



Qenos

February 2020 ACNCG



Introduction

Qenos update since November ACNCG

- Qenos actions arising (nil)
- Environmental performance
- Regulatory Interface
- 2019 Groundwater monitoring
- 2019 Flare report

2019 Trends



Environmental performance

- High temperature excursion for discharge to CWW 25th Dec
- Leak on underground flare drain header reported to EPA, Worksafe 10th January
- Confirmed complaints
 - 16th January Flare noise.



Regulator interface

EPA

EPA has been discussing flare performance and site legacy contamination with Qenos over the past year and has recently issued the following notices

- Pollution Abatement Notice 90009621 to carry out review of Flare operations.
- Clean Up Notice 90009622 to carry out a Section 53V Contamination audit

CWW

- Nothing to report

WORKSAFE

- TBA



Qenos Altona safety performance

- No recordable injuries at Altona in 2019
 - Last Altona recordable injury 15th may 2018
- Contractors achieved 4Q KPI.
 - Donation to Cancer Council at December Toolbox meeting



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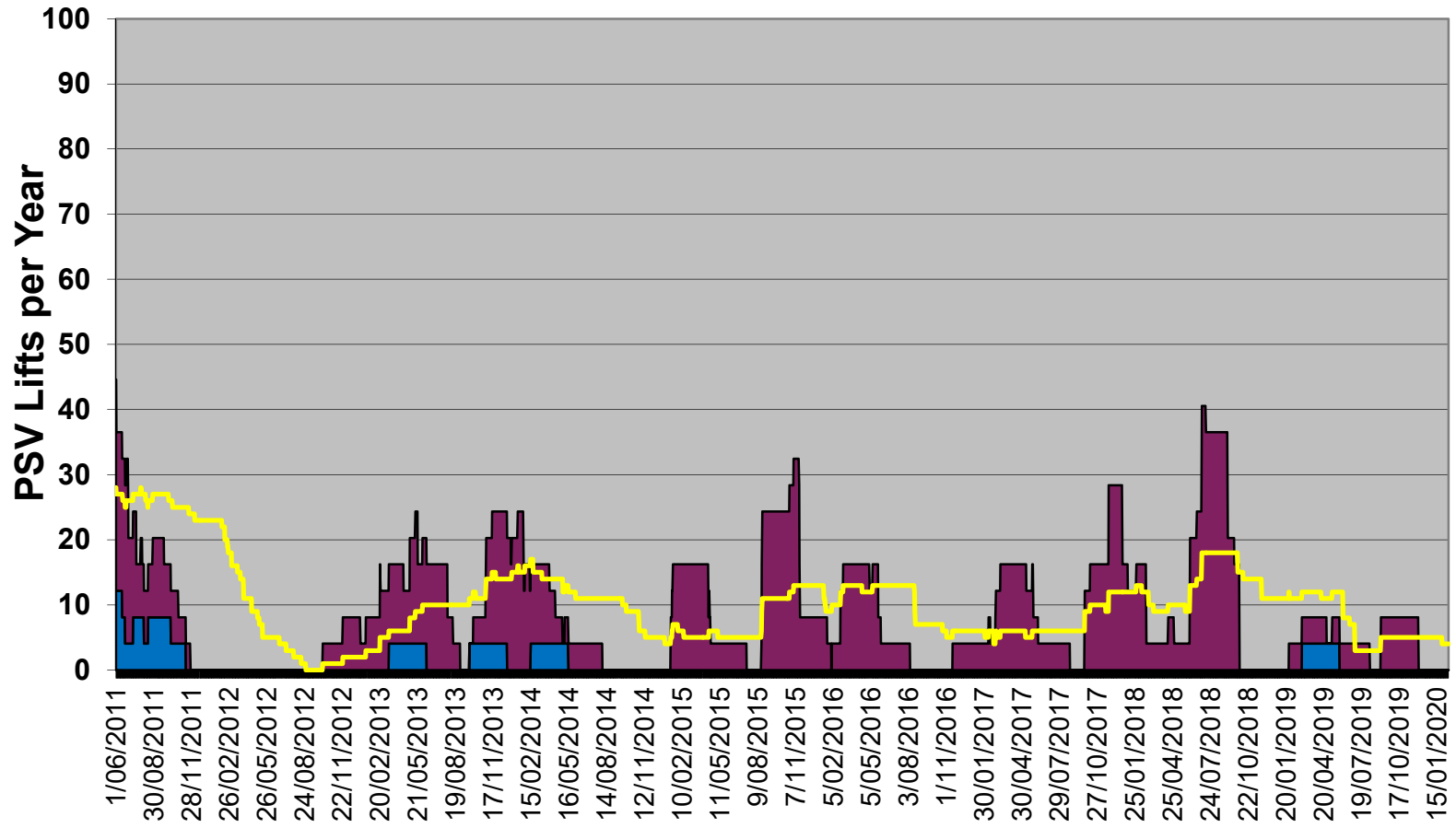
2019 Total - 5
 2018 Total - 11
 2017 Total - 12
 2016 Total - 6
 2015 Total - 13

High Pressure Events > PSV Set Points 90 Day Trend

2 PSV Lift since last meeting
 -2 SCal-1 PSVs to flare following compressor trip

Annualised trend
 90 day abnormal operation
 90 day normal operation trend

In period 2009 - 2014:



PullingOurWeight

global challenge to reduce plastic waste

- Qenos attended industry Clean Up Day held on 29th November at Werribee South beach
- 70 volunteers from nine organisations including Dow, Chemistry Australia, Qenos, LyondellBassell, Martogg, BASF, and SNF with conservation partners Tangaroa Blue and the Werribee River Association.
- Removed 228kg of rubbish from Beach. Av 3.4kg/person

