
72	With advance controls on the FCCU and gas plants, what are refiners doing to train new operators and keep their experienced operators sharp and ready to handle FCCU upsets and emergencies? Are refiners using simulators to help with the training and retraining?
Process	
73	What levels of distillate boiling range material do you include in the FCC feeds? Discuss the yield and heat balance implications of varying the feed distillate content. What equipment/technology options do you employ to minimize the distillate levels?
74	Please discuss how yield data can be used to identify hardware issues. What hardware issues can you address to fix dry gas and benzene production?
75	What have refiners done to mitigate or eliminate coke buildup in reactors? How do you monitor and vary feed quality, reactor severity, catalyst formulation and other variables to impact coke formation. How does feed distributor operation and design impact reactor coke buildup?
76	How can you tell if spent catalyst stripping is "good"? We don't believe our hydrogen on coke results.
77	How do you minimize the entrainment of inerts from the regenerator which eventually enter the fuel gas system and sulfur recovery units reducing available capacity?
78	In your experience, how effective and reliable are hydrocyclones, electrostatic separator, additives, and filters in reducing the ash content of the slurry?
79	Backwash containing catalyst fines collected by main column bottoms hydrocyclones, filters or electrostatic precipitators are normally routed back to the FCC reactor riser. In your experience, how does the recycle of catalyst fines in main column bottoms impact particulate emissions from the FCCU?
80	What best practices do you recommend to improve LCO recovery? Do changes in LCO pump around affect LCO recovery? What are common challenges?
81	Refiners operating FCCUs producing high levels of propylene have seen different or excessive product contaminants when compared to a less severe operation. In your experience, how has this impacted gasoline or LPG treating unit? What specific contaminants have you identified? What impact have you seen in amine color, consumption, or foaming tendency? What actions have you taken that have mitigated or prevented treating unit issues?
Reliability	
82	Immediately after startup of the FCCU, we experienced a hot spot in the regenerator dome and flue gas system. Do you know of any "on the run" acceptable mitigations? Should steam and/or water sprays be applied to the impacted area? Are there reliable analytical techniques to determine if and when the unit should be shutdown for repairs?
83	What is your experience with regenerator cyclone refractory hex steel failure due to oxidation/corrosion? Do you observe a relationship between these failures and feed sulfur content or refractory type?
84	Please describe the function of the critical flow nozzle in relation to the operation of a third stage separator. What are the key process/operations/maintenance considerations you associate with the performance of the nozzle? Can poor performance result in a unit shutdown?
Catalysts	

85	What is the typical range that you employ for iron content on FCC equilibrium catalyst? What methods are available to determine how iron is accumulated on the catalyst surface? How does the distribution of iron on the catalyst surface impact the FCC operation, yield structure and emissions?
86	In your experience, what are catalyst best practices to shift FCC yields rapidly between gasoline and diesel maximization and then back again? Many catalyst suppliers are recommending blended catalyst systems. Do you believe this catalyst/additive blending is the best approach?
87	In your experience, how does catalyst activity affect the catalyst's coke selectivity and the FCCU's delta coke? How are the coke selectivity and delta coke related? Lastly, discuss how to determine the proper activity to maximize conversion.
88	What options exist for the disposition of FCC equilibrium catalyst and fines? For refineries processing residual feedstocks, what are the limitations on the contaminate levels for the various disposal options?
Environment	
89	In shifting from partial burn to full burn in a side by side unit, what has been your observed impact on the NOx emissions? What is necessary to achieve 20 ppm NOx?
90	Does any refiner use an on-line particulate emissions (PM) analyzer to measure PM concentration and/or particle size distribution in the flue gas? Are any of these analyzers using continuous emission monitoring systems (CEMS)? How reliable and accurate have these systems been?
91	Assuming the FCCU already has a third stage separator, what are the various options you consider for further reduction of particulate emissions (PM) and what is the expected level of PM to be achieved?