Austin, Texas

2007 NPRA Q&A and Technology Forum

Hilton Austin
Austin, Texas
October 9 – 12, 2007

NPRA

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7:30 am – 11:00 am	Hydroprocessing P&P	Austin Grand Ballroom Salon G
9:00 am – 9:30 am	Coffee Break	Austin Grand Ballroom Foyer
9:30 am – 11:00 am	Plant Automation: *Concluding Keynote Dr. J. Pat Kennedy President and Owner, OSIsoft*	Austin Grand Ballroom Salon F

2007 NPRA Q&A and Technology Forum

The 2007 NPRA Q&A and Technology Forum addresses real problems and challenges that you face at your facility and will help you sort through potential solutions as you discuss them with panelists and other attendees. Today's competitive refining environment requires attention to plant safety, superior technology, innovation, and excellence in operations. The shared knowledge of the refiners, petrochemical producers, catalyst and chemicals suppliers, plant automation specialists, process licensors, engineering firms, and other industry experts at the Q&A and Technology Forum keeps you moving in the right direction as you optimize your plant's operation.

The 2007 Q&A and Technology Forum program will emphasize process safety and its primary importance in plant operations and design. Each session will include questions or presentations on proven practices for improving process safety.

Questions & Answers
Q&A sessions will have panels of industry experts from refining companies and technology providers who will respond to questions and engage attendees in a discussion of today's tough issues.

Principles & Practices
The Principles & Practices (P&P) sessions, which correspond to and complement the Q&A sessions, will be ideal for operations superintendents, process engineers and others who can benefit from a session that is focused on practical issues, the fundamentals of good operations, and elimination of persistent problems.

- Crude / Vacuum Distillation and Coking
- Gasoline Processes
- FCC
- Hydroprocessing
- Plant-wide Systems

Plant Automation & Decision Support
The Plant Automation and Decision Support topics are included in the Q&A and Technology Forum so that attendees whose responsibilities overlap between process engineering, unit operations, process control, and planning will be able to use their conference time effectively. This "conference within a conference" will have 10 separate sessions that will provide a comprehensive array of topics for plant automation professionals.

Cyber Security Roundtable
New at this year's Q&A and Technology Forum is the NPRA Cyber Security Roundtable on Thursday, October 11. This Roundtable will show what tools are available for IT and DCS personnel in the refining and petrochemical industries. Attendees will learn how to use these tools to anticipate a cyber security attack and avoid having a company's operations disabled by such an attack.

This is the industry's only one-day program designed specifically for IT and DCS personnel in the refining and petrochemical industries.

Attendees will be able to attend any of the Q&A, P&P, Plant Automation or Cyber Security sessions. There will be one Keynote session for all attendees on Monday and the hospitality suites will be open to every attendee.

Session Information

Plant Automation & Decision Support

The NPRA Plant Automation and Decision Support topics are ideal for those individuals who are responsible for plant automation, process control, planning and scheduling, IT and modeling/ simulation. Unlike other plant automation and decision support programs, this program is designed by operating companies for operating companies.

There will be ten separate sessions under plant automation and decision support:

- Readiness/Lessons Learned
- Readiness/Industry Perspectives
- A Crude Reality Check
- Convergence of IT and PC
- Supermodels (APC and Full Diagnosis)
- Operator Training
- Energy Management
- Panel on Energy Management
- The Future
- Concluding Keynote

Principles & Practices Sessions

The Principles & Practices (P&P) sessions are discussion-oriented sessions, primarily designed for the engineer whose overall operating experience is less than 20 years. The P&P sessions will complement the information exchange that occurs in the Q&A sessions. Each of the sessions will address the fundamentals of good operation and the foundational principles for the technologies that are commonly employed. These sessions will usually have short presentations followed by a time where attendees can ask further questions or present their own particular problems and benefit from the collective experience of the other attendees.

The five P&P sessions are:

- Crude & vacuum distillation and coking
- Gasoline processes
- FCC
- Hydroprocessing
- Plant-wide Systems (Process Safety, Flare Management, Asset Management)

Cyber Security Roundtable

New this year at the Q&A and Technology Forum is the NPRA Cyber Security Roundtable. Unlike other cyber security seminars, this roundtable is tailored to the specific needs of the IT and DCS personnel in the refining and petrochemical industries.

This roundtable will address six main topics considered by NPRA members to be top priorities in cyber security:

- Making the Case for Cyber Security in the Company's Budget
- How to Integrate Business and DCS Networks / Connectivity
- Remote Access
- Wireless Issues
- Future of Cyber Security
- Cyber Security and Physical Security – Working Together

In addition to illustrating the top cyber security issues, this roundtable will show which tools are available today for the IT and DCS personnel in the refining and petrochemical industry.

Sponsors

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Opening Reception
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Wednesday Morning Coffee Break
Aspen Technology

Wednesday Afternoon Refreshment Break
Technip USA

Thursday Afternoon Refreshment Break
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Wednesday
October 10, 2007

Keynote Address

8:00 am – 9:00 am
Austin Grand Ballroom Salon H

Carolyn Merritt
Former Chairman of the
U.S. Chemical Safety Board

Plant Automation & Decision Support: Readiness / Lessons Learned

9:00 am – 10:00 am
Austin Grand Ballroom Salon F

Presider
Steve Williams, Aspen Technology

Keynote
The Katrina Experience
Roxan Kraft, Motiva Enterprises

The 2005 hurricanes taught the refining industry how to prepare for and recover from a disaster, but what about future hurricanes and other incidents that could disrupt the industry? What can be done to be ready for the next Katrina or 9/11?

Experiences from a Global Roll-out of Refinery Planning and Scheduling
Piet-Hein Daverveldt, Shell International

Supply chain management innovation is a critical competitive differentiator. It is essential to stay attuned to changing market conditions and customer requirements. Shell's scenario planning process provides a framework for assessing how markets may evolve. Themes common to all scenarios include more intense competition, more price volatility and higher customer expectations in terms of security of supply and social and environmental responsibility. This places a premium on end-to-end supply chain optimization and excellence in execution. Shell's Global Supply Excellence project implements globally standardized processes and tools in its refineries and supply envelopes. It also heavily invests in change management and training. Moreover it establishes the "sustain and improve" capability for its processes, tools and competencies. Thus it fosters a world-class organization focused on continuous improvement and flawless execution.

Plant-wide Systems Principles & Practices

9:00 am – 12:30 pm
Austin Grand Ballroom Salon G

Presider
Chris McDowell, Tesoro Petroleum

Flare Management/Flare Gas Recovery
Chevron

Incorporating Safety Learnings into New Plant Design
U.S. Chemical Safety Board

FCC Q&A

9:00 am – 12:30 pm
Austin Grand Ballroom Salon H

Panelists
Aram Asdourian, Sunoco
Rex Heater, BASF Catalysts
Regan Howell, Holly
Ralph Thompson, Chevron
Patrick Walker, UOP
Michael Wardinsky, ConocoPhillips

See page 18 for questions.

Wednesday
October 10, 2007

Plant Automation & Decision Support: Readiness / Industry Perspectives

10:30 am – 12:30 pm
Austin Grand Ballroom Salon F

Presider
Rich Bowman, TOTAL Petrochemicals USA

A Scalable Automation and Decision Support Infrastructure that Enables a Proactive, Asset-Based Approach to EHS Compliance
Bruce Taylor, Suncor Energy
Dave Drerup, Data Systems and Solutions

As a result of several major incidents over the last several years and recommended corrective actions by the US Chemical Safety and Hazard Investigation Board (CSB), OSHA launched a national emphasis program initially aimed at the US refining industry that attempted to change Process Safety Management OSHA 1910.119 to a performance-based standard. In order to effectively address and benefit from this program, refiners need to evaluate their automation and decision support infrastructure in concert with their EHS solutions to effectively enable a proactive, record-based, asset approach to comply with OSHA 1910.119 including scalability.