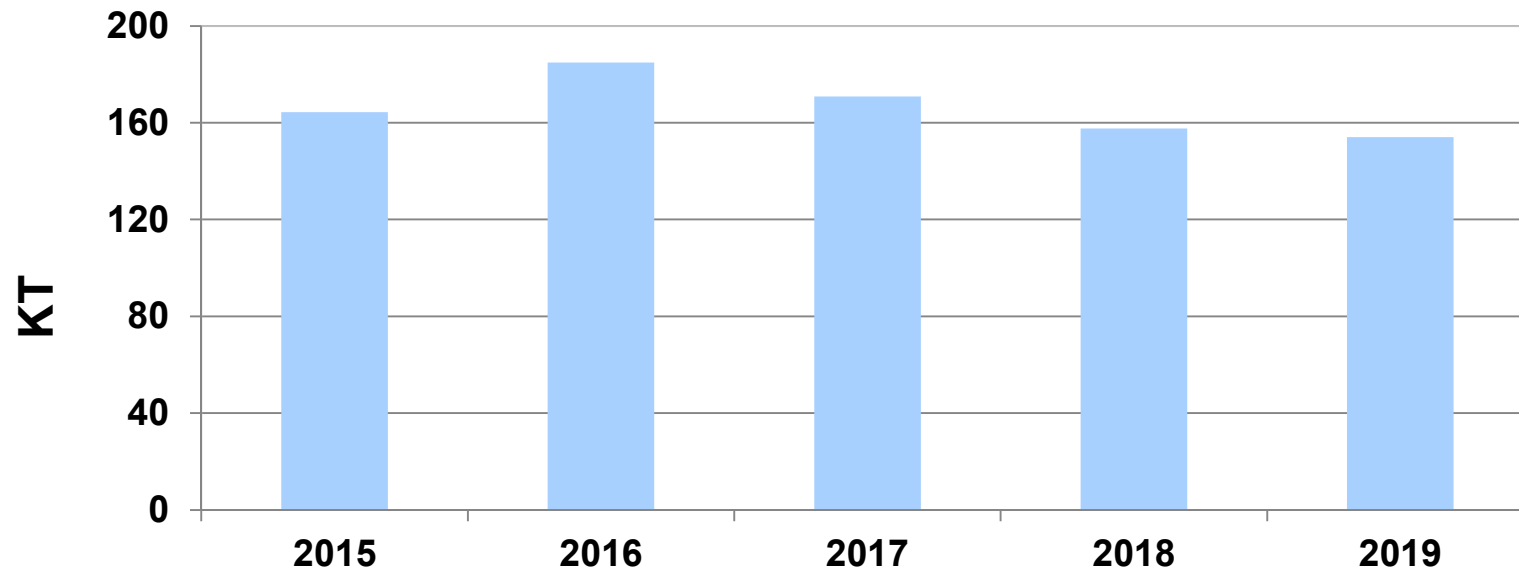


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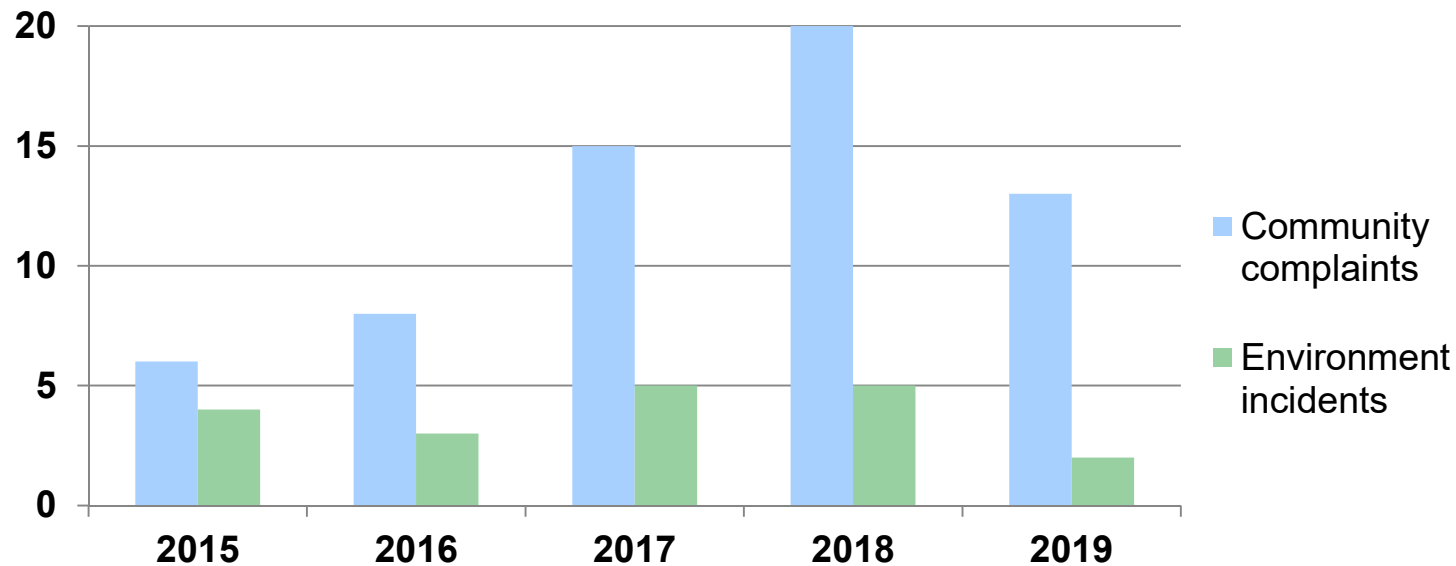
Polyethylene Production

- Production at 90% of plan
 - Reduced feedstock supply
- Lower production impacted overall efficiency



Environment trends

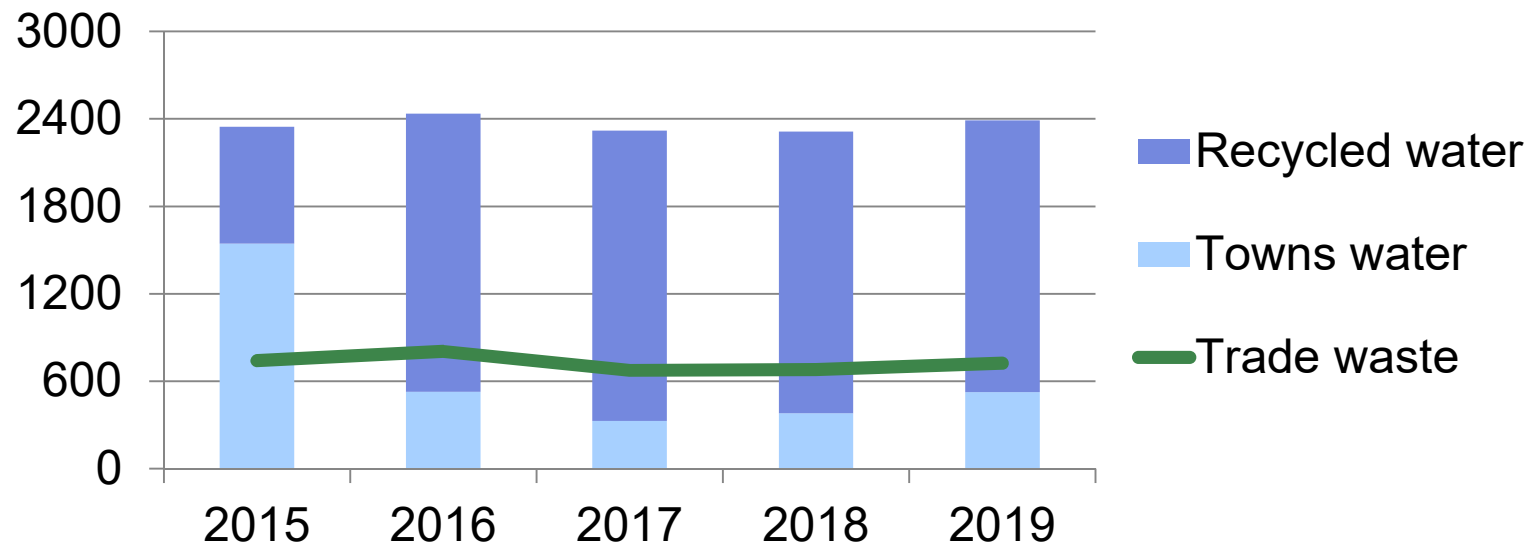
- 10 complaints for flare noise. (8 related to 3 events)
- 3 complaints for Effluent plant odour
- 1 non-compliances (High temperature to sewer Nov 25th)
- 1 reportable events. (Pump seal leak April 10th)



