

FINAL Minutes of June 13, 2019 Ethylene Producers' Environmental Sub-Committee Meeting
(June 13, 2019, Rev. 0)

Following are the minutes of the June 13, 2019 Ethylene Producers' Environmental Sub-Committee Meeting, held via teleconference with Walter Postula, Shell Global Solutions (US) Inc., as host.

Present: David Elam, TRC Solutions
Jacob Hilbrich, ChevronPhillips
Brandon Lithgoe, NOVA Chemicals
Dan Lutz, Ineos
Arijit Pakrasi, Edge Engineering and Science
Walter Postula, Shell Global Solutions (US) Inc.
Jeffrey Seay, University of Kentucky (AIChE Environmental Division)
Mark Ulrich, Linde Engineering North America
Gary Wojnowski, BASF

Absent: Rick Beleutz, LyondellBasell
Benjamin Burns, SASOL North America
Ted Heron, The Catalyst Group
Brad Hopper, BASF
Patti Long, Eastman
Jennifer Port, ExxonMobil Chemicals
Gerardo Ruiz-Mercado, US EPA (AIChE Environmental Division)
Mark Schmidt, Dow
Debalina Sengupta, Texas A&M (AIChE Environmental Division)
Dick Siegel, R&B Consulting Services (AIChE Environmental Division)
Edward Soliz Jr., SASOL North America
Russell Wozniak, Dow

The teleconference began at 9:00am with Walter Postula reading the Ethylene Producers' Committee (EPC) anti-trust statement:

No activity of the committee shall involve the exchange, collection, or dissemination of information among competitors for the purpose of bringing about or attempting to bring about an understanding or agreement, written or oral, formal or informal, express or implied, among competitors, with regard to costs, prices, pricing methods, terms or conditions of sale, distribution, production quotas or other limitations on either the timing or volume of production or sales, or allocation of territories or customers.

The meeting agenda was published in advance and is included below:

- 1) Reading of Anti-Trust Statement [9:02 AM]
- 2) Chair/Co-Chair for session [9:05 AM]
- 3) Potential New Members for Environmental Subcommittee [9:10 AM]
 - a. Ahmad Hamad – Siemens
 - b. Andrés Muñoz Gandarillas – Neste
- 4) Review of 2019 Session Feedback (see attached) [9:20 AM]
- 5) Discussion of Potential Topics for Environmental Session [9:35 AM]
- 6) Date for Potential Face to Face [9:50 AM]
- 7) Review of Action Items [9:55 AM]

- 8) Important Date Reminders
- June 21, 2019 – Call for abstracts opens
 - November 22, 2019 – Call for abstracts closes
 - December 13, 2019 – Papers accepted or rejected
 - January 17, 2020 – Program goes live
 - March 6, 2020 – Paper submission closes
 - March 30 – April 2, 2020 – Spring Meeting – Houston, TX
- 9) Adjourn [10:00 AM]

Interest in continuing to serve on EPC Environmental Subcommittee: Was suggested we verify interest from those listed as members of the EPC Environmental Subcommittee by asking each of you to respond to Walter Postula affirming commitment.

Chair/Co-Chair for Session: Per discussions that occurred at the 2019 EPC, Brandon Lithgoe volunteered for the 2020 Session Chair role. Jake Hilbrich volunteered for the 2020 Session Co-Chair role. Thank you, Brandon and Jake! Others on the subcommittee who have filled one/both of these roles previously agreed to be available to help Brandon and Jake with questions they may have.

Potential New Members for Environmental Subcommittee: Mark Ulrich was approached at the 2019 Conference by Ahmad Hamad (Siemens) and Andrés Muñoz (Neste) who were interested in participating on the Environmental Subcommittee and presenting material in the session. Mark summarized his discussion with each for those on the call and ended with endorsing both for membership on the subcommittee. Everyone on the call agreed to have them join. Presenting at the session will depend on overall interest in their individual topics and fit with the rest of the session. Mark will contact to welcome them to the subcommittee. Walter will include them on distribution of minutes.

Review of 2019 Session Feedback: Mark Ulrich and Brandon Lithgoe summarized the feedback received on the 2019 Environmental session (see Appendix 1). Both thought the session went well and thought use of sli.do for Q&A went well. Note that the questions received via sli.do are also included in Appendix 1. The session averaged about 50 attendees.

Subjects attendees would like to see: 1) Update from Steve Smith next year on ethylene MACT, wastewater rules, 2) Moving to zero flaring, how do we do this, and 3) Technical options to reduce CO₂ emissions - electrification, h₂ burners, etc.

The overall EPC attendance was about the same as last year in Orlando.