Panelists
Roxan Kraft, Motiva Enterprises
Piet-Hein Daverveldt, Shell International
Bruce Taylor, Suncor Energy
Dave Drerup, Data Systems and Solutions

Plant Automation & Decision Support: A Crude Reality Check

1:30 pm – 3:00 pm
Austin Grand Ballroom Salon F

Presider
Anne Keller, Jacobs Consultancy

Performing Accurate Refinery Configuration Studies to Address the Upcoming EPA Benzene Reductions
Robert Powell, KBC Advanced Technologies

Most refiners will have to undertake detailed studies to determine what changes will be needed to meet the new U.S. EPA benzene regulations. The main producers of benzene in a fuels refinery are the FCC and reformer. Control strategies involve either pre-fractionation of benzene-forming species from reformer feed, or post-fractionation of a benzene-rich cut from the bulk of reformate. The benzene in the benzene-rich stream must then be extracted for sales or converted via saturation.

Most of these configuration studies are now performed by LP models. Since the choices are very subtle, the "granularity" of the LP makes it a less than perfect toolset for this use. This presentation will demonstrate the capabilities of a new toolset for evaluating different processing schemes. The effects on gasoline production and refinery economics are quantified in detail.

Benchmarking Study Supports Benefits of Smart Refineries
Pete Sharpe, Emerson Process Management

This presentation will illustrate a study that involved a detailed review of two process units, a coker and hydrocracker, comparing prior history from the previous two years to the past 12-18 months with the new systems in place. This study was done following a recent process control modernization project to upgrade to the latest "smart" technology. The metrics utilized, the variables studied and the preliminary results from the first few sets of post-project data will be highlighted.

Crude & Vacuum Distillation and Coking Q&A

1:30 pm – 5:00 pm
Austin Grand Ballroom Salon H

Panelists
Bill Cates, Hunt Refining
Brian Doerksen, ConocoPhillips
Regan Howell, Holly
Eberhard Lucke, CB&I
Paul Norton, Sunoco
Randy Rechtien, Baker Petrolite

See page 20 for questions.

Wednesday
October 10, 2007

FCC Principles & Practices

1:30 pm – 5:00 pm
Austin Grand Ballroom Salon G

Presider
Ken Peccatiello, Valero Energy

Process Safety: FCC Emergency Shutdown with Unburned Hydrocarbon in Reactor / Regenerator for a Long Period of Time
Valero Energy

Main Fractionator Bottoms Product Ash
ABB Lummus Global

Training Boot Camp: 7-7-7 (Days, Weeks, Months)
BP

FCC Baseline Monitoring, Troubleshooting, and Unit Performance Testing
Albemarle Catalysts

Feedstock Effects on Yield, Product Quality and Downstream Processing
Grace Davison

Plant Automation & Decision Support: Convergence of IT and Process Control

3:30 pm – 5:00 pm
Austin Grand Ballroom Salon F

Presider
Blake Larsen, Western Refining

The Advantages of Implementing Wireless I/O over Wired Alternatives
Brent McAdams, FreeWave Technologies

This presentation will explore new technologies that enable greater use of spread spectrum radio for monitoring and control in industrial environments. Attendees will discover that wireless I/O interfaces are less expensive – in some cases costing tens of thousands of dollars less than traditional wired alternatives and learn how to identify the key economic business drivers and to develop a decision matrix to leverage existing investments in technology.

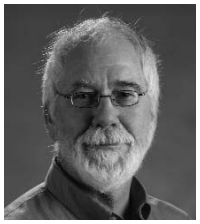
Convergence of IT and Process Control in the Petrochemical Industry
Jason Vick, Valero Energy

Many companies today struggle to find cost effective ways to integrate hundreds or even thousands of systems that are neither automated nor electronically controlled within their facility. Valero's solution to this dilemma is to converge cutting edge mobile technology and their field workforce to optimize their processes.

2007 NPRA Q&A Peter G. Andrews Lifetime Service Awards

8:00 am – 8:30 am
Austin Grand Ballroom Salon H

The Peter G. Andrews Lifetime Service Award honors members who have made long lasting contributions to the value and vitality of the NPRA Q&A meeting. Recipients of this award have served as Q&A panelists, screening committee members, and, most importantly, active participants in the dialogue that is fundamental to the meeting. During their careers, the recipients have demonstrated a willingness to pass on their knowledge and expertise to future generations in this forum, have made significant contributions to the meeting's quality, and have emphasized the importance of sharing knowledge in making continuous improvements.



Dr. J. Pat Kennedy
OSIsoft

Charles LeRoy
Valero Energy

Christina McDowell
Tesoro

Cyber Security Roundtable

8:30 am – 5:00 pm
Austin Grand Ballroom Salon J

Department of Homeland Security Briefing on Cyber Security
Darin Harris, Department of Homeland Security

The Department of Homeland Security (DHS) will discuss the nation's current heightened threat environment. This presentation will focus in on the relationship of the threat environment with cyber threats and security across the nation's critical infrastructure. The DHS will discuss the general treats and some specific incidents that have occurred overseas. The presentation will also highlight the recently released national intelligence assessment.

Implementing Security Solutions That Co-exist and Support the Mission of Existing Control Systems
Jonathan Pollett, Industrial Defender

This presentation starts with an overview of the typical vulnerabilities with SCADA, DCS, and real-time process control systems, and how to mitigate these inherent risks using SCADA security technology that can be implemented with zero impact on the operations of the system.

This presentation will describe an approach to implementing security solutions for SCADA, DCS, and systems that support critical infrastructure that not only co-exist, but also support the mission of the operational team. Those attending this presentation will gain a much broader awareness of the unique security requirements for SCADA, DCS, and control systems, and will be able to go back to their environments and use this methodology to begin laying out their own security plan.

SCADA Protocols Detailed for Better Security
Ganesh Devarajan, TippingPoint-3Com

This presentation will cover basic networking ideas and safe practices. The main focus will be in the software vulnerability area. The presentation will discuss Modbus and DNP3 protocol details along with the function codes and instruction. Due to the lack of authentication in these protocols the discussion will center on how the messages can be spoofed and sent to the server. Finally, it will show how you can use Sulley to fuzz your own product.

Implementing a Standard Security Architecture (SSA) in the Tesoro-Mandan Refinery Process Control Environment (PCE)
Ron Muller, Tesoro

Tesoro has implemented a two-layer firewall architecture that allows the business and control engineering environments to manage their respective firewalls while providing secure access to shared systems.

Defense In-Depth – A Holistic Approach to Cyber Security
Marilyn Guhr, Honeywell Process Solutions

Without an effective cyber security regimen, the fundamental mission of process control, to ensure safe and reliable operations, can be compromised by an ordinary cyber threat such as a virus or worm. Therefore, a comprehensive cyber security strategy that employs a defense in-depth model must be an essential element of every process control and safety system implementation.

The Convergence of Physical and Logical Security in Support of Compliance, Emergency Response and Efficiency
Andrea Gay, CA, Inc.

Real-world security projects to integrate physical and logical security (including one for a US oil company) will be analyzed. From assembling the team to successful project close, each project had its share of challenges and lessons learned.

The Future of Cyber Security: Changing Motivations, Tools, and Attackers Portend the Future
Leyton Pitzer, Pitzer Consulting

Any security program worth implementing will undoubtedly result in a host of disparate technical tools and applications which combine to provide a holistic security package. A holistic security program will also include the need for managing and performing recurring processes such as policy review and asset and risk rankings. This presentation offers a look at some of the factors influencing an on-going security program, considerations for implementing management tools and a look at some ideas on automation and the use of technology to integrate many of these seemingly unconnected systems into a manageable security program.

Future of Cyber Security Management
Rick Kaun, Matrikon

This presentation offers a look at some of the factors influencing an on-going security program, considerations for implementing management tools and a look at some ideas on automation and the use of technology to integrate many of these seemingly unconnected systems into a manageable security program.

The Risk-to-Mission Assessment Process (RiskMAP) for Process Control Systems
Chalton (Jim) Watters, MITRE Corporation

The session will demonstrate RiskMAP, the proven Risk-to-Mission Assessment Process now being commercialized for use in industry. RiskMAP translates between the technical terms of network risk and the business terms of corporate risk so that all can understand and decide on risk mitigation strategies.