Water consumption

- Olefins plant 92% recycled water. (Lower availability)
- Plastics water reuse ceased (Water retention tank leak)

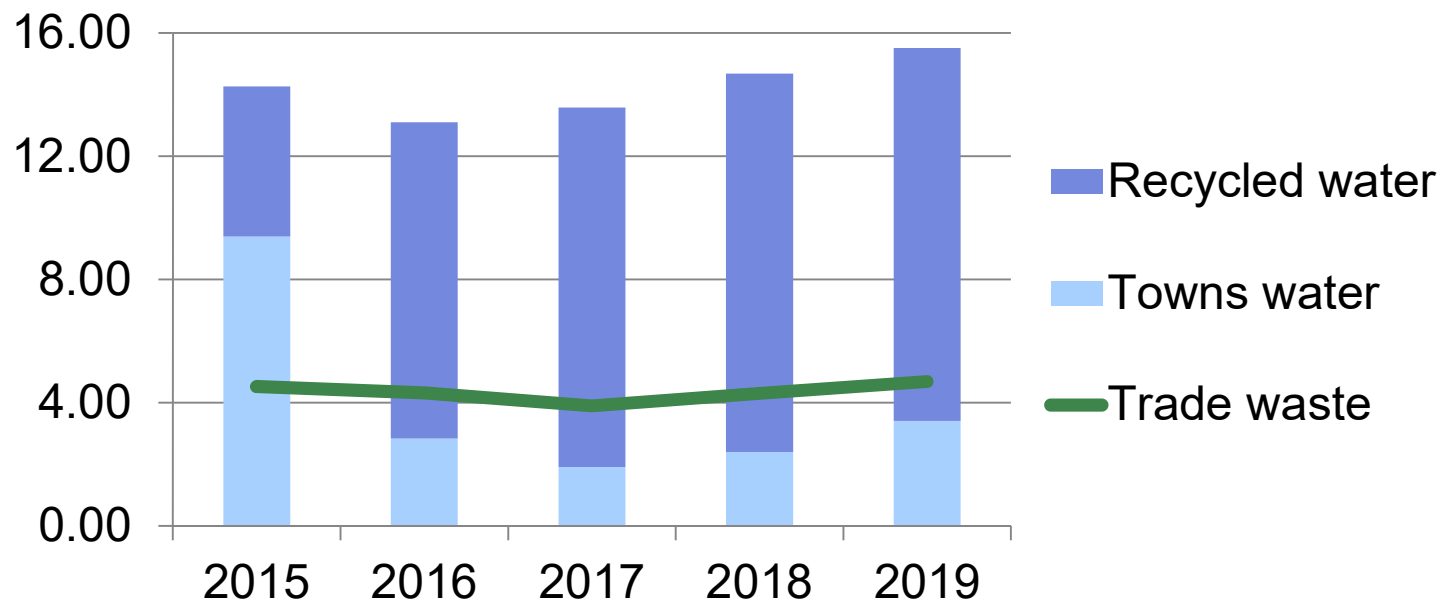
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Water Efficiency

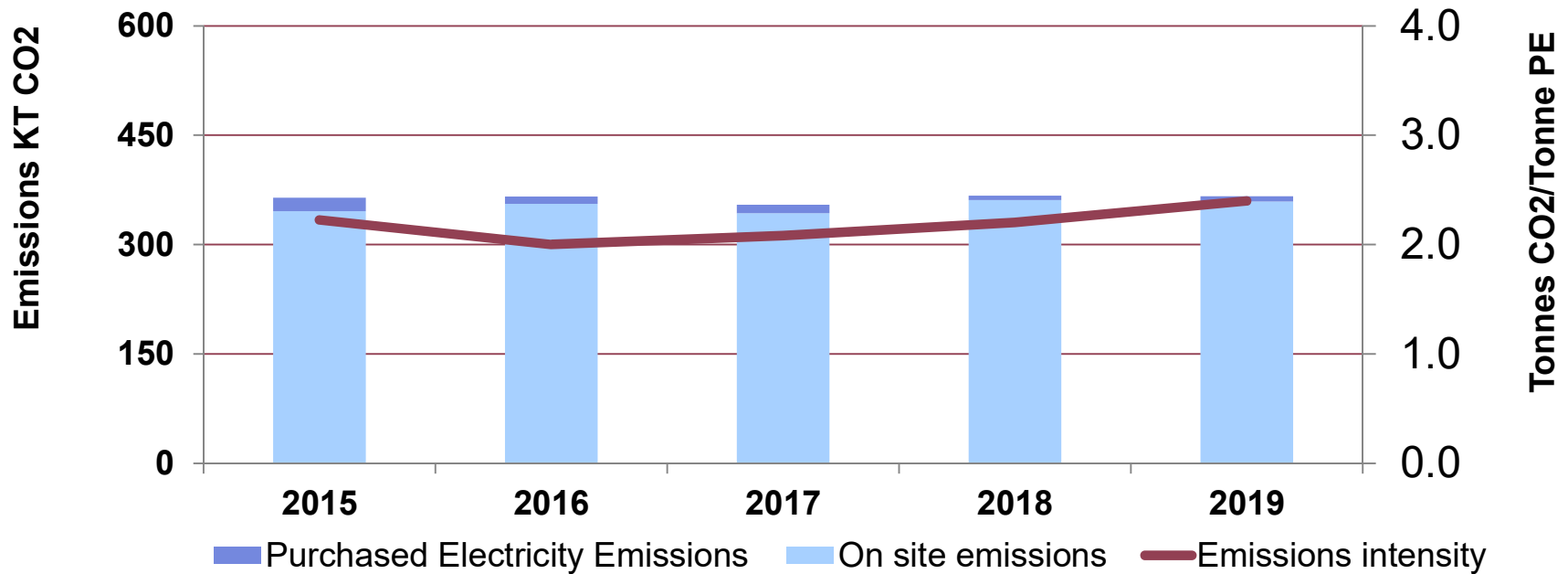
- Efficiency impacted by unavailability of Plastics water reuse

