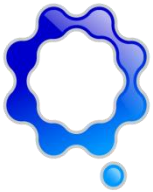
Qenos

FLARE ANNUAL REPORT

March 2024



Flare Annual Report 2024

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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 when returning to service (displacement of hydrocarbon with nitrogen and vice versa)
  - 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

- Data between 2009 and 14 August 2020 that was used for the Flare EMP is updated annually. The latest data update includes data to 31st December 2023
- 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 2023 the key contributions to flaring were:
  - Planned SCAL 2 Major Maintenance in March/April
    - Note: Startup flaring extended beyond the planned period in March/April. Startup had to be suspended to rectify issues resulting in a second flaring period.

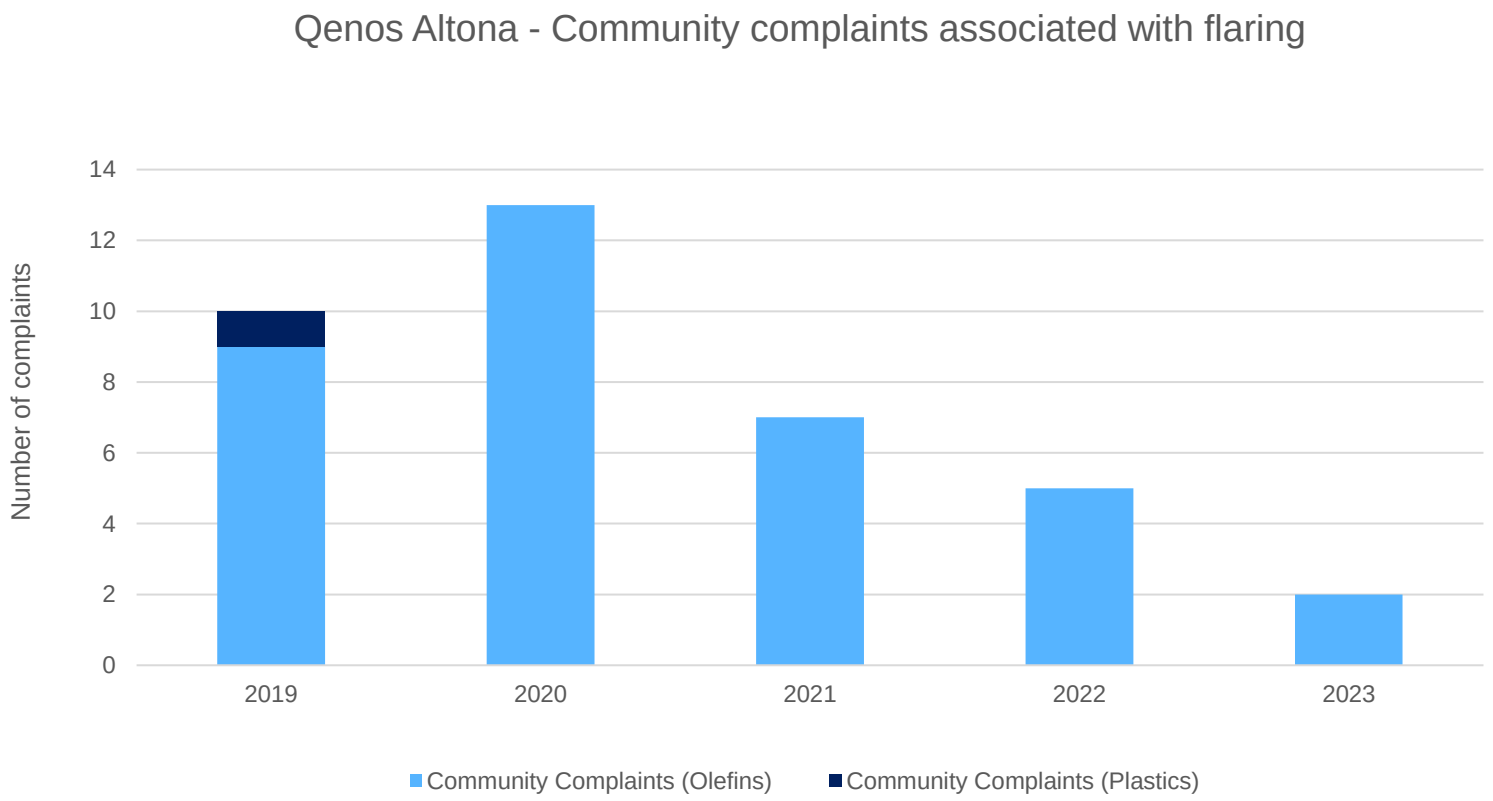
- Flaring > 5tph at very low level

- Duration of flaring in 1-5 tph range increased with SCAL 2 Major Maintenance

- The operation of SCAL2 standalone has continued to result in an overall reduction in flaring events and consequently reduced complaints

