

Track Summary – Flares

Training Classes – February 19 – 21, 2020

Flares for Experts Class #1: Flares Essentials

Flare for Experts Class #2: Flare Flow Mass and Volume Measurement

Flare for Experts Class #3: Flare Composition/Btu Measurement

Flare for Experts Class #4: Flare Control

Mass Spec Gas Analyzers: Operation and Maintenance – Extrel

Breakout Presentations – Thursday February 20, 2020

The Proposed Flare Requirements of Ethylene MACT

Reduce Turnaround Duration By Eliminating Flare/Flare Gas Recover Using New Scrubber Technology

Natural Draft Low-Emissions Combustors

Ultra-Low NOX Burner

Eliminating H₂S & SO₂ Emissions at SRU, Coker and Other Sulfur Handling Units of Refineries

The Final Flare Requirements – Latest Update on the Refinery Sector Flare Rule

Ultra-Low Steam Consumption, High Capacity Smokeless Flare

On-line GC Solution to Comply with Flare Measurement Requirements

Flare Guardian Project

Meeting Flare Emissions Regulations with BTU Measurement

Optical Flow Sensors for Environmental Compliance and Process Control

Flare System Control and Optimization at Refineries and Chemical Plants

Measurement & Speciation Using Mass Spectroscopy Flare Gas Composition

Flare Gas Measurement Lessons Learned from Refineries & Future of Chemical Plants

Does CZNHV Track Flare Performance?

Flare Panel Moderated by Spectrum Environmental Solutions, LLC

Detailed Agenda Continues on Next Page

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Flares – Breakout Presentations

Flares for Regulatory Compliance Breakout Presentations

Room 406 – Thursday February 20, 2020

- **10:30 AM – 11:00 AM**
 - **The Proposed Flare Requirements of Ethylene MACT – Latest Update – Troy Boley – Spectrum Environmental Solutions, LLC**
 - Abstract Coming Soon.
- **11:00 AM – 11:30 AM**
 - **Reduce Turnaround Duration By Eliminating Flare/Flare Gas Recover Using New Scrubber Technology – Jim Woodard – Vapor Point, LLC**
 - The refining industry is challenged with the development of alternative technologies to control hazardous and regulated emissions such as Hydrogen Sulfide and Total VOC compounds. Federal Agencies, through rule promulgation and Consent Decree, have emphasized a highlighted effort to minimize flare usage as a control device. The current rule promulgation of NSPS subpart Ja, Refinery MACT, and the Refinery Technology Rule each will provide challenges to perform de-inventory and decontamination phases of turnarounds in a timely manner. The direct impact of regulatory action is on the shoulders of those responsible for the planning, execution, and management of turnaround activities. Vapor Point will present case histories on projects at multiple refineries and multiple process units requiring various control requirements. Presentation will demonstrate very common challenges that refiners face under the new EPA regulations and solutions that have been successfully deployed in the field with the new scrubber technology package.
- **11:30 AM – 12:00 PM**
 - **Natural Draft Low-Emissions Combustors – TBD – Ashcor & Clearsign Combustion**
 - ASHCOR's Low Emissions Combustor, powered by ClearSign Core™ technology, achieves the industry's lowest NOx and CO emissions while maintaining a greater than 99.99% destruction efficiency. All units are equipped with ASHCOR flame arresters and Profire burner management controls that improve site safety and add a sense of reliability to the constant risk in the oil and gas industry.
- **12:00 PM – 12:30 PM**
 - **Ultra-Low NOX Burners – Chris Ferguson – Honeywell UOP Callidus**
 - Abstract Coming Soon
- **12:30 PM – 1:30 PM Lunch Break in the Exhibit Hall**
- **1:30 PM – 2:00 PM**
 - **Eliminating H2S & SO2 Emissions at SRU, Coker and Other Sulfur Handling Units of Refineries – Al Christopher/Sean Kirkpatrick – Vapor Point, LLC**
 - "Vapor Point applies high efficiency liquid scrubbing systems to eliminate Hydrogen Sulfide (H2S), Sulphur Dioxide (SO2) other Sulfur Species as well as other Hazardous Air Pollutants

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(HAPs) and Volatile Organic Compounds (VOCs). Specially designed temporary vessels for liquid and vapor phase product management have also been developed and are key elements in some applications. These control system concepts and resulting proven processes were developed with input from refining personnel who needed alternative technologies that would offer operational flexibility eliminating the various sulfur contaminants. The vapor phase emission control systems and specially designed process vessels have met the needs of the refining industry with numerous field implementations."