KL/T PE



Greenhouse Gas Emissions

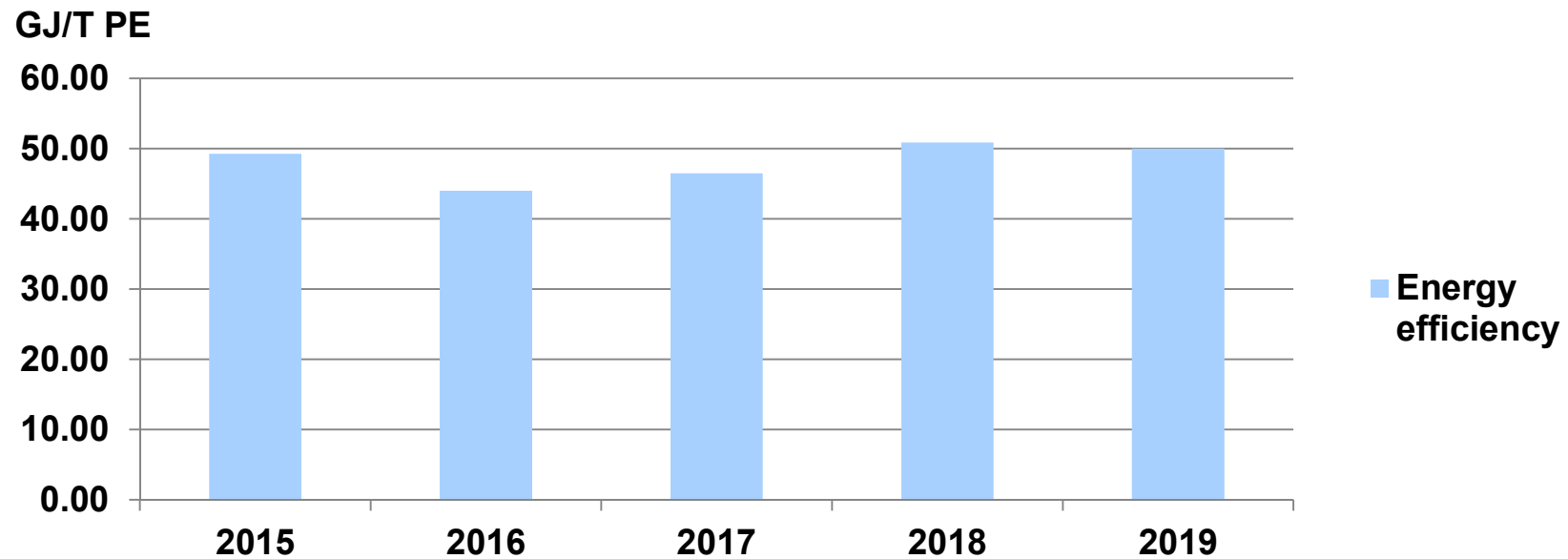
- Efficiency impacted by lower production.



Energy Efficiency

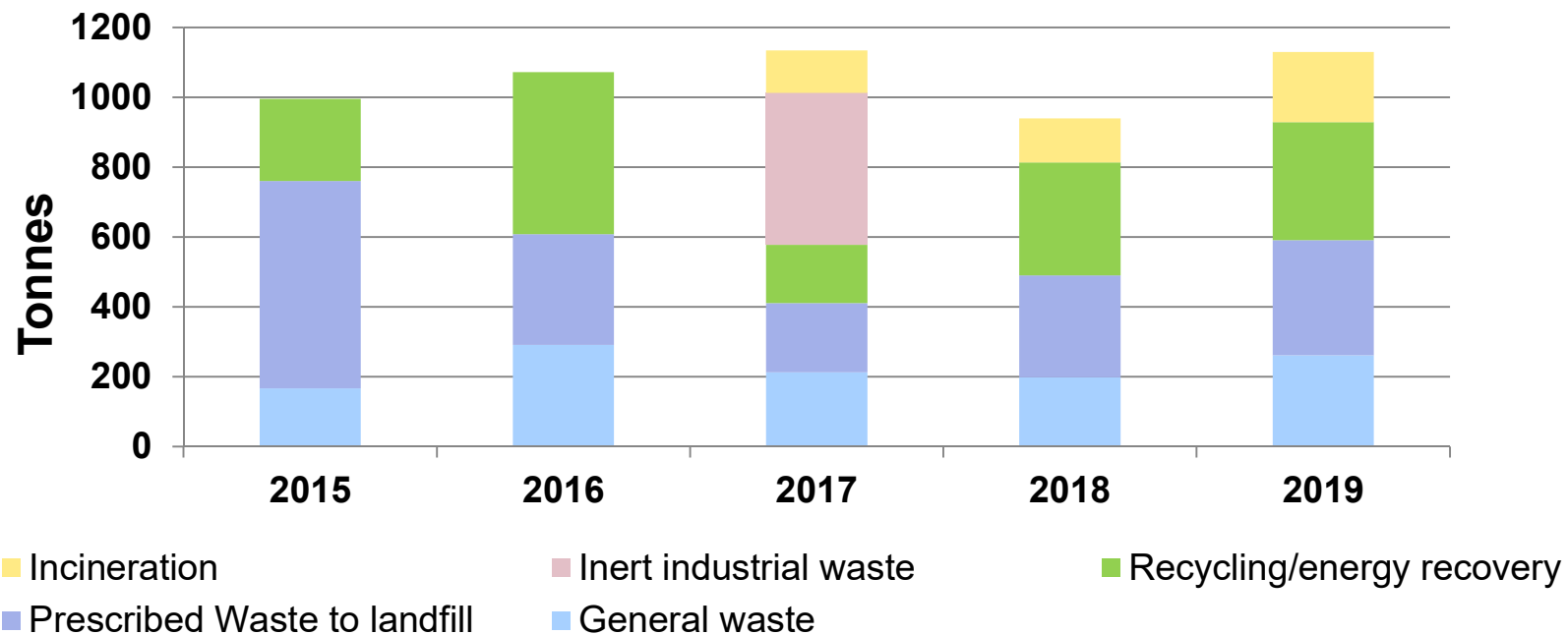
- Efficiency impacted by lower production