Discussion of Potential Topics for Environmental Session: For awareness, the AIChE Environmental Division is planning programming on the topic of “Waste Plastics to Chemicals”. Jeff Seay is leading this effort. Nothing significant to report, but Jeff will keep the subcommittee informed. Likely that EPC Environmental Subcommittee will co-sponsor this session(s).

Specific to the EPC Environmental Session, the list below was generated:

- 1) Electro-oxidation, ZimCad, and/or activated carbon in waste water treatment (topic from Ahmad Hamad, Siemens)
- 2) Renewable naphtha/diesel as feedstock for producing bio-ethylene/-propylene (topic from Andrés Muñoz, Neste), strong interest from those on call
- 3) Update to RTR/EMACT (one more time for Steve Smith?), continued strong interest
- 4) Zero flaring / Flare Management Plans, very relevant
- 5) Update on SCR (NO_x removal) operation
- 6) CEMS on furnaces
- 7) CO₂ reduction

- 8) Rejected papers from 2019 session (abstracts and presenter contact info in Appendix 2), both are Honeywell UOP
- a. Smokeless Operation of Flares: Design and Physical Testing of Industrial Scale Flares
 - b. Practical Low NOx Burner Retrofit Considerations for Ethylene Furnaces

Date for Potential Face to Face: Agreed to continue face-to-face meeting and settled on October 10, 2019 meeting date. Mark Ulrich and Linde once again agreed to host.

Review of Action Items: **Mark Ulrich** to contact Ahmad Hamad and Andrés Muñoz to communicate their acceptance on the subcommittee and lay out next steps for consideration of their abstracts for the 2020 session. **Brandon Lithgoe** to pursue potential author/speaker for Flare Management Plans. **Rick Beleutz** to check if Steve Smith is willing to follow up on his RTR/EMACT presentation (3rd times a charm!), assuming details of rule will be known. **Mark Ulrich** to follow-up within Linde on zero flaring. **Brandon Lithgoe** to look into author/speaker for CO₂ reduction. **Mark Ulrich** to contact Linde's office in Germany regarding offering in CO₂ reduction. **Jake Hilbrich** will check with CPChem technical willingness to share update on SCR operation. **All** to review list of potential topics and "second" interest, suggest additional topics (especially for those not on call). **All** to respond to Walter affirming interest in continuing to serve on subcommittee.

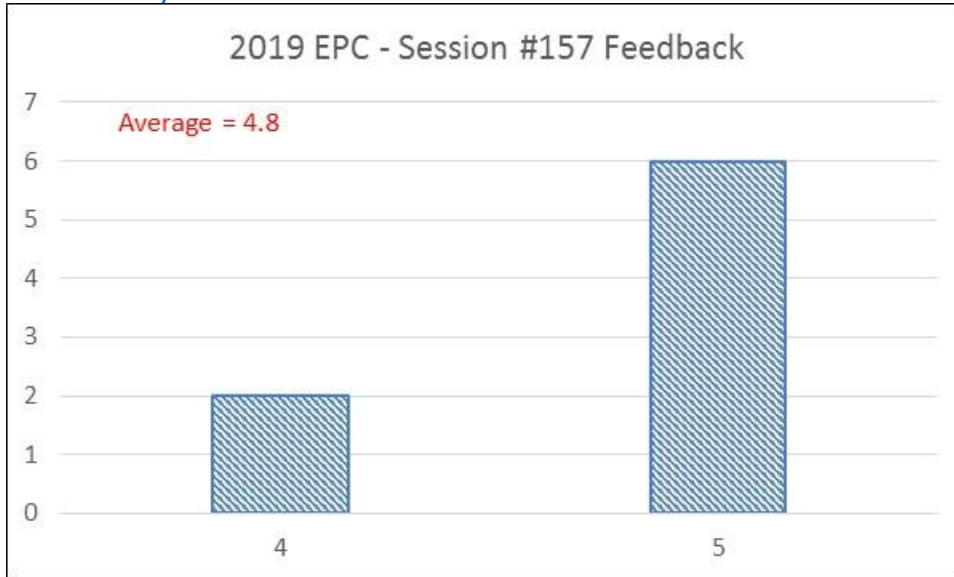
Important Date Reminders: The dates provided in the agenda were reviewed.

Adjourn: The meeting/teleconference was closed at 9:58 am.

APPENDIX 1

2019 EPC – Session #157 (Ethylene Plant General Environmental) Survey Results

How would you rate the session overall?



Do you have specific feedback for this session?