- **2:00 PM – 2:30 PM**

- **The Final Flare Requirements – Latest Update on the Refinery Sector Flare Rule – Troy Boley – Spectrum Environmental Solutions, LLC**

- The experts at Spectrum Environmental Solutions, LLC (Spectrum) have been involved with a wide variety of industrial flare related issues within the petroleum and petrochemical related industry sectors. This presentation will lay a solid foundation for the rest of the conference presentation day as Spectrum will highlight the recent Federal flare rules specifically promulgated for the petroleum refinery sector. The intent will be to provide attendees with an understanding of the most likely flare improvement requirements anticipated by industry within future rulemaking for ethylene and chemical facility flares.

- **2:30 PM – 3:00 PM**

- **Ultra–Low Steam Consumption, High Capacity Smokeless Flare – Clayton Francis – Zeeco**

- This paper will introduce the technology behind, test data for, and industry challenges addressed by a new Ultra–Low Steam Consumption, High Capacity Smokeless Flare design developed by Zeeco, Inc. This flare technology is designed to further improve flaring efficiency and reduce steam consumption while continuing to meet the EPA Code of Federal Regulations, Chapter 1, Subchapter C, Part 63, Subpart CC requirements. We will focus on how the design addresses known industry challenges in high capacity, low steam consumption flaring, such as needing the ability to operate at low flare gas pressure since many applications have a maximum flare gas pressure at the flare tip of 3 psig. The paper will detail how this new design can achieve as low as 0.17 lbs. steam / lbs. flare gas at 20% of maximum flow rate, with the maximum flow rate achieved at a flare gas pressure of 3 psig. The above data is based upon a 5 mph wind with less than Ringlemann 1 opacity and a flare gas that is 100% propylene. For smokeless operation with propylene, other current steam assisted flare designs require approximately 0.5 lbs. steam / lbs. flare gas and / or a much higher flare gas pressure at maximum flaring capacity. Ultra–Low Consumption Steam Assisted Flaring is very important since any reduction in the required steam flow rate saves not only money, but also reduces the emissions produced from the production of the required higher steam flows. A key feature of this technology is that the air and steam mixture leave the flare at the same elevation as the flare tip exit, meaning no pre–mixing of air into the flare stream. Other current industry designs mix the air and steam with the flare gas prior to exiting the flare tip, negatively impacting the NHVcz according to the new calculation parameters required by MACT CC. Zeeco’s design more efficiently mixes the steam and air

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together and then mixes the resulting stream with the flare gas, creating a final mixture with a significantly increased volume of air. When the resulting mixture interacts with the flare gas at the tip exit, the increased air volume is readily available for combustion, meaning the flare is less likely to smoke. Since the design more efficiently mixes the air and steam together, less steam is required to achieve smokeless operation. Furthermore, the inherent efficiency of the mixing delivers a design less dependent upon using flare gas pressure to achieve smokeless operation. The flare can successfully operate at lower gas pressures at maximum flow rate.

- **3:00 PM – 3:30 PM Break to Enjoy the Exhibit Hall Refreshments**
- **3:30 PM – 4:00 PM**
 - **MSS Support Services – TBD – Gem Mobile**
 - GEM has developed a wide variety of vapor control solutions to assist customers with Maintenance Startup & Shutdown (MSS) permit compliance. Our comprehensive emission management program offers multiple customized options to meet individual facility needs.
- **4:00 PM – 5:00 PM**
 - **Flare Panel Moderated by Spectrum Environmental Solutions, LLC**

Flare Instrumentation & Analyzers Agenda Begins Next Page.