Energy efficiency



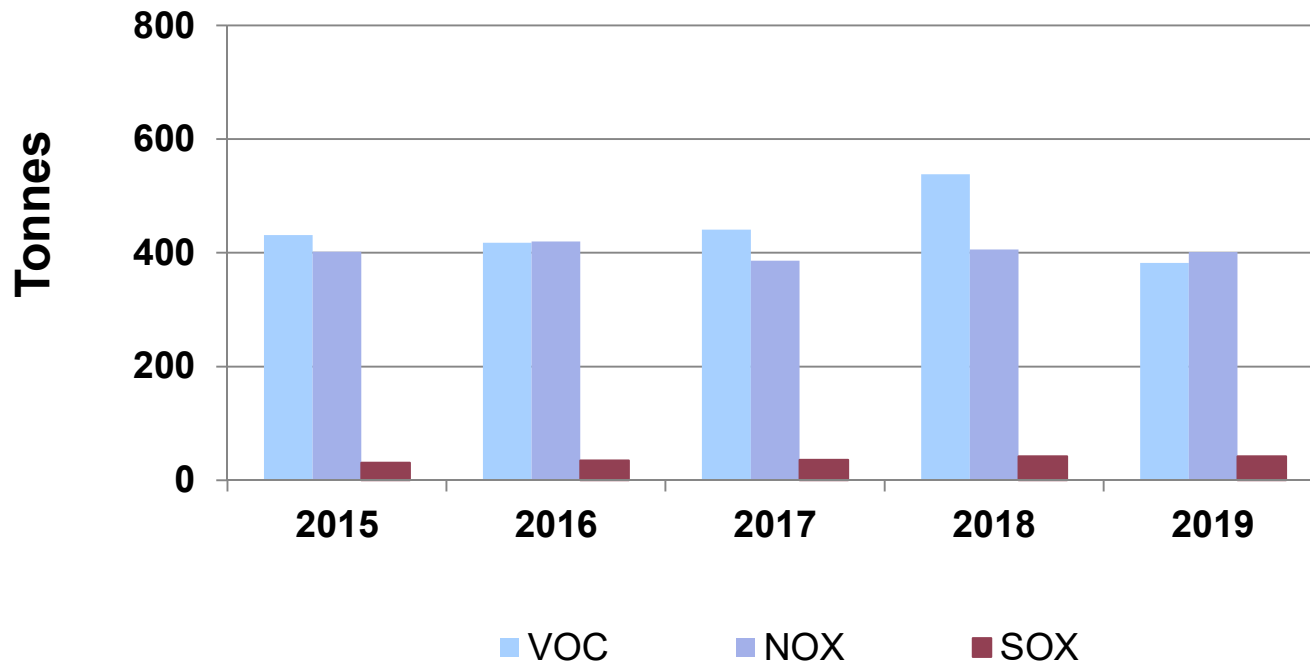
Waste

- Recycling included
 - Scrap metal recycling. Total scrap metal @ 180t
- Prescribed Waste to Landfill included
 - Polyethylene waste 58 t
 - API separator waste oil and sludge 75 t



Emissions

- All emissions well inside license limits.
- Reduce fugitive emissions from valve leak monitoring program

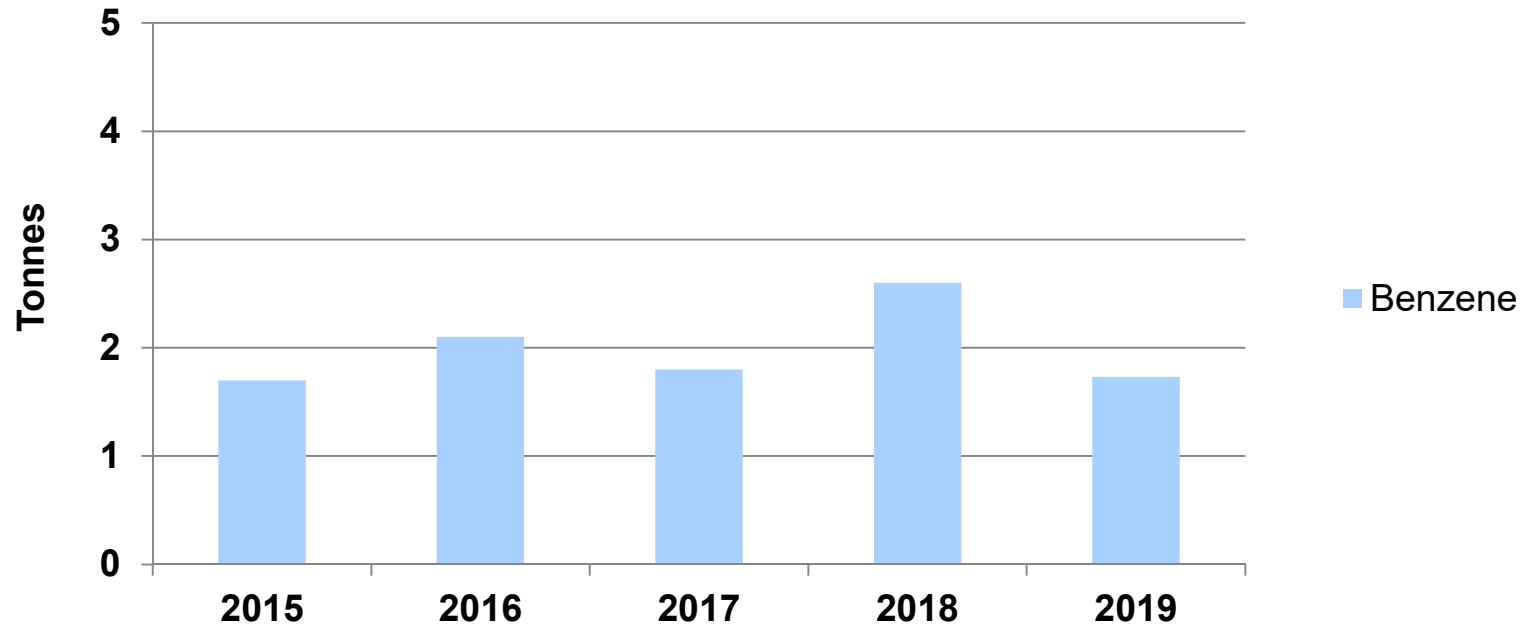


Financial year 15



Benzene emissions

- Fugitive emissions leaks from pump seals and valves reduced.



Financial year

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Qenos

Olefins Flaring Incident Analysis Summary 2019

EMT Update
February, 2020



Olefins Annual Flaring review

- Has operated since 2009.
 - Continues to provide opportunities to reduce flaring and reduce the impact of flaring.
- Follow up review for the past 6 months (reverting to calendar year reporting)
 - Summary of unplanned and planned causes and opportunities to reduce
- Improvement Activities
 - Including Pollution Abatement Notice (PAN)