Making the Case for Cyber Security in Your Company's Budget
Cliff Pedersen, Suncor

Process Control Networks (PCN) are the communications 'spinal cord' that tie the process and control systems of operating plants together, but historically they have not been adequately separated from the business networks to ensure security and protection of the plant. Suncor Energy Inc. has embarked on a project to address the inherent inadequacies at its Oil Sands plants with the objective of establishing secure integration of its PCNs with the business network according to industry best practices. This presentation will describe the justification (economic, exposure and cultural), the scope, the design and engineering considerations, and the intent to position the implementation for future operations and business needs.

Wireless Application Security – Securing the Plant Application Network
Steve Beck, Apprion

The challenges of securing petrochemical plants and refineries can be complicated and expensive. Understanding key wireless security issues will help simplify and prioritize the cyber security issues your facility needs to address. Some of the top wireless security issues include:

- Authentication and access control thus ensuring a person or device is who they say they are and restricting access to applications, data, and resources.
- Data encryption and integrity to provide confidentiality through scrambling of data.
- Data integrity to ensure what was sent matches what was received.
- RF jamming.
- Rogue APs detection through modern APs, controllers, and management solutions that can detect and alert on attempts to associate rogue clients.

Security Risk Assessment Practices for Wireless Instrumentation Solutions
Tom Culling, Chevron

This presentation will present the overall security architecture of wireless instrumentation solutions, and how all this fits in with various industry standardization efforts. Included is a presentation of the development of a risk assessment methodology for assessing this new technology within Chevron and how collaboration between Emerson, Chevron Engineering, and Chevron IT overcame barriers to adopting this new technology.

Plant Automation & Decision Support: Supermodels (APC and Fault Diagnosis)

8:30 am – 10:00 am
Austin Grand Ballroom Salon F

Presider
Steve Williams, Aspen Technology

Using Advanced Process Control to Drive Regulatory Emissions Compliance
Dennis Cima, Mustang Engineering and Constructors

This presentation explores a methodology for EMS and APC integration and provides a case study for the potential benefits and technical challenges for success.

Integration of Fault Detection and Diagnosis Techniques in Complex Processes: Application to An FCC Unit
Carlos Agudelo, Instituto Colombiano del Petroleo – Ecopetrol

Many approaches have been tested to detect and diagnose faults in complex processes. It has been proposed that a hybrid architecture integrating some of these approaches might lead to a better result. We propose an integration architecture which uses knowledge from the operational and fault states of the process to build a logic program and uses a rigorous dynamic model in order to detect and diagnose the defined faults. Tests using this integration architecture have been made on a Model IV fluid catalytic cracking unit, and the results are presented.

Application of an Adaptive MPC Controller
Yucai Zhu, Tai-Ji Control

An adaptive MPC technology is introduced which contains three modules: MPC control module, online identification module, and monitor module. When an MPC design is delivered, the MPC commissioning and maintenance can be done automatically under the supervision of the operator. Two TPA unit applications have been carried out with success.

Gasoline Processes Q&A

8:30 am – 12:30 pm
Austin Grand Ballroom Salon H

Panelists
Tina Drumheller, Frontier El Dorado Refining
Pedro Fernandez, Jacobs Consultancy
Kleber Hadsell, Tesoro
Edward Lowe, Pasadena Refining System
Gregory Mullins, Marathon Petroleum
Jay Ross, Axens North America

See page 22 for questions.

Crude & Vacuum Distillation and Coking Principles & Practices

8:30 am – 12:30 pm
Austin Grand Ballroom Salon G

Presider
Bill Cates, Hunt Refining

Process Safety: Coker Incident
Lyondell Houston Refining

Hardware for Desalting Heavy Crudes
NATCO

Chemicals for Desalting Heavy Crudes
Champion Technologies

Production Methods of Western Canadian Crudes
Crude Quality

Issues for Refiners Processing Opportunity Crudes
CITGO Petroleum

Burner Upgrades for Process Furnace Retrofits
Universal Combustion

Retrofitting Process Heaters
Therma Tran

Thursday
October 11, 2007

Plant Automation & Decision Support: Operator Training

10:30 am – 12:30 pm
Austin Grand Ballroom Salon F

Presider
Cliff Pedersen, Suncor Energy

Operator Training
Bryan Aitken, Lambton College, School of Technology

The Chemical Production Engineering Technology (CPET) program is unique globally and is recognized for its academic excellence and outstanding graduate placement as it meets the precise needs of industry. The combination of engineering knowledge and practical knowledge of plant operations has proved to produce operations personnel with the necessary skills to meet the present and future demands of the processing industries. This presentation will include a look at the tools that are used in terms of college facilities and simulations, as well as the very unique co-op models and industry participation in the program.

Leveraging Today's Process Control Expertise
George Buckbee, ExperTune

This session provides practical techniques and examples for leveraging process control expertise globally. Real-world examples will demonstrate the bottom-line value of each technique. This presentation highlights several methods to increase the leverage of process control engineers including:

- Educating engineers to know and communicate the economic value of their work.
- Reducing or eliminating labor-intensive, routine, and low value tasks.
- Accelerating the troubleshooting process.
- Using the power of networking to leverage expertise globally.
- Focusing resources on the biggest payback opportunities.

Overcoming the Challenge of Meeting the Competency Requirements of IEC 61511
Chuck Miller, Emerson Process Management

The recently adopted Industry Guidelines IEC 61511 and ANSI/ISA 84 mandate that systems requiring a Safety Integrity Level (SIL) analysis be designed, operated and maintained by competent personnel. This presentation compares the various resources available for structured training and the options operating companies have in meeting the requirements in support of the safety life cycle.

Making Sense of Knowledge and Intelligence Initiatives in Today's Petroleum Industry
David Haake, IBM Global Business Services

This presentation discusses some of the key opportunities that petroleum companies face to provide better knowledge and intelligence especially to their front-line workers at key times to improve performance measurement, decision-making, and access to information that helps them take action.

Plant Automation & Decision Support: Energy Management

1:30 pm – 3:00 pm
Austin Grand Ballroom Salon F

Presider
Craig Harclerode, OSIsoft

Refinery Utilities System Optimization Using an On-line Tool
Srinivasan Vanchinathan, Sunoco

Sunoco's Philadelphia refinery has implemented an automated on-line advisory utilities optimization system (Visual MESA) that continually monitors and makes recommendations on the optimal means of generating and utilizing energy while reducing overall utilities system operating cost. This paper provides a detailed account of implementation experience, challenges, and means of sustaining such on-line advisory systems.

Energy Management in the 21st Century
J. Pat Kennedy, OSIsoft

The volatility, uncertainty, and cost of energy are predicted to continue to increase in the 21st century. Global warming concerns will lead to more challenges and opportunities for refiners with the integration of carbon management and alternative energy sources into the energy equation. There is much debate about how to best deal with greenhouse gas (carbon) emissions, but from a production planning perspective, managing energy production and use will get much more complicated. Additionally, deregulation in the electrical generation, transmission, and distribution (T&D) sector coupled with supply/demand imbalances has resulted in the need for a dynamic energy response capability in the Oil & Gas sector with increased energy supply/demand integration. These changes reinforce the value of a more evolutionary approach that supports a continuous improvement organizational culture for energy management and optimization.

This presentation provides the rationale for building a dynamic energy response and enterprise real-time energy and carbon management capabilities into the automation and decision support systems to address the complexity of new regulation in the energy supply world. A summary of specific recommendations will be presented to help Oil & Gas organizations prepare for tomorrow, today.

Closed-Loop Real-Time Optimization of Refinery Energy System with No Operational Intervention
Tetsuji Tani, Idemitsu Kosan

This paper presents key aspects of a successfully implemented Energy Closed-Loop Real Time Optimization (E-CL-RTO) application at Idemitsu Aichi Refinery in Japan. This optimizer mimics the behavior of a skilled operator working continuously to optimize operations. The E-CL-RTO has been found to have reliably provided optimal targets to various pieces of equipment automatically without any operator intervention resulting in a more uniform operating strategy across various shifts and operators.