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Flare Instrumentation & Analyzer Breakout Presentations

Room 408 – Thursday February 20, 2020

- **10:30 AM – 11:00 AM**
 - **On–line GC Solution to Comply with Flare Measurement Requirements – Ulrich Gokheler – Siemens Industry**
 - On line GC measurement solutions are often utilized to satisfy and comply with a wide variety of flare measurement regulations. 63.670 (RSR), Chapter 115 (TCEQ HRVOC) and Subpart Ja, Rule 1118 (SCAQMD) for example. There are similarities between several regulations permitting to share the same analytical configuration. Often GCs are the default choice because reliability, familiarity and maintainability. Utilizing on–line analyzers successful is not necessarily the analyzer but the knowledge of sample transport and sample conditioning design, validation needs and simplicity of maintenance. This presentation will discuss analytical similarities especially between RSR and HRVOC, explain proven and reliable analytical configuration and possible validation simplifications.

- **11:00 AM – 11:30 AM**
 - **Flare Guardian Project – Clayton Francis – Zeeco**
 - Eliminate the inaccuracies and delayed results inherent to indirect flare monitoring. Directly monitors flare performance in real–time rather than determining compliance and combustion efficiency through a time–consuming, repetitive process of measuring inputs, assuming reactions and velocities, and arriving at an assumed operating status.

- **11:30 AM – 12:00 PM**
 - **Meeting Flare Emissions Regulations with BTU Measurement – Tom Watson – AMETEK Process Instruments**
 - Learn how mass spectrometer technology can be used to meet emissions requirements by measuring BTU in the flare gas. This session will cover the methods of BTU determination, and will outline the advantages of a mass spectrometer analyzer – speed, accuracy, range, etc. – while discussing application specifics, and total cost of ownership and maintenance needs. There will also be a review of mass spectrometry technology, components, and functions.

- **12:00 PM – 12:30**
 - **Optical Flow Sensors for Environmental Compliance and Process Control – Donn Williams – Optical Scientific**
 - OSI's Optical Flow Sensor (OFS) can help you comply with EPA's Organic Liquids Distribution MACT, RSR and Ja regulations. Unaffected by temperature, pressure, density or gas concentration, OFS makes drift–free flow measurements on flare stacks, thermal oxidizers and a host of similar routine and extreme processes alike with no shutdown needed to install.

- **12:30 PM – 1:30 PM Lunch Break in the Exhibit Hall**

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- **1:30 PM – 2:00 PM**
 - **Flare System Control and Optimization at Refineries and Chemical Plants – Dan Johnson – Baker Hughes 2:00 PM – 2:30 PM**
 - The new Refinery Sector Rule (RSR), passed by the EPA in December 2015, extends and strengthens the regulations governing stationary emission sources, specifically flares in refineries. It calls for the control and monitoring of flare systems, including, for example, meeting the specific requirements of Net Heating Value in combustion zone gas (NHVcz), smokeless combustion and actual flare tip velocity (V_{tip}) for steam assist flare systems and additional Net Heating Value dilution parameter (NHVdil) for air assist flare systems. A flare control design, which takes live input of speed of sound from flare meters, was implemented to achieve real-time control using measurement of average molecular weight of an unknown hydrocarbon mixture from the sound of speed. This information can be used by the control system to determine the net heating value of vent gas as well as provide a dynamic ratio control for steam, this provides for a more efficient and responsive control scheme. Combined with the requirement of vent gas NHV imposed by V_{tip} , a continuous, efficient flare operation of supplemental gas will be demonstrated. By utilizing real time control via the speed of sound measurement provided by the flare meter, the risk of having a block of non-compliance is mitigated. Flare control systems using other schemes, such as controls based on feedbacks from Gas Chromatograph (GC) or calorimeters, were discussed in the paper. Practical implementation of this methodology and data are also discussed in this paper.
- **2:00 PM – 2:30 PM**
 - **Measurement & Speciation Using Mass Spectroscopy Flare Gas Composition – Chuck de Carlo – Extrel**
 - As refineries continue to optimize their approach RSR 63.670 compliance, new regulations for flare emissions are set to hit a broad range of industries over the next five years. The goal is to ensure the destruction of Hazardous Air Pollutants (HAPs) prior to release into the atmosphere, but drastic changes in vent gas composition make controlling that efficiency difficult. Getting the full composition of the vent gas quickly allows operations to apply corrections as soon as possible. Flare gas mass spectrometers measure hydrocarbons, carbon oxides, hydrogen, sulfurs, moisture and various volatile organics, and report concentrations and Net Heating Value (NHV) to the control system in seconds. Examples from recent ethylene flare gas regulations and MON sites will be covered in the discussion, along with data from oil refinery flare events.
- **2:30 – 3:00 PM**
 - **Flare Gas Measurement Lessons Learned from Refineries & Future of Chemical Plants – Arnold Griswald – Fluenta Inc**
 - EPA's Refinery Sector Rule is about to come online. The new rule will cover all aspects of combustion efficiency to ensure the flare operation is done in a manner that is safe for the environment and safe for the operation of the facility. Refineries will undoubtedly need to take some actions irrespective of whether they use steam or air assisted flares in order to ensure