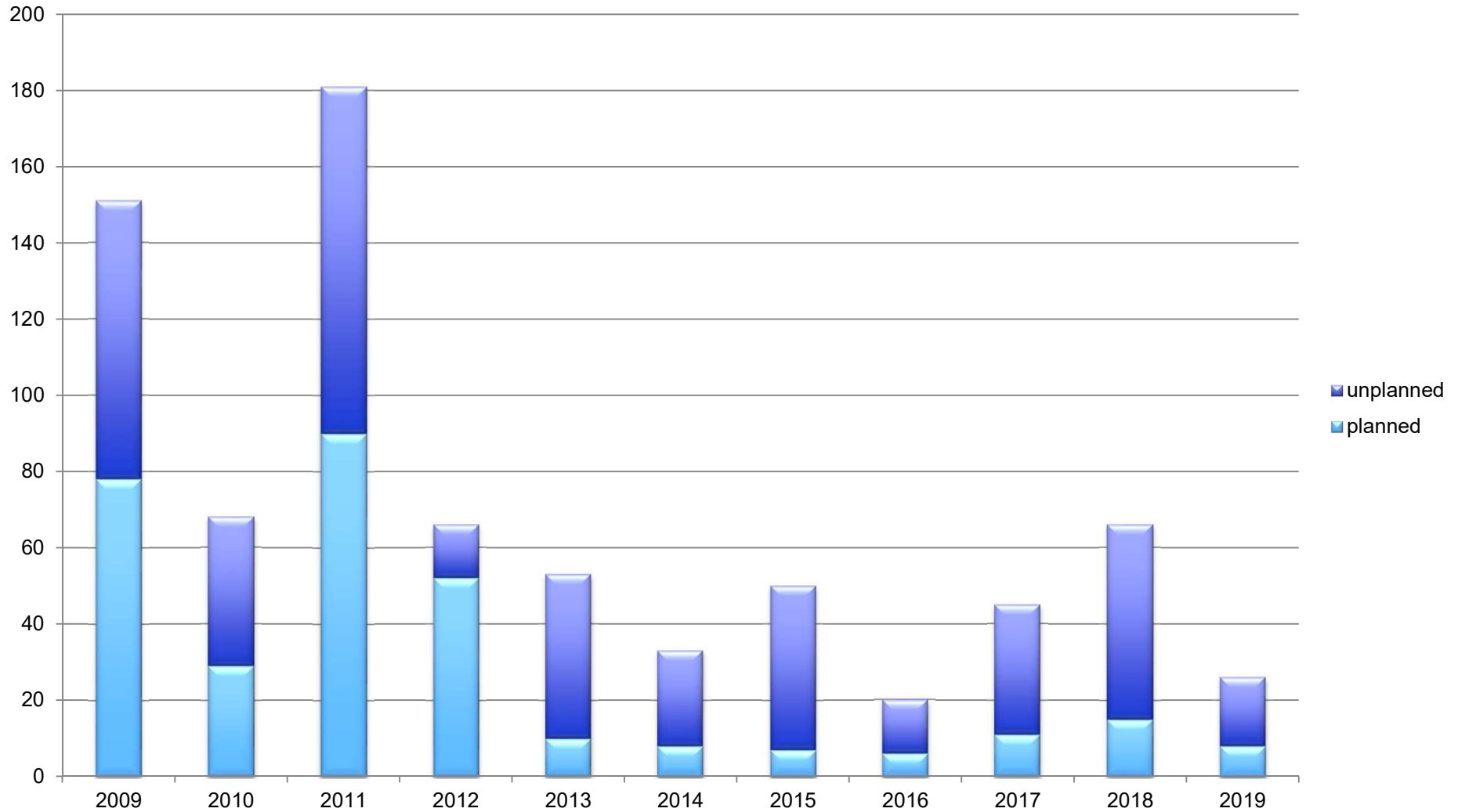
July 2019 – Dec 2019 Summary

- 2H19 continued 1H19 trend of much steadier operation after disappointing period of increased flaring in 2017 and 2018
- Flaring monitoring is well embedded within the Olefins Operations Group
 - Process Alarms and Manufacturing Alert system to minimise flaring above 5tph
 - Maximising product recovery to fuel gas to minimise flaring
 - Noise monitoring to reduce community impact including alarm to prompt steam adjustments where practical
- Communication to community when flaring is to occur can help prevent community alarm to flaring
- Planned higher rate flaring targeted for daylight hours
- Challenge is to sustain period of improved performance



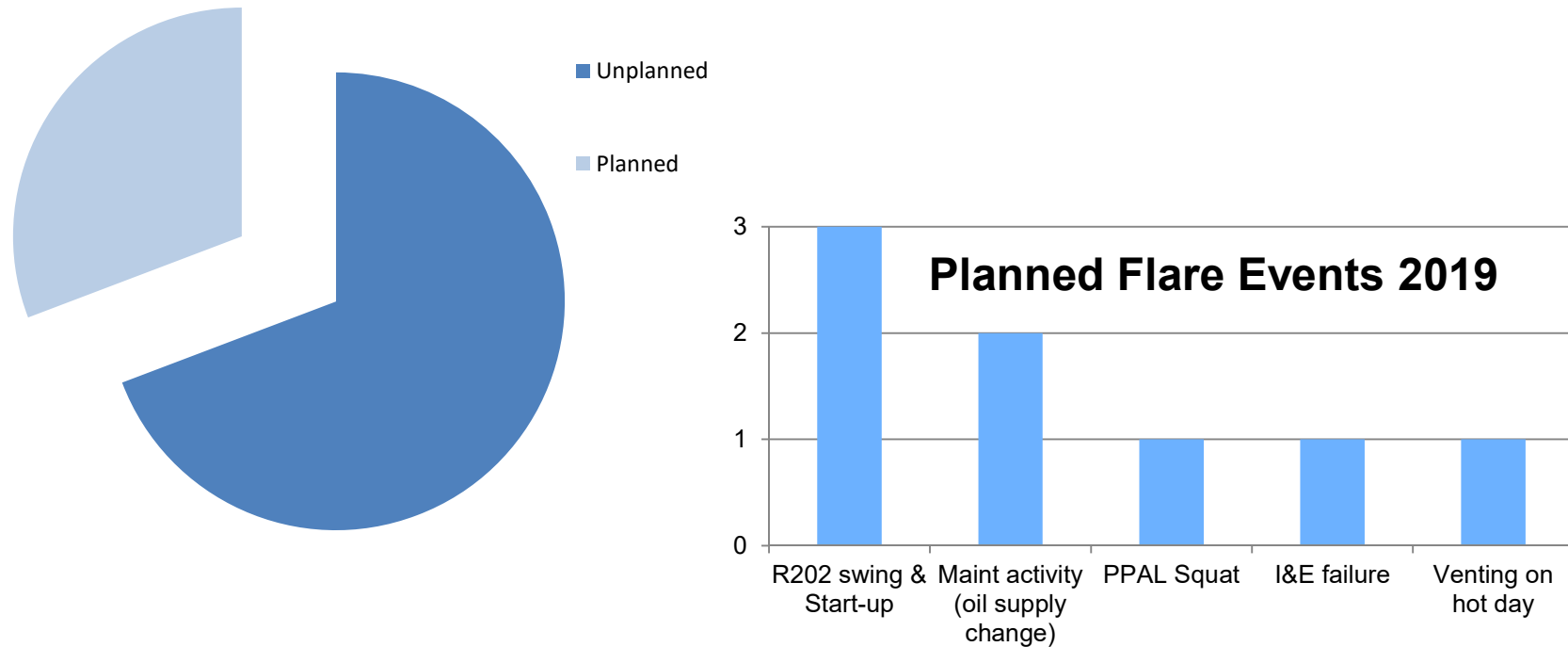
Flaring Rates decreased in 2019 reversing increase over 2017/18 – 2nd lowest flaring rate in last 10 years

Graph below shows # events > 5t/hr over recent years



Note: 2019 data evenly spread over 1H and 2H

Flaring from Unplanned events was higher than Planned events in past 12 months



- 26 events – 8 planned and 18 unplanned
- Note: 2 tests of camera system not included in stats above