Gasoline Processes Principles & Practices

1:30 pm – 5:00 pm
Austin Grand Ballroom Salon G

Presider
Dan Kennedy, Pasadena Refining

Process Safety: Debutanizer Overhead Corrosion

Ethanol Blending

Safe Operation of HF Alkylation Units (API Recommended Practice 751)
Chevron

Isomerization 101 and Benzene Management
UOP

Hydroprocessing Q&A

1:30 pm – 5:00 pm
Austin Grand Ballroom Salon H

Panelists
Shaun Boardman , Jacobs Engineering Group
Paul Ceccato, Criterion Catalysts & Technologies
Gary Everett, Lyondell Houston Refining
Scott Harper, Consumers' Co-operative Refineries
Yvonne Jeanneret, CITGO Petroleum
Gregory Mullins, Marathon Petroleum

See page 24 for questions.

Plant Automation & Decision Support: Panel on Energy Management

3:30 pm – 5:00 pm
Austin Grand Ballroom Salon F

Presider
Craig Harclerode, OSIsoft

Panelists
Srinivasan Vanchinathan, Sunoco
Tetsuji Tani, Idemitsu Kosan
J. Pat Kennedy, OSIsoft

Notes

Friday
October 12, 2007

Plant Automation & Decision Support: "The Future"

7:30 am – 9:00 am
Austin Grand Ballroom Salon F

Presider
Cliff Pedersen, Suncor Energy

Refinery of the Future…Simplicity
Eddie Habibi, PAS

The "refinery of the future" is a complex, integrated ecosystem operating somewhat as a service function to the petroleum downstream value chain. By driving the supplier and user community towards open, usable standards, we can abstract the complexities, and allow an interoperable, information infrastructure to help simplify the petroleum refining operation.

Maximize Competitive Advantage with Integrated Supply Chain Management
A.K. Pradhan, Indian Oil

Indian Oil Corporation Limited, India's leading refining and marketing company employs a top down integrated approach for supply chain management using LP models and enterprise-wide resource planning (ERP) as backbone. It optimizes the entire supply chain from crude procurement and refinery production to product logistics and products exchanges.

Visualization in the Refinery of the Future
Robert Edwards, Tesoro

Packaging and delivering complex information that is constantly changing for all of the aspects of refinery-centric supply, operations, maintenance, and distribution activity will be a key factor in the success of the refinery of the future. Visualization starts with vision. This presentation will examine the evolution of visualization tools and techniques, look to the future of such tools and what they mean to the refining industry, and address some of the business drivers and challenges associated with formulating and enacting a visualization strategy.

Hydroprocessing Principles & Practices

7:30 am – 11:00 am
Austin Grand Ballroom Salon G

Presider
Fred Hill, Marathon Petroleum

PREDICT Software for Corrosion Control Monitoring
UOP

Basic Principles for Water Wash Corrosion Control
Shell Global Solutions

In-situ Sulfiding
Criterion Catalysts & Technologies

Pre-sulfiding and Pre-sulfided/ Pre-activated Catalyst
Eurecat

Refiner's Sulfiding Experience
Valero Energy

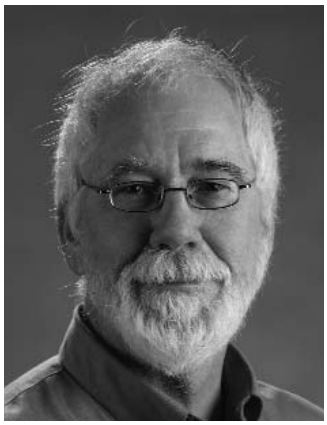
Spent Catalyst Contaminants and the Catalyst Vendor Perspective
Haldor-Topsoe

Hydrotreating Catalyst Regeneration Technology
TriCat

Refiner's Experience with Spent Catalyst Management
Consumer's Co-Op

Plant Automation & Decision Support: Concluding Keynote

9:30 am – 11:00 am
Austin Grand Ballroom Salon F



Dr. J. Pat Kennedy
OSIsoft

With refining profitability stronger than we have seen since the mid 1970's, the challenge is to invest money, not only to make an immediate return, but to provide long term benefits in the case of a return to lower margins.

Dr. Kennedy will review the evidence that the survivors in the refining industry over the next 10 years will be those who aggressively and effectively invest in and leverage automation and information management to empower their organizations. By viewing information as a key corporate asset and a core element of an overarching corporate strategy, investments in enterprise infrastructures and systems can provide high returns well into the 21st century. Technology projects can also become the money pits that consume huge amounts of time and money without any return – the key is finding the difference. By taking a holistic approach to their automation and information investments and replacing the evolved, obsolete infrastructure installed over the last 20 years, leading refiners can position themselves for profitability and survivability during the next, inevitable, down cycle.

Aram Asdourian is the Lead Process Engineer at the Sunoco Philadelphia Refinery where he manages a team of engineers providing Technical Support for the FCCU's, hydrotreaters and crude/vacuum distillation units. He has worked in the refining industry for 19 years in various technical roles with Tosco Refining; Hess Oil, Virgin Islands; and Sunoco.

Aram holds a BS in Chemistry/Biology from West Chester University, a BS in Chemical Engineering from Drexel University and a MBA from Villanova University.

Shaun Boardman is the Group Manager for Hydroprocessing for Jacobs Consultancy. He has over 24 years of experience in oil refining, including refinery operations, hydrotreating catalyst applications, process optimization, process design and refinery reconfiguration analysis.

Shaun holds a BSChE from the University of Natal's Howard College in South Africa.

Bill Cates is a Senior Refinery Engineer at Hunt Refining in Tuscaloosa, Alabama where he consults to any refinery department requiring operating or process engineering expertise. Bill worked at Cross Oil in Smackover, Arkansas for 21 years holding positions as Project Engineer, Process Engineer, Maintenance Manager, Engineering Manager and Operations Manager. During the majority of his tenure there, he was the only engineer on staff and functioned as the mechanical engineering, civil engineering and inspection departments in addition to the technical process adviser and troubleshooter to the operations personnel.

Bill has a BS in Chemical Engineering from Louisiana Tech University.

Paul Ceccato is a Senior Technical Services Engineer for Criterion Catalysts & Technologies with over 18 years of experience in hydroprocessing technology. Prior to joining Criterion, Paul held numerous refinery positions in Technical Services, Process Engineering, and Operations supervision which focused on hydrotreating, hydrocracking, coker and FCCU operations. Other assignments included project and turnaround production planning and mechanical reliability coordination. With Criterion, Paul supports catalytic applications in the areas of hydrotreating, hydrocracking, tail gas treatment and reforming. He is responsible for specifying catalytic systems, monitoring, troubleshooting and optimizing process unit performance, establishing operational procedures, and participating in the design and revamp of new and existing hydrotreating units.

Paul has a BSChE from the University of California at Berkeley.

Brian Doerksen is Principal Engineer in Refining Technical Services, Coke Technology for ConocoPhillips where he has worked for 27 years. He began in the Central Engineering and Maintenance Engineering departments in Ponca City, Oklahoma, mainly supporting CoP's coking units, and coker licensing work and then spent 13 years in the Westlake, Louisiana refinery in positions ranging from engineering to Maintenance Superintendent.

Brian has a BSME from Kansas State University.

Photo not available

Tina Drumheller is the Process Safety Manager for the Frontier Refining, El Dorado facility. Since coming to Frontier, she has held a variety of positions in process engineering and operations. Prior to that, she worked in chemical manufacturing operations.

Tina holds a BSChE from Arizona State University.

Gary Everett is Senior Refining Consultant for Houston Refining L.P. a Lyondell Company in Houston, Texas. In his current position he is responsible for providing strategic technical guidance to Houston Refining management and Lyondell Chemical corporate staff responsible for this major, heavy sour crude refinery complex. Prior to this assignment Gary managed the Process Design and Technology group which provided process engineering support for major projects like RFG and ULSD fuels projects. Most of the 35 years experience with ARCO and Lyondell has been focused on hydroprocessing technologies, many of which have been licensed worldwide while Gary was Director of Technology Licensing for Lyondell.

