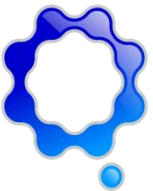


Qenos

FLARE ANNUAL REPORT

— March 2023

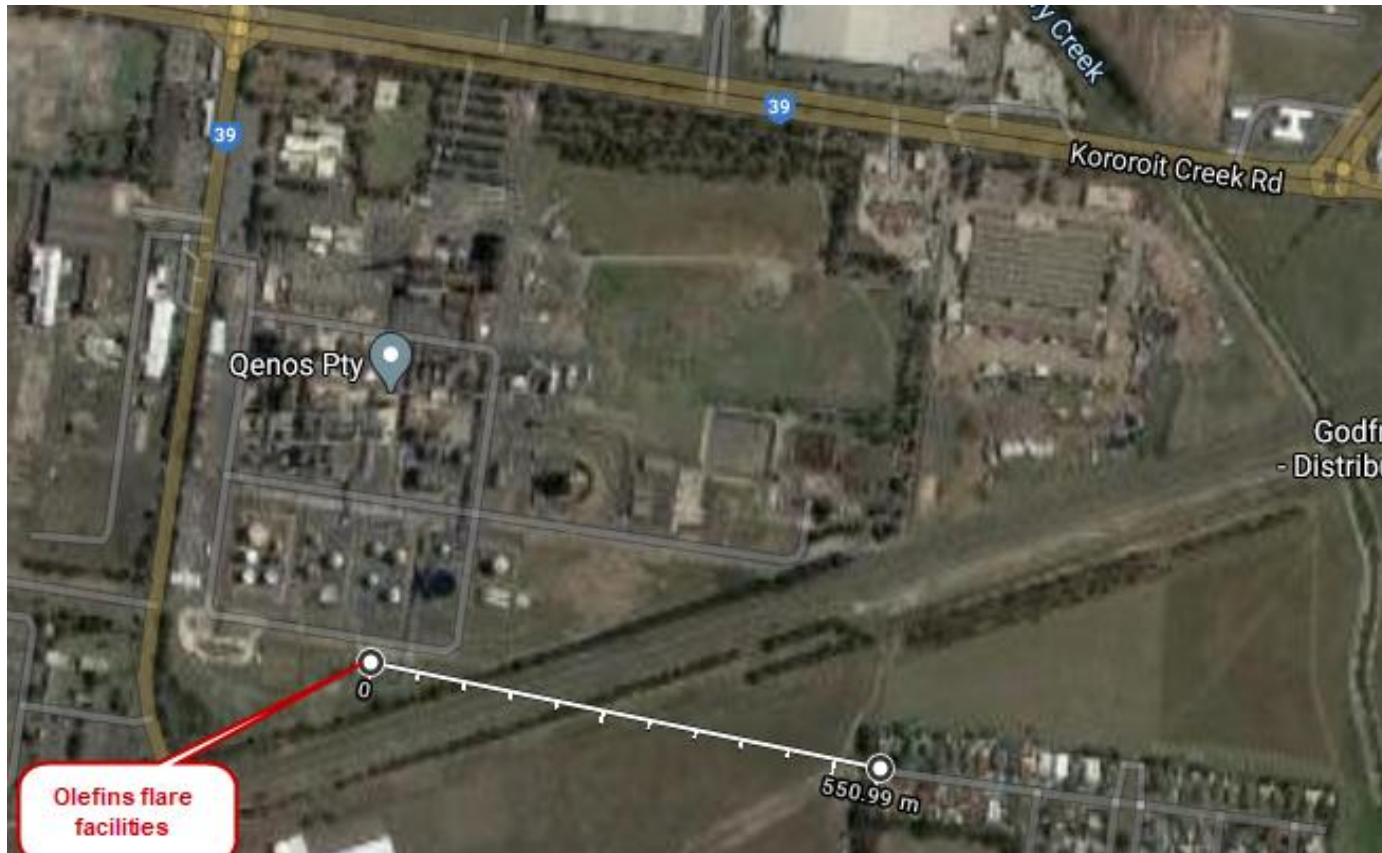


Flare Annual Report 2023

- Qenos Flare Overview
 - Description
 - Causes of Flaring
 - Methodology of Review
- Summary – Annual Flaring Review
- Five Year Trends
 - Community Complaints
 - Flaring Rates
- Community Complaints Summary
- Flare Improvement activities
- Back-up