Flaring from planned activities was minimal in last 12 months

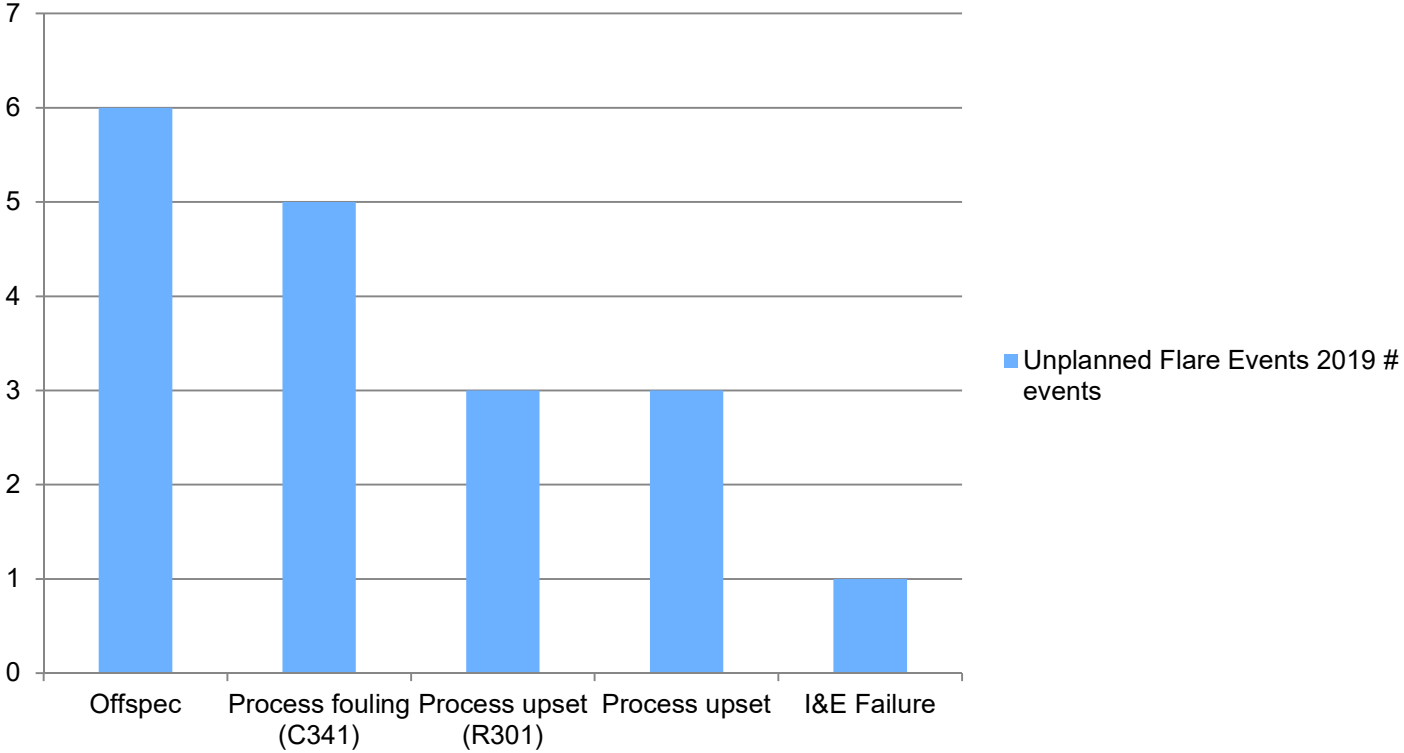
- Observations
 - There were no major planned outages in the period
 - 3 of 8 flaring events from planned activities associated with catalyst replacement in R202 and subsequent start-up. This catalyst replacement increases plant reliability.
 - 2 flaring events associated with Maint activity that caused trip of C301 and subsequent start-up
 - No consistent issues - demonstrating focus on rectifying known planned flaring causes
 - Reflects conscious effort by the shift group to keep flaring rate below 5tph where possible
- Plant start-ups and shutdowns
 - Flaring is an integral part of the process
 - For the planned shutdown & start-ups, procedures have been amended to reduce the flaring during a start-up or shutdown
 - Target daytime flaring on planned start-ups and shutdowns where practical
 - Planned Scal-2 plant shutdowns in Oct 2020 – will be communicated closer to event
 - Challenge is to prevent the unplanned events

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The total number of unplanned events was 18 in last 12 months. A significant reduction from 51 in 2018.

Unplanned Flare Events 2019 #events



Opportunities continue to be explored to reduce unplanned flaring activities

- Observations
 - The highest cause of unplanned flaring was associated with offspec events when product is diverted to flare due to product quality.
 - C341 issue has been rectified with the compressor opened and cleaned of unexpected polymer fouling – it is now operating without issue
 - R301 issues have been rectified with replacement of the catalyst with new modern technology catalyst – this also assists with offspec events above.
 - All other incidents are worked on a case by case basis with incidents raised and investigations completed and corrective actions identified
- Opportunities
 - Maintain reliable operation to avoid major events
 - In 2020 should see full year benefit of both:
 - catalyst replacement program to increase plant reliability
 - and C341 cleaning
 - External power disruptions incidents remain at 0 with Cogen operating well.



A number of improvements to flare operation continue in order to minimise community impact

- Scheduling of peak flaring activity to avoid night time period. (After 10 pm)
 - For planned flaring
 - For managing recovery from unplanned flare events - i.e restart activities that involve flaring timed to minimise night time impact
- Flare smoke suppression control system improvements
 - A new flare emissivity camera has been installed and is showing promising signs with respect to preventing excess steam addition (causing additional noise).
- Reviewing flare improvements from 2009 until 2019 and any future opportunities as part of EPA Pollution Abatement Notice (PAN)
 - A full review of improvement activities completed between 2009 & 2019 (due April 30 2020)
 - A review of any potential options to reduce the incidence and impacts of flaring (due Sept 30 2020)





Qenos

2019 Groundwater monitoring report



EMT Update
February, 2020

2019 Groundwater monitoring

- Gauged levels of 142 wells in November.
- Sampled 129 wells from October. (91 PFAS)
 - Analytes mainly dissolved hydrocarbons and PFAS.
- Groundwater Monitoring report received @ end of January.

The report is a large technical report.

This presentation is a high level overview.

If anybody wants to have a detailed look at the report please see me to arrange.



Light Non-Aqueous Phase Liquid (LNAPL)

Free phase floating oil/hydrocarbon

Conclusions

- There were no LNAPL trigger level exceedances which required a contingency action
- 6 wells had measurable LNAPL in 2019. (7 wells in 2018)
 - Amount of LNAPL within historical levels.
- 12 wells had globules or sheen in 2019. (14 wells in 2018)
- LNAPL remediation review under way.
- Remediation has removed ** LNAPL

Recommendations

Remediation review under way



Dissolved phase Groundwater assessment

Conclusions

- Hydrocarbon concentrations were reported above the adopted Groundwater Quality Objectives in
 - Elastomers 4 wells, Olefins 26 wells, Plastics 16 wells, Resins 1 well.
- Trend Analysis of wells (with ≥ 4 sample analysis)
 - Generally stable, probably decreasing, decreasing or no trend,
 - Increasing: Elastomers 2 wells, Olefins 5 wells, Plastics 3 wells, Resins 1 well.
- A review indicates that biodegradation of contaminants is occurring at Olefins and Plastics

Recommendations

- Assess the potential source of the increasing trends.
- Monitoring to continue and increase analysis for 3 wells to six monthly
- On basis of consistent natural attenuation data and decreasing LNAPL, natural attenuation data be assessed on less frequent basis



Table 1 Mann-Kendall Trend Analysis Results – Elastomers

Well ID	Benzene	Toluene	Ethylbenzene	Total Xylenes
BH3QE	No Trend	No Trend	No Trend	Decreasing
BH111QE	No Trend	No Trend	Prob. Increasing	No Trend
BH113QE	Increasing	Prob. Increasing	Increasing	LOR
BP1(A)QE	Stable	No Trend	No Trend	No Trend