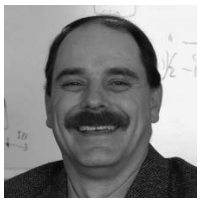
Gary holds a BSCHE from Michigan State University and a MSChE from Illinois Institute of Technology.

Pedro Fernandez is a Group Manager for Jacobs Consultancy. He has over 25 years experience in research, development, and supply of process technology for the petroleum, petrochemical, and gas processing industries. His responsibilities have ranged from process unit startups and technology design, to business and project development and management. Recent project assignments have involved the analysis and conceptualization of alternative gasoline production and refinery configuration strategies. Prior to joining Jacobs Consultancy, he held a variety of technical and management positions at UOP.

Pedro holds a BSChE from Universidad Autonoma Metropolitana in Mexico and a MSChE from the University of Delaware.

Kleber Hadsell is a senior process engineer for Tesoro Corporation at their Mandan, North Dakota refinery and has 21 years of experience in the petroleum refining industry. During that time he has held assignments including refining research and development; operations engineering in alkylation, isomerization, reforming, FCC, and crude distillation; economics and scheduling; and capital project development.

Kleber received a BS in Chemistry from Colorado State University and a MS degree in Chemical Petroleum and Refining Engineering from the Colorado School of Mines.



Scott Harper was recently promoted to the position of Superintendent – Process Technology at Consumers' Co-operative Refineries Limited (CCRL), Regina, Saskatchewan, Canada. In this role Scott oversees the work of both the Process Control group and the Process Engineering group. He began his career as a Unit Operations Engineer with CCRL and spent over 12 years in the Operations Department. During that time he was responsible for monitoring and advising on the day-to-day operations of the naphtha hydrotreaters, isomerization unit, catalytic reformer, hydrocracker, atmospheric residuum desulphurization unit, hydrogen plants, sulphur plant, sour water stripper, DGA reclamation, crude and vacuum units, and the gas-oil hydrotreater. During his career Scott has also worked as a unit area maintenance supervisor for 13 maintenance turnarounds.

Scott graduated with a BSChE from the University of Calgary in 1990.

Rex Heater is a Senior Account Manager for BASF Catalysts where he provides sales and technical support to FCC customers throughout the US. Rex has 34-years of experience in the refining industry beginning with Conoco where he was a Process Engineer at the Ponca City refinery and then at the Billings refinery. While with Conoco, Rex was assigned to a number of refinery units and was involved with several projects, including a coker/calciner expansion. In 1976 Rex joined Farmland Industries at their Coffeyville, KS refinery. At Farmland Rex served in a number of positions from Process Engineer to Refinery Superintendent.

Rex has a BSChE from the University of Kansas.

Regan Howell is currently Process Engineering Manager for Holly Refining & Marketing at the Woods Cross, UT refinery where he is responsible for the Process Engineering group. He has held various engineering, planning & economics, and operations positions in small-to-mid-size refineries. He spent five years redefining maintenance practices and implementing Computerized Maintenance and Materials System (CMMS) packages; first as an operations supervisor in a refinery and later as a project manager for a software company. He has experience with FCCs, crude distillation, SRUs, utilities and wastewater, hydrotreating, solvent deasphalting, and aromatics extraction.

Regan holds a BSChE from the University of Utah.

Yvonne Jeanneret is the Process Technology Manager at CITGO Petroleum's Lemont, Illinois refinery. She is responsible for the Operations Process Engineering Group, Process Design, and Process Technologists. Yvonne has 25 years of experience in process design, operations engineering, operations area management, strategic planning, and planning and economics management.

Yvonne holds a BSChE from the University of Wisconsin, Madison.

Edward Lowe is Superintendent for the catalytic reforming, HF alkylation, and sulfur recovery units at Pasadena Refining's Pasadena, TX refinery. Edward has over twenty years experience in the chemical industry working for world class chemical manufacturing organizations and has been Plant Manager for several facilities. His experience includes production, maintenance, and process safety management.

Edward has a BS degree in Commerce & Engineering from Drexel University and a BSChE from the New Jersey Institute of Technology.

Eberhard Lucke is the Process Design Manager of the Delayed Coking group for CB&I. Eberhard has more than 16 years of experience in the oil refining industry, of which 14 have been dedicated to delayed coking. He started his career with Veba Oel AG in 1991 as a technical engineer and was eventually named unit engineer of the delayed coker's operations team and was responsible for day-to-day optimization, monitoring, energy optimization, troubleshooting, operator training and operations scheduling.

Eberhard has a MSChE from the University of Essen, Germany.

Greg Mullins is currently the Technical Services Manager at Marathon's Detroit Refinery where an expansion project increasing capacity by 30% and producing 100% low sulfur fuels was recently completed. During his career, he has held various positions including process and project engineering as well as technical and operational supervision and management. Greg is a member of AICHE and Chairman of the Wayne State University Chemical Engineering Industrial Advisory Board.

Greg holds a BSChE degree from Wayne State University.

Paul Norton is the Crude Unit Specialist for Sunoco R&S. He is responsible for coordination of standard crude unit practices across Sunoco facilities, and the identification of crude unit capital projects that are aligned with the company's strategic operating goals and its vision of top tier performance in safety, reliability and energy utilization. He has 30 years of experience in refining, starting his career in Operations, moving into the Technical Services Dept., and on to process design within the Engineering Dept. where he was responsible for grassroots designs as well as significant revamps of existing units. He has 15 years of experience in refinery Technical Services covering a wide variety of units including crude, and vacuum units, and 12 years of experience in process design.

Paul holds a BSChE from Drexel University.

Randy Rechtien is a Senior Technical Support Engineer for Baker Petrolite Corporation in St. Louis, Missouri. In his current position, he is responsible for optimizing and troubleshooting refinery additive applications with an emphasis on corrosion control programs. During his 17-year career, he has implemented process improvements in a wide range of refinery areas, including crude units, FCCU's, hydroprocessors, cokers and finished fuels. Prior to his tenure with Baker Petrolite, he worked as a Technical Service Engineer for AEA Technology-Hyprotech where he employed simulation modeling techniques to enhance the performance of refinery and petrochemical processes. Randy is a member of AIChE and NACE and has authored or co-authored several publications.

Randy holds a BSChE from Rice University in Houston, Texas.

Jay Ross is a technology manager covering the field of transportation fuels including FCC, catalytic reforming, isomerization and biodiesel production. He has over 25 years of experience in the refining and petrochemical industries including process engineering design, R&D, licensing and technical assistance. He has served on NPRA and ERTC expert panels and has authored several patents and numerous technical papers and articles.

Jay holds a BSChE degree from Princeton University.

Ralph Thompson is Senior Process Engineer, Chevron Corporation, El Segundo, California. Ralph provides advanced process support in the FCCU and alkylation areas for the El Segundo refinery. He also provides training, troubleshooting, environmental, project, and startup support for Chevron's other North American FCCUs. Prior to joining Chevron in 1991, he was the Technical Services Manager for the Sinclair Refinery in Sinclair, Wyoming. His 30+ year career has also included process engineering positions with Exxon in the areas of refinery process design and technology development.

Ralph has an MSChE from the University of Wyoming.

Patrick Walker is a member of UOP's FCC Operating Technical Services group. Pat has 15 years international experience with design and operation of FCC units. Pat's experience includes basic engineering, process and project design of FCC unit reactors, regenerators, main columns and gas concentration units for new units and revamps, as well as process design studies and proposals. Pat's current responsibilities include home office support for checkout and commissioning of new and revamped FCC units, troubleshooting, and training.

Pat also provides technical service support to UOP's engineering, research and project sales activities.

Michael Wardinsky is the FCC Network Lead for ConocoPhillips Refining Technology Services group, based in Ponca City, Oklahoma. His current responsibilities include the development, implementation and sharing of best practices for seventeen FCCU's operated by ConocoPhillips and conducting benchmarking studies and facilitating FCC unit reviews to identify improvement opportunities.