Qenos Flare Description - Olefins

- Two staged elevated flares. Note: Plastics flares no longer in service



Source of flaring

- Flares continue to be in operation at Olefins
- There are many and varied reasons for needing to use the flare
 - Safe preparation of equipment prior to maintenance and returning to service (displacement of hydrocarbon with nitrogen)
 - Product quality problem
 - Plant operational upset and/or equipment trip
 - Loss of external utility supply (eg power)
- Steam is added to the flare to aspirate (draw in air) in order to avoid smoke
 - Excess addition of steam results in higher noise



Methodology

- A review of data between 2009 and 14 August 2020 that was used for the Flare EMP has been updated to include latest data to 31st December 2022.
- Five year data trends from this review are in the body of the report
- The review considered flaring that resulted in
 - Community Complaints
 - Flaring > 5t/h (Olefins) & Flaring > 1t/h (Olefins)
 - 5 t/h was selected as the threshold as flaring under that level is unlikely to result in unreasonable noise levels in the community
- Flaring events were categorised by
 - Planned (known) or Unplanned (including recovery of unplanned events)
 - Cause
 - Equipment

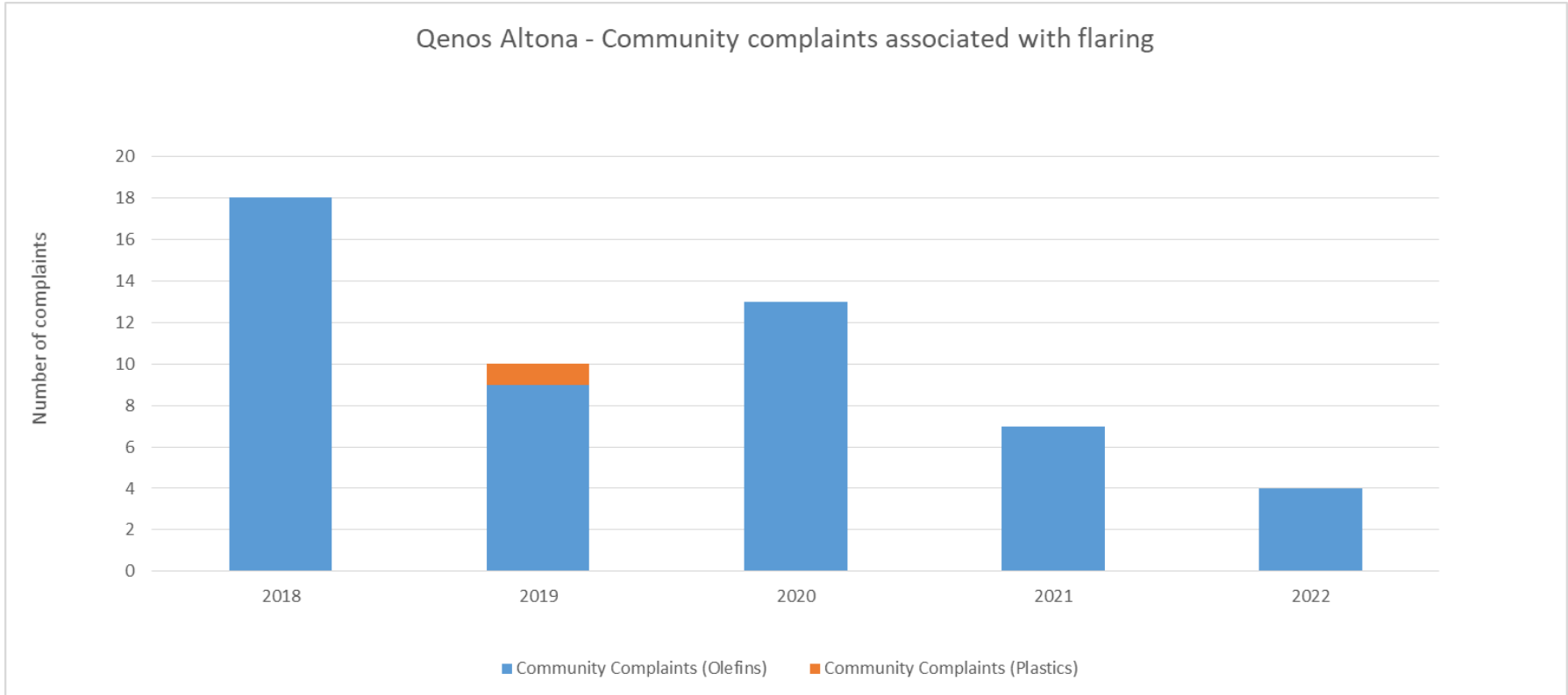


Summary - Annual Flaring Review

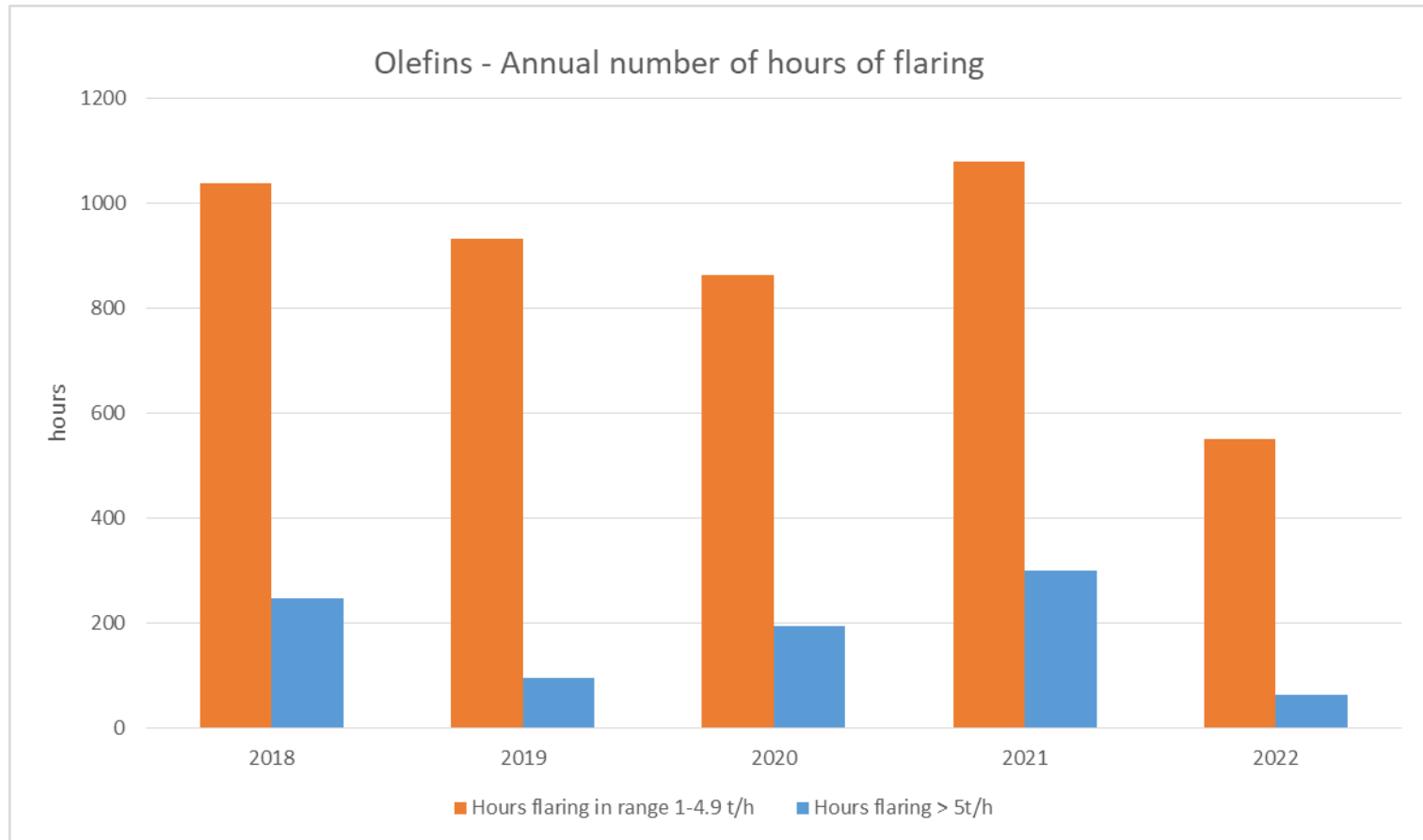