- 1) Excellent session covering very pertinent topics to the industry. The first half of the session really fit well together. Back half of the program was also interesting and covered good topics - good speakers.
- 2) Great session, lots of good questions. Like Sli.do.
- 3) The session was very good, relevant topics that were also engaging.

What topics would you like to see presented at future conferences?

- 1) Update from Steve Smith next year on ethylene epa, wastewater rules,
- 2) Moving to zero flaring, how do we do this
- 3) Another update on MACT next year as appropriate
- 4) Technical options to reduce CO2 emissions - electrification, h2 burners, etc

If you are interested in presenting, please provide contact information (name/e-mail/phone).

If you are interested in serving on an EPC subcommittee, please provide contact information (name/e-mail/phone).

2019 EPC – Session #157 (Ethylene Plant General Environmental) Questions

Question text	Submission Time
How is clean gas for fuel defined?	08:20:01
To reduce overall emissions we might want to burn flare gas which contains HAPs. Would something in these new rules prevent that?	08:23:38
For the proposed requirement of a seven year replacement of radiant coils; is there or will there be a process to request an extension for additional years	08:28:03
Realizing it is all speculation, do you have any idea whether the Rule Making may differently address new ethylene plants versus existing units?	08:30:34
What is the rationale for the EPA to use 1212 versus the actual heat value of hydrogen?	08:32:30
Presuming the visible flame from the flare indeed becomes the regulatory requirement, does industry plan any kind of press releases to address public concerns?	08:36:34
Any consideration to greater emissions from startup/shutdown to fix a HX versus waiting past the 45 days if a turnaround is already scheduled soon?	08:42:49
Per Refinery Sector Rule on Cooling Tower Emissions, have you seen any requirements placed on use or reuse of treated wastewater as cooling tower makeup water?	08:49:33
Are the EPA staff you work with experienced engineers? Are they reasonable?	08:50:26
Are there other methods for the flare CPMS than GC?	09:16:04
Can WAO unit run Turnaround to Turnaround - say 7 years?	10:11:31
What are some reliability / fouling or other issues do you need to monitor / shutdown equipment to clean/ maintain?	10:12:48
Besides going to wastewater is there anything else we can do with WAO effluent? Any examples?	10:13:31
Will left over polymeric components in spent caustic can chok oxidation reactor at the down stream? how it can be avoided?	10:13:42
Has the addition of activated carbon provided for more stability i.e. less upsets -- in the wastewater treatment process	10:19:43
Any notable differences in feed slates for ethane versus liquid crackers?	10:20:17
Considering the addition of the membrane system, Is the combined prices still the most cost effective?	10:20:17
Any history with salt accumulation post neutralization causing strainers to choke on the pump suction strainers?	10:24:28
Are there any weather conditions that could impact measuring ability?	10:34:15
How does the system perform at night and weather events?	10:34:39
Only for elevated flares or ground flares too?	10:35:26

How close to the flare does the VISR need to be for most accurate results?	10:35:44
Remote mounted, on the ground ok?	10:36:09
Is there a minimum and maximum distance for the detector to be positioned relative to the flare?	10:36:43
Why sample every .03 seconds? Is this frequency dictated by regulations?	10:37:28
Does VISR have to view the entire flame, if so is there loss of resolution between normal and upset flaring rates	10:37:34
Is VISR technology proven with an Olefins unit flare? If so, which?	10:38:08
Would an operator expect to use more or less supplement gas with VISR compared against NHVcz?	10:39:21
Is VISR technology required by EPA's flaring regulations? If not, how does VISR's accuracy compare to other flare monitoring technologies?	10:40:05
Does VISR work when the flare flame is not visible?	10:40:39
What is the maximum radiant energy load on the installation?	10:46:07

APPENDIX 2

2019 Environmental Session “Rejected” Abstracts

Smokeless Operation of Flares: Design and Physical Testing of Industrial Scale Flares

Abstract Text:

Increased enforcement and changing regulations have placed a renewed focus on flare operation and design. Industrial scale test data is presented for the operation of a flare with mixtures of propane, propylene and nitrogen. The data is compared with standard calculations for flare sizing as well as with general design practices. The data reveals that some common assumptions about the operation of flares may not transfer among flares of differing geometries.

Matthew Martin

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Honeywell UOP Callidus

Senior Product Line Manager

Practical Low NO_x Burner Retrofit Considerations for Ethylene Furnaces

Abstract Text:

Case studies are presented for retrofit installations of low NO_x burners that comply with new air quality regulations. While the effects of air leakage, fuel gas condition and burner design have been widely studied, here the effects on both NO_x and heater performance are explored and documented through physical experimentation, computational fluid dynamics, and field installation.

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