Michael received a BS in Chemistry from the University of Washington and MS and PhD degrees in Chemical Engineering from Brigham Young University.

NPRA Q&A Screening Committee
The Q&A Screening Committee is a forum where NPRA members can discuss operations in the refining and petrochemical industries with special emphasis on process technology. The Q&A Screening Committee and panelists met on June 25-27 in Kansas City, MO, where the Committee selected 101 questions deemed most interesting and beneficial to the conference from those submitted. If you submitted questions which are not adequately covered by the selected questions, you may still present them from the floor during the appropriate session of the Q&A session. The following are members of the 2007 Screening Committee:

Matthew Baebler, Tesoro
Vito Bavaro, Shell Global Solutions
Sandie Brandenberger, ConocoPhillips
David Brossard, Chevron
Ken Bruno, Albemarle Catalysts
Tim Campbell, Axens North America
Robert Carpenter, GE Water & Process Tech.
Bill Cates, Hunt Refining
Ken Chlapik, Johnson Matthey Catalysts
Geri D'Angelo, Advanced Refining Technologies
Bob Davis, R.E. Davis Chemical
Larry Denk, Aggreko
Kevin Dodds, Albemarle Catalysts
Daryl Dunham, ConocoPhillips
Gary Everett, Lyondell Houston Refining
Mike Facker, Western Refining
CJ Farley, BASF Catalysts
Jon Finch, Flying J
Angelo Furfaro, UOP
Tom Germany, Calumet
Joey Hagmann, Placid Refining
Stephen Haik, Motiva Enterprises
Terrance Higgins, Hart Energy Publising
Fred Hill, Marathon Petroleum
David Hunt, Grace Davison
Jeff Johns, Chevron
Cheryl Joyal, BP
Daniel Kennedy, Pasadena Refining
Garry Kirker, Valero Energy
Lawrence Kremer, Baker Petrolite
Larry Lacijan, UOP
Jerry Lane, BP
Warren Letzsch, Shaw Stone & Webster
Larry Lew, Chevron
Glenn Liolios, DuPont-STRATCO
Sam Lordo, NALCO
Bob Ludolph, Sunoco
Tariq Malik, CITGO Petroleum
Ron Marrelli, Holly Refining & Marketing
Chris McDowell, Tesoro
Harvey McQuiston, Shaw Stone & Webster
David Mendrek, Murphy Oil USA
Rik Miller, ConocoPhillips
Paul Moote, Sinclair Oil
Brian Moyse, Haldor Topsoe A/S
Donald Mulraney, CB&I
Mart Nieskens, Shell Global Solutions
Kenneth Peccatiello, Valero Energy
Roger Pelham, Pelham Consulting
Randy Peterson, DuPont-STRATCO
Ron Pinaire, Flint Hills Resources
Kevin Proops, Solomon Associates
Kerry Rock, CDTech
Bob Roddey, Roddey Engineering Services
Gene Roundtree, ExxonMobil Research & Engineering
Glen Scheirer, ExxonMobil Research & Engineering
Jeff Spearman, Barnes and Click
Brent Stratton, Valero Energy
John Tedesco, GE Water & Process Tech.
Michael Toole, United Refining
Sal Torrisi, Criterion Catalysts & Technologies
Steve Tragesser, KBR
Lee Turpin, Turpin Consulting
Keith Whitt, Shell Global Solutions
Bill Wilson, BP Products North America
Irl Zuber, Motiva Enterprises
Jeff Hazle, NPRA

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Ernie Cagle, Murphy Oil USA
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Joe Coco, Flint Hills Resources
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Larry Cunningham, Afton Chemical
Alan Davis, Chevron
Joel Elstein, Flying J
Rick Fontenot, Lyondell Chemical
Paul Fritz, Sinclair Oil
Jim Gillingham, Valero Energy
William Haywood, Tesoro
Fred Hill, Marathon Petroleum
Steve Jackson, Hunt Refining
Vince Kelley, Sunoco
Robert Kent, CITGO Petroleum
Pat Kimmet, CHS
Dave Lamp, Holly
Mike Lewis, Motiva Enterprises
Keith Osborn, Coffeyville Resources
Jaspal Singh, Indian Oil Corporation
Stephen Smiejan, Hess
Jim Stump, Frontier El Dorado Refining
Nina Thornton, TOTAL Petrochemicals USA

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Craig Harclerode, OSIsoft
Blake Larsen, Western Refining
Anne Keller, Jacobs Consultancy
Steve Williams, Aspen Technology

FCC

Reliability and Safety

1. Historically, instrument air was used to purge FCC reactor instruments. More recently, dry gas or nitrogen is typically used for this service. Please explain the reasons for moving away from air and provide examples of operating upsets which have occurred when using air to purge instruments.

2. Which type of valve technology or design is typically utilized in units with high catalyst withdrawal rates? Do you continuously withdraw catalyst? From a reliability and safety perspective, what type of hardware are you using for control? What is the best withdrawal line design?

3. Carbonate stress corrosion cracking (CSCC) has been identified as a cause of failure in FCC main fractionator overhead systems. What changes in feed quality, unit operation, or configuration would lead to increased risk of CSCC? What parameters do you monitor to determine whether a system is susceptible to CSCC? While CSCC can be alleviated through post-weld heat treating, has the problem been significant enough to warrant either comprehensive PWHT in potentially affected areas or localized PWHT when problem areas are identified?

4. Does your refinery/company adopt a time-based rather than inspection-based replacement strategy for FCC reactor and regenerator hardware such as feed nozzles, air distributor, cyclones, cyclone support systems, and flue gas expansion joint bellows? If so, what is the planned service life for this equipment?

5. What is the shortest possible time between oil out and entry for maintenance on large inventory, high capacity FCC units? How is this achieved?

6. Some CO and waste heat boilers operate with bypass stacks separated by seal pots or isolation valves. Maintenance of these seal systems can be expensive and these seal systems can be sources of poor reliability. What design upgrades and operating practices have enabled you to eliminate these bypass systems?

Environmental

7. Is your company either considering, or actually implementing, FCC projects that include reduced CO2 emissions (greenhouse gas reduction-GHGR) as an offset/credit?

8. What level of PM2.5 particulate removal do you expect (or have achieved) with flue gas fines separation and removal equipment such as third-stage separators, fourth-stage separators, electrostatic precipitators, or wet gas scrubbers?

Catalysts

9. Are there specific lab studies or commercial examples regarding the effect of regenerator temperature on catalyst deactivation and particle integrity, specifically attrition properties, apparent bulk density, and morphology?

10. What is your recent experience regarding the maximum level of equilibrium catalyst metals (Ni, V, Na, Fe, Ca) in FCC units processing residual feedstocks? Have there been any recent improvements in vanadium passivation technologies? At nickel levels approaching 10,000 ppm, have you experienced increased catalyst deactivation as evidenced by lower equilibrium zeolite surface area?

Process

11. What process or catalyst options are available for shifting yield selectivities from gasoline to distillate while minimizing the impact on light olefin yields? How are the product properties impacted? How does change-out rate impact the viability of the catalyst options?

12. For FCC units with closed riser termination device (RTD)/cyclone systems, do you operate with the primary separator sealed or unsealed in the stripper bed? What differences in performance do you see between these modes? Which do you prefer?

13. With the move toward greater utilization of “opportunity crudes” such as Canadian synthetic crudes, what shifts do you expect in FCC product yield and quality and how will this impact the operation of the FCC unit?

14. What reactions lead to acetone formation and how can they be mitigated? We have measured acetone concentrations between 100 and 1200 ppm in the FCC butanes/butylenes stream.

15. What variables influence gasoline aromatics? In particular, please address feed properties, catalyst, and FCC operating conditions.

16. A number of refiners are adding a chloride dispersant to address FCC main fractionator overhead system plugging issues. What is your experience with these products and have you had issues with downstream gasoline product quality?

17. What minimum nozzle velocities are required in air and steam distributors to prevent catalyst backflow and subsequent erosion? Please consider both upward and downward pointing nozzles.