Decreasing = decreasing trend at a confidence level of 95% ($p < 0.05$).
No Trend = no trend at a confidence level of 90% ($p < 0.1$).
LOR = no trend because all results are <LOR.
Stable = stable trend at a coefficient of variation <1.
No Data = insufficient data points (<4) to estimate trend.
*See full analysis, including time series COPC charts, in **Appendix F**.*

Table 1 Mann-Kendall Trend Analysis Results – Resins

Well ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH C ₆ -C ₉	TPH C ₁₀ -C ₃₆
BH8QR	Increasing	Increasing	LOR	LOR	Increasing	Stable

Increasing = increasing trend at a confidence level of 95% ($p < 0.05$).
No Trend = no trend at a confidence level of 90% ($p < 0.1$).
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Table 1 Mann-Kendall Trend Analysis Results - Plastics

Well ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH C ₆ -C ₉	TPH C ₁₀ -C ₃₆
BH5QP	Stable	LOR	LOR	LOR	Decreasing	Decreasing
BH6QP	Stable	Decreasing	Prob. Decreasing	No Trend	Decreasing	Decreasing
BH9QP	No Trend	No Trend	Increasing	Stable	Stable	Stable
BH12QP	No Trend	Prob. Decreasing	Decreasing	Decreasing	No Trend	Stable
BH16QP	No Data	No Data	No Data	No Data	No Data	No Data
BH18QP	Increasing	Prob. Decreasing	LOR	Stable	Prob. Decreasing	Stable
BH106QP	Decreasing	Decreasing	LOR	LOR	Decreasing	Decreasing
BH110QP	No Trend	LOR	No Trend	LOR	Prob. Decreasing	No Trend
BH113QP	Decreasing	Decreasing	LOR	LOR	Decreasing	Decreasing
BH117QP	Stable	Decreasing	Decreasing	No Trend	Decreasing	Increasing
BH119QP	Decreasing	Decreasing	Prob. Decreasing	Prob. Decreasing	Decreasing	Stable
BH122AQP	Decreasing	Decreasing	No Trend	Decreasing	Decreasing	Decreasing
BH123QP	No Trend	No Trend	No Trend	No Trend	Prob. Decreasing	No Trend
BH127QP	Prob. Decreasing	Prob. Decreasing	LOR	LOR	No Trend	Stable
BH130QP	No Trend	Stable	LOR	LOR	Prob. Decreasing	No Trend
BH135AQP	Decreasing	Decreasing	Prob. Decreasing	No Trend	Prob. Decreasing	Decreasing



Table 1 Mann-Kendall Trend Analysis Results – Olefins

Well ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH C ₆ -C ₉	TPH C ₁₀ -C ₃₀
BH10QO	Stable	Decreasing	Decreasing	Decreasing	No Trend	Decreasing
BH15QO	Decreasing	LOR	Decreasing	Decreasing	Stable	Decreasing
BH26QO	Decreasing	Decreasing	Decreasing	No Trend	Decreasing	Decreasing
BH27QO	Decreasing	Decreasing	Stable	Stable	Decreasing	Decreasing
BH30QO	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Prob. Decreasing
BH33QO	Stable	Stable	No Trend	Stable	No Trend	No Trend
BH34QO	Prob. Decreasing	LOR	LOR	LOR	Increasing	Increasing
BH35QO	LOR	LOR	LOR	LOR	No Trend	LOR
BH36QO	LOR	LOR	LOR	LOR	Decreasing	Decreasing
BH104QO	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	No Trend
BH119AQO	Decreasing	LOR	Decreasing	Decreasing	Decreasing	Stable
BH126AQO	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Stable
BH129QO	Stable	No Trend	Stable	No Trend	No Trend	No Trend
BH131QO	Stable	Stable	Stable	Stable	Stable	Stable
BH132QO	Decreasing	Stable	No Trend	Prob. Increasing	Stable	Prob. Increasing
BH133QO	Stable	Stable	No Trend	No Trend	Stable	Stable
BH134QO	Decreasing	Decreasing	Stable	No Trend	Decreasing	Stable
BH137QO	Decreasing	Prob. Decreasing	Stable	Stable	Stable	Stable
BH140QO	No Trend	LOR	LOR	LOR	LOR	Stable



Well ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH C ₆ -C ₉	TPH C ₁₀ -C ₃₆
BH143QO	Stable	Stable	Stable	Stable	Stable	Stable
BH144QO	No Trend	Decreasing	Decreasing	Decreasing	No Trend	No Trend
BH160QO	No Data	No Data	No Data	No Data	No Data	No Data
BH162QO	No Trend	LOR	LOR	LOR	Stable	Stable
BH164QO	No Trend	No Trend	Increasing	Prob. Increasing	Prob. Increasing	Prob. Increasing
BH169QO	Increasing	Stable	Increasing	Increasing	Increasing	Stable
BH171QO	Stable	No Trend	No Trend	No Trend	No Trend	No Trend
BH172QO	No Trend	No Trend	No Trend	No Trend	No Trend	Prob. Increasing
BH173QO	No Data	No Data	No Data	No Data	No Data	No Data

Decreasing trend = decreasing at a confidence level of 95% (p<0.05).
No Trend = no trend at a confidence level of 90% (p<0.1).
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No Data = insufficient data points (<4) to estimate trend.
See full analysis, including time series COPC charts, in **Appendix F**.

Table 1 Mann-Kendall Trend Analysis Results – Olefins – Chlorinated Hydrocarbons

Well ID	1,1-dichloroethene	Trichloroethene	1,1,2-trichloroethane	Chloroform	Tetrachloroethene	EDC
BH15QO	Decreasing	No Trend	Stable	LOR	LOR	Stable
BH34QO	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing
BH35QO	Decreasing	Decreasing	Decreasing	Prob. Increasing	No Trend	No Trend
BH36QO	Stable	Decreasing	Decreasing	No Trend	No Trend	Decreasing
BH102QO	No Data	No Data	No Data	No Data	No Data	No Data
BH112QO	Prob. Decreasing	Decreasing	Decreasing	LOR	LOR	LOR

Decreasing = decreasing trend at a confidence level of 95% (p<0.05).
Prob. Decreasing = decreasing trend at a confidence level of 90% (p<0.1).
No Trend = no trend at a confidence level of 90% (p<0.1).
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See full analysis, including time series COPC charts, in **Appendix F**.



PFAS

Conclusions

- 91 Wells sampled for PFAS
- Concentrations generally consistent of slightly lower than historical results.
- Increased (trigger exceedances): Olefins 3 wells, Plastics 1 well, Resins 2 well.
 - Generally at boundary where it will migrate off site.

Recommendations

- Continue monitoring PFAS in groundwater.
- Review of the site conceptual model and potential additional groundwater analysis is required to assess PFAS trigger exceedances at BH17QO, BH24QP and BH13QR.
- Re-installation of BH26QP should be considered.