- In 2022 the key contributions to flaring were:
 - Flaring Associated with a power outage external to Olefins (Resins plant sudden shutdown due to power outage caused flow on effect to Olefins)
 - Scal-2 unplanned shutdown and restart in December due to a failure of Cooling Water supply
 - Short offspec events
- The operation of Scal-2 standalone has resulted in an overall reduction in flaring events
- Automated flaring controls have improved to be in place > 99.9% of time
- Final Flare Improvement Notice report submitted to EPA on schedule



Community complaints for flaring in 2022 were the lowest for the 5 year period



Flaring level in 2022 was lowest in 5 year period for both >5tph flaring and 1-5 tph flaring



In 2022, there were 4 community complaints associated with flaring

Date	# complaints	Planned/ Unplanned	Event	Cause	Equipment	Time > 5tph	Follow-up
17/8/22	3	Unplanned	Resins Power Failure and flow on impact to Olefins	Failed Cable	Resins HV cable	3 hrs over period 3 am to 9 am	Power restored on alternative supply. Failed cable has been replaced. Investigation into additional cable monitoring program.
22/12/22	1	Unplanned	Plant Startup following unplanned outage	Loss of cooling water due to blocked screens caused unplanned shutdown with subsequent restart	Scal-2 Cooling Tower	55 hrs over 10 day period	Increased screen cleaning. Engineering solution in development.