18. Some refiners have installed gas injection in FCC secondary cyclone diplegs to increase capacity and avoid defluidization problems. Please describe your experience operating with gas addition in the diplegs and any maintenance issues. What advice would you give to others considering this installation?

19. FCC revamps commonly include technology upgrades which increase the catalyst circulation rate which then increases the stripper flux and reduces the stripper residence time. Please describe your experience with the high flux stripper and its performance. What is the maximum flux you have achieved? What is the minimum residence time you have achieved? Will the use of high efficiency stripper internals reduce the required residence time?

20. Several refiners are considering continuous operation of the combustion air heater to maintain a minimum regenerator temperature when processing light, severely hydrotreated feedstocks. What control systems, design features, and other general precautions should be considered?

21. When operating with one or more catalyst coolers on a regenerator, what control philosophy do you employ (e.g. constant heat duty, constant regenerator temperature, etc.)? What are the advantages and disadvantages for each approach? How does operating in full or partial burn impact the control decision??

22. With the introduction of modern riser termination devices (RTD's) and the advent of severe FCC feed hydrotreating, what is your experience (typical values) with the ash content of the main fractionator bottoms (MFB) product (please provide typical values for: wt% ash, BS&W, particle size distribution, etc.)? Please describe the testing methodology utilized and the recommended testing frequency for this stream. What process, practices, and/or equipment changes can be, or have been, employed to reduce the ash content of the MFB product?

Crude/Vacuum Distillation and Coking

Process Safety

23. High acid crude processing increases mechanical integrity risk. What steps do you take to ensure piping and vessel integrity when running these crude oils? Please discuss:
    - Safe limits of operation (SLO's) for crude acid number, sulfur, temperature and velocity;
    - Metallurgy upgrades;
    - Chemical additives;
    - Inspection techniques, including smart pigging, eddy current testing, UT and inspection frequencies; and
    - Inspecting furnace convection sections and other equipment that are difficult to access.

24. How do you manage risk of heater firebox explosion? Please describe your heater shutdown systems. To what extent do you rely on API Recommended Practice 556, Instrumentation, Control, and Protective Systems for Fired Heaters and Steam Generators? Do you double block and vent both fuel gas and pilots? Do you use the fuel control valve as a block valve or are these separate valves? How often do you test the components of the heater shutdown system?

25. Coker drum operations have several areas of risk. Please describe your current practices and plans for minimizing risk in the following areas:
    - Bottom head;
    - Top head;
    - Drilling; and
    - Switching.

    Is remote operation of unheading and drilling operations a feasible target?

Opportunity Crudes

26. What is your experience with crude containing high levels of mercury? What are the operational and safety issues?

27. What are the low-temperature aqueous corrosion impacts of processing high TAN crudes? How do you mitigate those impacts?

Desalting

28. How do you increase the capacity and performance of existing desalter systems without major capital investment?

29. What operating strategies do you employ when desalting high conductivity crudes? What operational and/or equipment changes mitigate the problems caused by high conductivity?

30. What options are available to minimize the impact of high BS&W crudes on desalter operation and wastewater treating?

31. What are the challenges in desalting heavy or synthetic crudes such as those from western Canada or Venezuela? What are your experiences?

32. What are the best practices for minimizing desalter make-up and, consequently, desalter effluent volumes? Is it technically or economically feasible to utilize desalter effluent as make-up water for cooling water or boiler feed water service?

Crude/Vacuum Distillation

33. What resid cut point have you achieved during deep-cut operations? Please comment on vacuum unit design practices and the impact of deep-cut operations on downstream processes.

34. What impacts are oil field additives having on crude unit operations? What mitigation strategies do you use? Please describe your experiences.

Crude Heater

35. Please describe your experience with the latest generation of ultra-low NOx burners. Please comment on operating performance (NOx level achieved); flame height; operability; and sensitivity to fuel gas composition variability.

36. During a unit turnaround, how are you assessing remaining life for convection and radiant coils in the short time available?

37. What practices do you currently employ for exterior scale and process side coke removal in process heaters? What criteria are used to determine level of cleanliness?

Coker Heater

38. What mitigation strategies have you used to reduce delayed coker furnace fouling? Were they successful?

39. Is there a correlation between vacuum tower operating severity and delayed coker furnace fouling?

40. Does your refinery (or refineries) have plugged headers (mule ears) on one end or both ends of the heater? Is this common in the industry? Are you planning to phase them out?

41. How do you justify replacing major capital assets such as coker heaters and coke drums?

Coke Drums

42. What advances have been made on coke drum life expectancy, either through new drum designs or operating best practices?

43. What on-line inspection techniques (after a drum cut) have you employed on coke drums? Have you used laser ID measurement or video inspection to detect incipient cracks?

44. Which coke drum weld seams are more prone to cracking (cone-to-shell attachment or 2nd or 3rd seam from bottom)? What techniques have you employed to repair these cracks?

Coker Operations

45. Please describe your insulation system best practices for minimizing heat loss from a coke drum. Are there any correlations between coke drum overhead vapor temperature and coke make and/or liquid yield?

46. What procedures do you use (or are considering) to reduce coke drum emissions during the decoking steps?

47. When a full drum is switched to blowdown to begin cooling, we often see a rapid rise in foam level which is immediately reduced once water is introduced into the drum. What may be causing this and how might it be mitigated?

Coker Operations

48. For refiners who have implemented or are implementing coke drum blowdown vapor recovery: How did the additional backpressure on the blowdown drum impact coke drum cooling and vapor recovery to the coker compressor and/or the flare recovery compressor? Were additional relief valves required to maintain the unit's relief capacity?

Gasoline Processes

Process Safety

49. In the past year, a sulfuric alkylation unit released a significant amount of sulfur dioxide to atmosphere when light hydrocarbon flowed from the reaction zone through the acid blowdown system and into the spent acid tank. What measures do you recommend for preventing this?

50. What is the proper firefighting media to use when putting out a fire when both spent sulfuric acid and heavy hydrocarbon are present (e.g. in a spent acid tank or a diked area which has a layer of hydrocarbon floating on the spent acid)?

51. Reforming unit stabilizer column top trays and overhead condensers can experience fouling with ammonium chloride salts which are commonly removed by on-line water washing of the column overhead. What practices do you employ to reduce the risk of rapid corrosion and the potential failure associated with this fouling and subsequent water washing procedure?

52. Have you found highly condensed aromatics (i.e. red oil) around the reforming unit, especially around heat exchangers and/or valve leaks? What safety precautions do you recommend for handling this material?

Alkylation

53. In a hydrofluoric acid alkylation unit, what can you do to prevent plugging in the acid-soluble oil caustic neutralizer?

54. In a sulfuric acid alkylation unit, what can you do to minimize foaming and/or plugging in caustic wash or water wash systems?

55. Have you incorporated coalescing media into your acid settlers to reduce acid carryover? If so, what were the benefits and/or problems?

56. In a sulfuric acid alkylation unit, there have been problems keeping the acid wash electrostatic precipitator (EP) operational. What steps do you recommend to improve the reliability of the EP?

57. What sulfur concentrations do you have in your alkylate and what have you done to decrease the sulfur content?

58. In a sulfuric acid alkylation unit, the refrigeration compressor's controls maintain a positive suction pressure by opening the anti-surge recycle valve. This limits refrigeration and, therefore, unit capacity. Do you operate the refrigeration compressor in vacuum? Is oxygen entrainment a concern? What have you done to debottleneck the refrigeration section?

59. For a hydrofluoric acid (HF) alkylation unit, what instrumentation do you recommend for controlling HF acid levels throughout the unit?

Isomerization

60. How do you detect leaks in an isomerization unit's steam charge heater? Have you been able to detect a leak before a significant portion of the catalyst bed was deactivated?

61. Have you found that you needed to install a methanator upstream of a chlorided catalyst isomerization unit to remove carbon monoxide (CO) from the feed? What is the source of the CO and how much of a difference has the addition of the methanator made to catalyst life? What is the expected payout for the cost of the methanator?

Naphtha Hydrotreating

62. How much coker naphtha can be added to the naphtha hydrotreater feed before you need to add a separate diolefin reactor?