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heating values of at least 300 BTU/scft of gas at the flare. This can be done by monitoring gas composition, steam/air flow and flare gas flow rate. As flow rate is part of the calculation supplied to meet the requirements put forward by the EPA, a gas flow meter will need to be used to provide that piece of the puzzle. This presentation will discuss how ultrasonic flow meters have been used to determine the flowrates in refineries and other facilities. A discussion will follow focused on how this technology helps the facility operator comply with the existing and new EPA regulations, and on how much more can be done from the metering perspective to help the implementation of the new EPA rule.

- **3:00 PM – 3:30 PM Break to Enjoy the Exhibit Hall Refreshments**
- **3:30 PM – 4:00 PM**
 - **Ground Flares, Air Quality Approvals and Requirements – Blake Soyars – Burns & McDonnell**
 - Pressure-assisted multi-point ground flare systems are used to control organic vapor emissions for a growing number of chemical manufacturing facilities. Ground flares serve the same purpose as conventional elevated flares, but current air quality regulations and approval processes are more complicated for ground flares. We will present key steps and challenges in the ground flare approval process, including the TCEQ Alternate Method of Control (AMOC) process and EPA Alternative Means of Emission Limitation (AMEL) process. We will discuss key compliance and permitting implications specific to ground flares at Texas chemical facilities. We will share actual permitting and approval timelines for example Texas ground flare projects.
- **4:00 PM – 5:00 PM**
 - **Flare Panel Moderated by Spectrum Environmental Solutions, LLC**

Track Summary – Flares

Training Classes – Wednesday February 19, 2020

- **Room 406 8:00 AM – 12:00 PM**
 - **Flares for Experts Class #1: Flares Essentials – Troy Boley, Herman Holm and Rishabh Jaishankar, Spectrum Environmental Solutions**
- **Room 410 1:00 PM – 5:00 PM**
 - **Flare for Experts Class #2: Flare Flow Mass and Volume Measurement – Dan Johnson, BHGE, Donn Williams, Optical Scientific, Julie Valentine, Emerson Automation Solutions**
- **Room 410 1:00 PM – 5:00 PM**
 - **Mass Spec Gas Analyzers: Operation and Maintenance – Extrel**

Training Classes – Friday February 21, 2020

- **Room 400 8:00 AM – 12:00 PM**
 - **Flare for Experts Class #3: Flare Composition/Btu Measurement – Chuck DeCarlo, Extrel, Ulrich Gokeler, Siemens Industry, Robert Paddison, Thermo Fisher Scientific, Troy Boley, Spectrum Environmental Solutions**
- **Room 406 1:00 – 5:00 PM**
 - **Flare for Experts Class #4: Flare Control – Dan Johnson, BakerHughes, A GE Company/Panametrics**

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