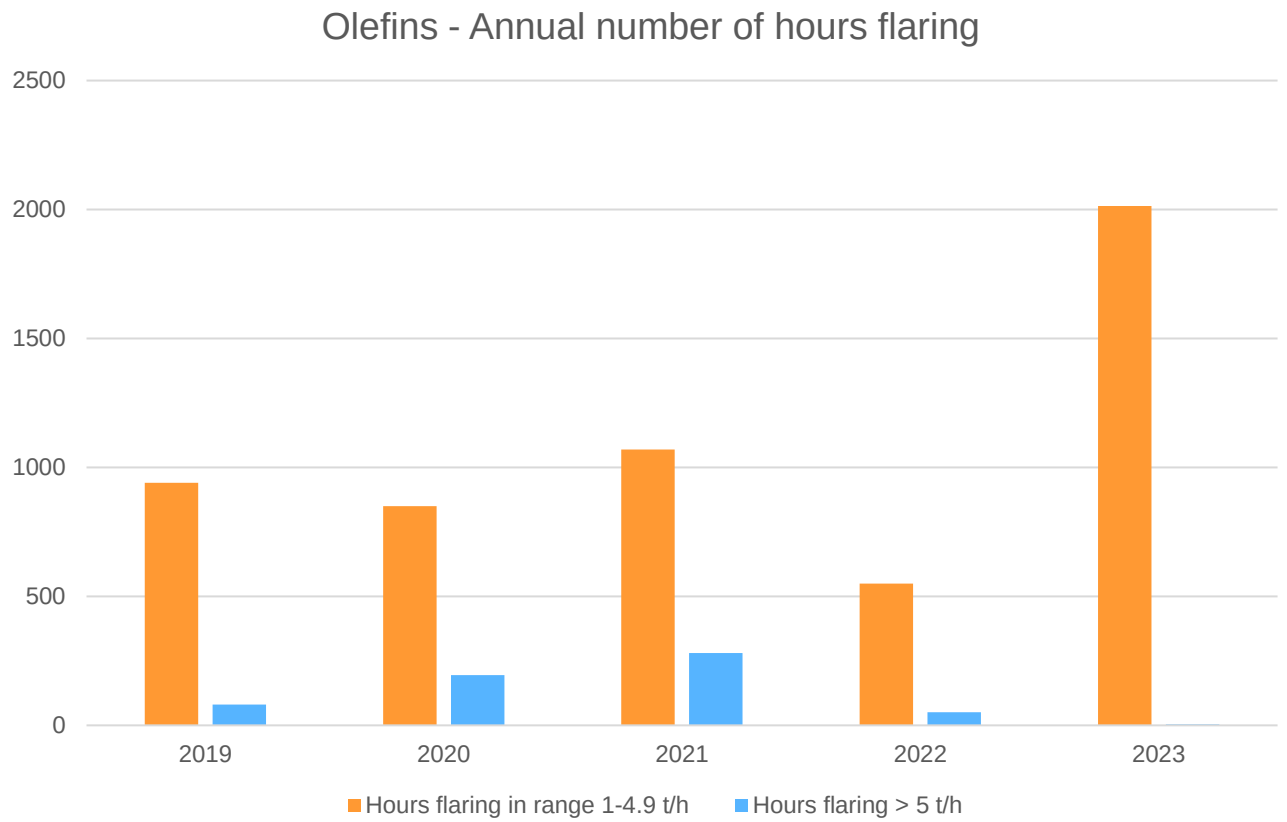
- Automated flaring controls continue to be in place > 99 % of time

Community complaints for flaring in 2023 were the lowest for the 5 year period



The downward trend in annual complaints continued

Flaring level in 2023 was higher for 1-5 tph flaring. However flaring >5tph (1hr averages) was the lowest on record



Majority of flaring associated with planned turnaround activity. This was controlled well to average below 5 tph for majority of event – however this did cause extended 1-5 tph flaring.

In 2023, there were 2 community complaints associated with flaring on the 6th of April following extended plant restart

Date	# complaints	Planned/ Unplanned	Event	Cause	Equipment	Time > 5tph	Follow-up
6/04/2023	1	Planned	Plant flaring during start up following major turnaround.	Offspec product during startup	Scal-2	Total of 5 hrs over period 11 am to 6 pm	Flare response and guidelines enhanced
6/04/2023	1	Planned	Plant flaring during start up following major turnaround.	Offspec product during startup	Scal-2	Total of 5 hrs over period 11 am to 6 pm	Flare response and guidelines enhanced

The two confirmed complaints were associated with turnaround flaring on restart with ethylene product being sent to flare that was offspec. The complaints occurred after an extended period of flaring due to two restarts of the plant following a leaking exchanger.

Additional 2023 Flaring Events (> 5tph, 1 hr average & other)

- In addition to the flaring associated with the two complaints there were two other periods of > 5tph flaring
  - Flaring associated with the shutdown of the Scal-2 plant for Major Maintenance in February. This planned flaring was well managed with a communication to the nearby community of this upcoming flaring period. No complaints were received.
  - The second event occurred on 19/9/23 following feed being removed from a furnace prior to decoke. The flaring lasted for 2 hours from 12-2pm. Noise levels were well managed, and no complaints were received

- Additional flaring event was reported to the EPA when smoking occurred for short period following unplanned cogen outage

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 with all but 3 complete (two of which are ongoing improvement activities)
- There are no additional ongoing improvement activities as a result of 2023 flaring or this report

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
Enhanced flare automation to enable improved optimisation/balancing of smoke and noise (steam boost/trim function)	Plant operators can better nudge automation to favour noise reduction vs. smoke reduction, subject to extra known factors (time of day, atmospheric conditions etc.) without compromising automatic smoke control.	Flaring impact	Olefins	Short term	Dec 2022

The following open activities continue

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	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. Olefins overcapacity flare tip has not been changed out as of March 2024 (drone inspection indicates change out not yet required). 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 following this activity and review
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 2024 – This report
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. Actions from 2023 complaint incident were recorded in QIDS 306527. These actions included updating alarm response for noise alert as well as additional training/familiarisation for shift technicians. All actions complete.

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

Questions?