Flare improvement activities

- For many years, Qenos has had a strong program of reporting, investigation and implementing improvements for events that have resulted in flaring
- In April 2020, Qenos submitted a list of improvements implemented since 2009 which has resulted in improved flaring performance
- A technology and potential improvements review was completed utilising Qenos historical data and worldwide technology best practices
- The proposed flaring improvements aimed to:
 - Reduce the incidences of events that lead to flaring
 - Reduce the impact of flaring on the community, by minimizing steam addition or reducing flaring rate
- Status of the improvement activities are overleaf



The following activities have been completed

Improvement	What problem will this resolve?	Flare impact or flaring rate?	Site	Timing In Flare EMP	Date Completed
Completed					
Complete a study on multiple SCAL2 furnace feed ins to determine best practice from decoke to full operation and then document this in procedures.	Both F655 and F656 appear to have increased CO concentrations at the beginning and end of decokes	Flaring rate/frequency	Olefins	Medium Term	January 2023
Replace the furnace tubes in F656	Reduces CO make immediately after furnace feed in. Higher CO make can result in an off spec event at R720 as CO acts as a catalyst moderator	Flaring rate/frequency	Olefins	Medium term	March 2020
Replacement of catalyst in R720A – catalyst is aged	Off spec events due to reduced responsiveness following furnace upsets	Flaring rate/frequency	Olefins	Short Term	November 2020
Replacement of E771 – heat exchanger has an internal leak	Leak resulted in flaring until product was able to be recovered internally	Flaring rate/frequency	Olefins	Short term	November 2020
Share content of this review with leadership, technical support staff, operations and maintenance to discuss findings and flare performances and key learnings from this review	Highlight flare performance, provide context for future changes and trials and aid with guiding work prioritization as some key equipment may not have been recognized as integral to flaring performance	Flaring rate/frequency	Olefins	Short term	December 2021
Review flare data and controller tuning to determine & implement improvement opportunities. Update operating guidelines excess steam addition	Reduces noise of flare to community	Flaring impact	Olefins	Short term	July 2021
Installation of infrared meter on overcapacity flare	Control of steam addition to overcapacity flare	Flaring impact	Olefins	Medium term	August 2021
Review Elevated flare control system and retune as required.	System needs to be optimized for new camera using Olefins learnings. Also need to update the Flare control system and operator guidance to match the retuned control system	Flaring impact	Plastics	Short term	August 2021



The following open activities are in progress

Improvement	What problem will this resolve?	Flare impact or flaring rate?	Site	Timing In Flare EMP	Date for Completion
In Progress or Ongoing					
Review flare tip technology to identify if a lower noise tip is able to be purchased when a tip replacement is needed	Reduce noise of flare operation	Flaring impact	Olefins	Medium term	<p>Technical data from four flare tip vendors (Zeeco, John Zink, Flaregas and Callidus) is being collected and reviewed. It is important to note that vendor noise claims are difficult to compare as they provide data with different conditions.</p> <p>Olefins overcapacity flare tip is planned to be changed out in 2nd Quarter 2023 with an existing spare flare tip. Once this flare tip is able to be closely inspected, a decision can be made as to whether to repair or replace. If replacement is justified, formal quotes will be requested from flare tip vendors with technology that has potential for lower noise operation. Recommendation to replace or repair will be made by end of Q3 2023</p>
Provide annual feedback of flaring events, cause and status of associated action items	In order to continue to reducing flaring rate/impact, work on continuously improving.	Flaring impact and flaring rate/frequency	Olefins	Annually	Next scheduled: first ACNCG meeting in 2023
Continue to investigate and implement action items relating to incidents captured in safety and quality databases	Addresses the diverse causes of incidents.	Flaring rate/frequency	Olefins	Ongoing	On occurrence

Note : A number of the improvements from the original report are no longer required with Scal-1 and Plastics mothballed



Questions?



BACK-UP



There is ongoing flare performance monitoring as part of how we operate

- Real time
 - Monitored in real time on Control System and Video Camera @ operating console
 - Operators can take over control if required
 - Communicate performance issues by shift log or if required QIDs/QNC
- Short/medium term
 - Daily process meetings
 - Process notifications
 - Monthly SHE performance reports
- Longer term
 - Annual flare performance review