63. What is the upper limit for mercury in catalytic reformer feed? What level of mercury in naphtha is removed in a naphtha hydrotreater? Does the use of cobalt/molybdenum (CoMo) or nickel/molybdenum (NiMo) catalyst make a difference in mercury removal? What is the typical hydrotreating catalyst capacity for mercury loading? If the mercury content in the naphtha is particularly high, is there an alternate method of mercury removal?

64. For an FCC heavy gasoline hydrotreater, how much arsenic (ppbw) do you see in the feed and how do you handle it?

65. Have you been successful in reducing naphtha hydrotreater reactor pressure drop by the use of chemical injection to the reactor? What were the keys to success, and how much time did the chemical injection procedure add to cycle length?

66. We have experienced ammonium chloride fouling at several of our sites with the location of the deposits varying from unit to unit. Of particular concern are deposits around the recycle gas compressors. What washing fluid do you recommend for eliminating these deposits from the compressors? Can you mitigate these deposits by modifying the operating conditions? What is the best strategy to minimize ammonium chloride formation?

67. Have you seen increased catalyst deactivation in FCC gasoline hydrotreaters due to CO getting into the unit? What is the deactivation mechanism? What was the source of the CO and how did you mitigate its effects? How much deactivation did you experience?

68. Please discuss coalescer operation and rating for naphtha service including the impacts that large swings in feed water content and inorganic solids contamination have on coalescer performance. Are there any good references on this topic? From a diagnostic standpoint, how can free and dissolved water contents be accurately sampled and measured? Are any commercial data available which show a component water balance around a coalescer where the balance actually closes?

Reforming

69. How do you address polymer deposits on combined feed exchangers in continuous regeneration reformers? Do you have parallel exchangers equipped with valving that enables one heat exchanger to be taken off-line and cleaned while the unit continues to operate? This problem has resulted in reduced rates or reduced hydrogen to hydrocarbon (H2/HC) ratio.

70. A continuous reformer running at very high temperature and low H2/HC ratio has sulfur injected as recommended by the licensor. However, there is still a large amount of coke build up between the scallops and the reactor wall. What is the likely cause of this coke formation and what steps do you recommend to resolve this problem?

71. Do you use an oxygen stripper upstream of naphtha hydrotreater/ continuous regeneration reforming units to remove absorbed oxygen found in purchased naphtha or naphtha that has been in storage? If so, what are the operating parameters of the oxygen stripper? Are there additive alternatives?

72. The mandatory addition of high ethanol concentrations to gasoline is reducing the reformate's required octane. What changes need to be made to a regenerator to allow it to run in a low coke mode?

73. With the new stronger scallop designs, what is the next weakest link that will break when the catalyst bed pressures build to the point where something has to break? What causes high reactor bed pressure and what are you doing to address the problem?

Hydroprocessing

Safety

74. What are your best practices for mitigating the risk of hydrogen back flow to tankage during a hydrotreater feed pump trip?

75. How do you protect against heater tube failures? Are operator observations adequate or must design and other monitoring features be incorporated? What are these features?

76. How are you applying API RP 579, Recommended Practice for Fitness-for-Service, to hydroprocessing unit fired heaters and steam/methane reformers? Are the inspection techniques and asset life modeling sufficient for improving turnaround management and extending turnaround cycles?

77. With the increasing number of larger, multi-bed reactors installed for high severity operation (ULSD, FCC feed treating, heavy crude, etc.), how are you managing the additional time required to prepare the reactors for unloading (lower explosive limit (LEL), inert atmosphere, etc.)?

78. Are you using partial stroke testing on critical service high rate depressuring valves to ensure valve availability in hydrocrackers and hydrotreaters? What do you do to test other emergency shutdown valve systems?

Hydrogen Management

79. Given ULSD-related increases in hydrogen consumption, sulfur/nitrogen removal, and the associated impact on existing downstream processes such as amine system, sour water stripper (SWS), and sulfur recovery units (SRUs), how have you changed your FCC feed treater operating strategy?

80. Do you have experience operating PSA (pressure swing absorption) units for hydrogen recovery from purge gases with significant quantities of H2S? Does the H2S cause any problems? Are maintenance intervals affected? What is a typical valve service interval for a PSA unit in hydrogen recovery operations?

Catalyst

81. With the newer regeneration/rejuvenation processes for catalysts with Type II active sites, what has been your experience with reuse of these catalysts in ULSD or other services?

82. What are the primary catalyst concerns when restarting the unit after a total power failure?

Process

83. What are the “best in class” practices for ensuring adequate reserve quench in both ULSD hydrotreaters and hydrocrackers? How do you determine the reserve quench requirement?

84. With tightening fuel regulations and the increased severity of distillate hydrotreater operations, have you experienced any unanticipated problems such as corrosion, fouling or catalyst issues?

85. Please identify the possible causes of increased pressure drop in middle and lower catalyst beds. What solutions have you implemented to prevent pressure drop events?

86. Given that FCC product yields can usually be improved significantly by feed hydrotreating, what level of performance (e.g., hydrogen uptake, basic nitrogen removal, desulfurization, etc.) might justify a new FCC feed treater installation?

87. With the projected shift to making more diesel and less gasoline, have you modified the FCC feed treater to add conversion capability and make more diesel? What changes in catalyst type, reactor volume, pressure, or product separation are needed to do this?

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88. Operating a FCC feed treater in aromatic saturation mode generally increases FCC liquid yields. Have you found that this increased severity leads to more refractory sulfur species in the LCO? If so, what options do you have to compensate?

89. When co-processing diesel and VGO for ULSD and FCC feed treating respectively, does this require a specialty catalyst and/or a modification of operating parameters? What is the impact on the FCC unit?

90. What levels of arsenic have you observed in opportunity crudes and how are the arsenic levels distributed through the various crude distillation fractions?

91. As these opportunity crudes are being processed and the use of arsenic trap catalysts is becoming increasingly common, higher levels of arsenic remain behind on spent catalyst. Are there special or additional precautions and procedures that need to be implemented for the safety of the personnel that handle this spent catalyst?

92. Are you aware of any "runaway" reactions in ULSD hydrotreaters (a runaway is defined as a self-perpetuating reaction characterized by a large temperature increase)? Please discuss the factors that can cause such a runaway.

93. The recommended hydrogen circulation rate for ULSD service is typically higher than in pre-ULSD days (i.e. > 5:1 hydrogen available/hydrogen consumed). How are units operating at ratios less than 3:1 performing compared to predictions?

94. In hydrotreaters with high heat release (i.e. hydrocrackers, FCC feed treaters, and ULSD units) what criteria are used to determine distribution throughout the beds during the entire cycle? Is there a recommended thermocouple arrangement and density? Is there an optimal or "best in class" arrangement?

95. Are you using advanced control techniques to optimize ULSD unit operations? Have you utilized feedback/feed forward controls successfully? What variables have you considered in these advanced control schemes? Are there specific analyzer recommendations for this service?

Process

96. What best practices do you employ for the use of diesel fuel additives such as lubricity, conductivity, pour point stability, and cetane improvement?

97. How are you dealing with previously processed diesel streams that don't meet ULSD specifications (e.g. diesel from FCC feed treaters, ARDS, H-Oil or LCFiner units and biodiesel)?

98. What factors affect ULSD hydrotreater end of run (EOR)? Have there been any issues (other than color specification) due to high temperature at EOR? How do LCO percentage, operating pressure, feed gravity, and feed endpoint affect the EOR color?

99. Initially, common carrier pipelines established very strict ULSD sulfur maximums to ensure that the product met end-use specifications. More than a year later, these same pipeline operators are considering relaxing their specifications. What options would you consider to take advantage of these changes?

100. How do you manage or avoid contamination due to the swing between jet fuel (up to 3000 ppm sulfur) and seasonal production of ULSK (ultra-low sulfur kerosene, <15 ppm sulfur)?

101. New North American hydrocracker units have been designed to make ULSD rather than gasoline (typical of older designs). What design, catalyst, and process changes have been implemented to make this product shift and ensure that the more stringent ULSD specifications are met?

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