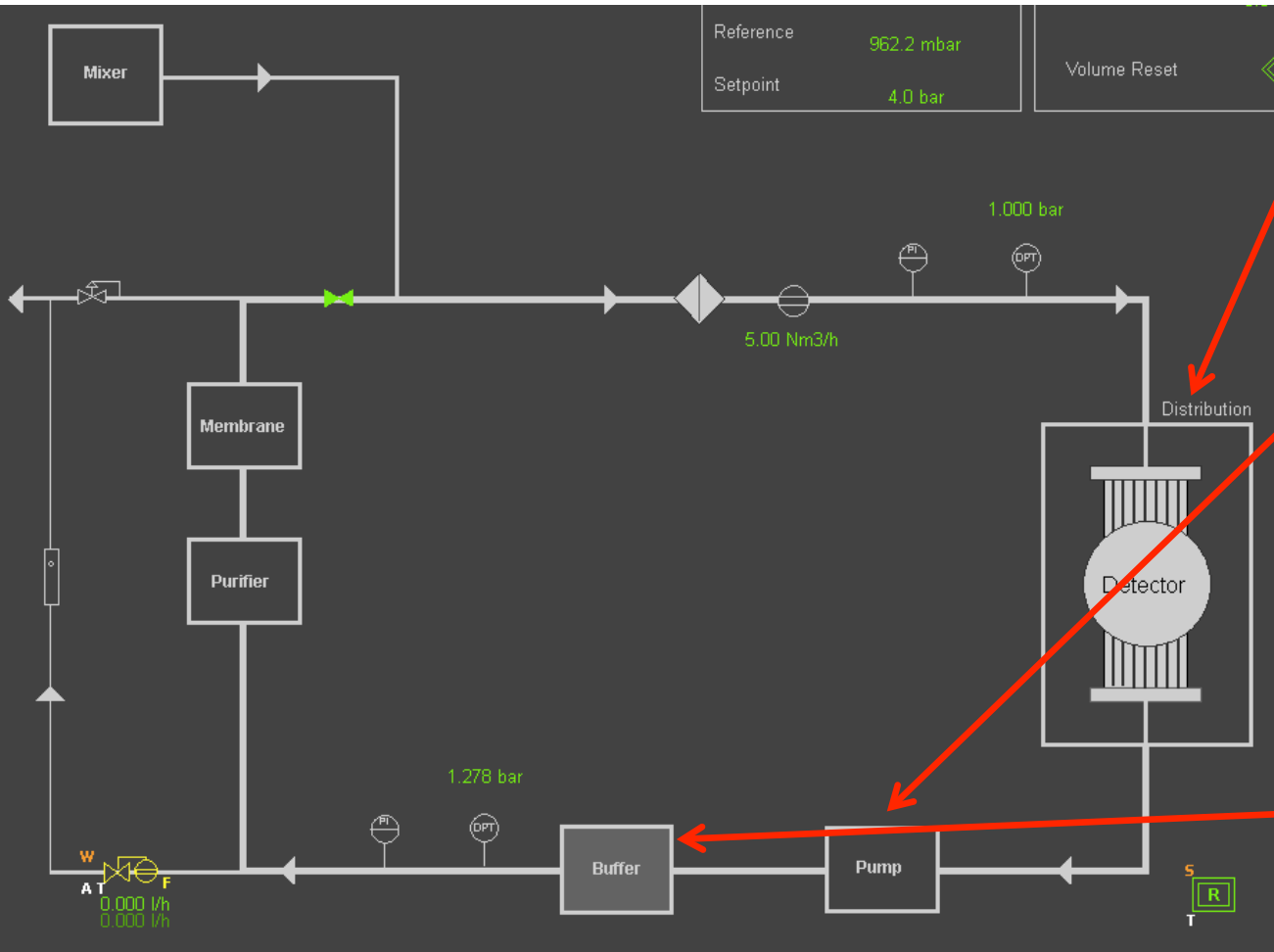


Gas loss during Christmas

C. Garabatos

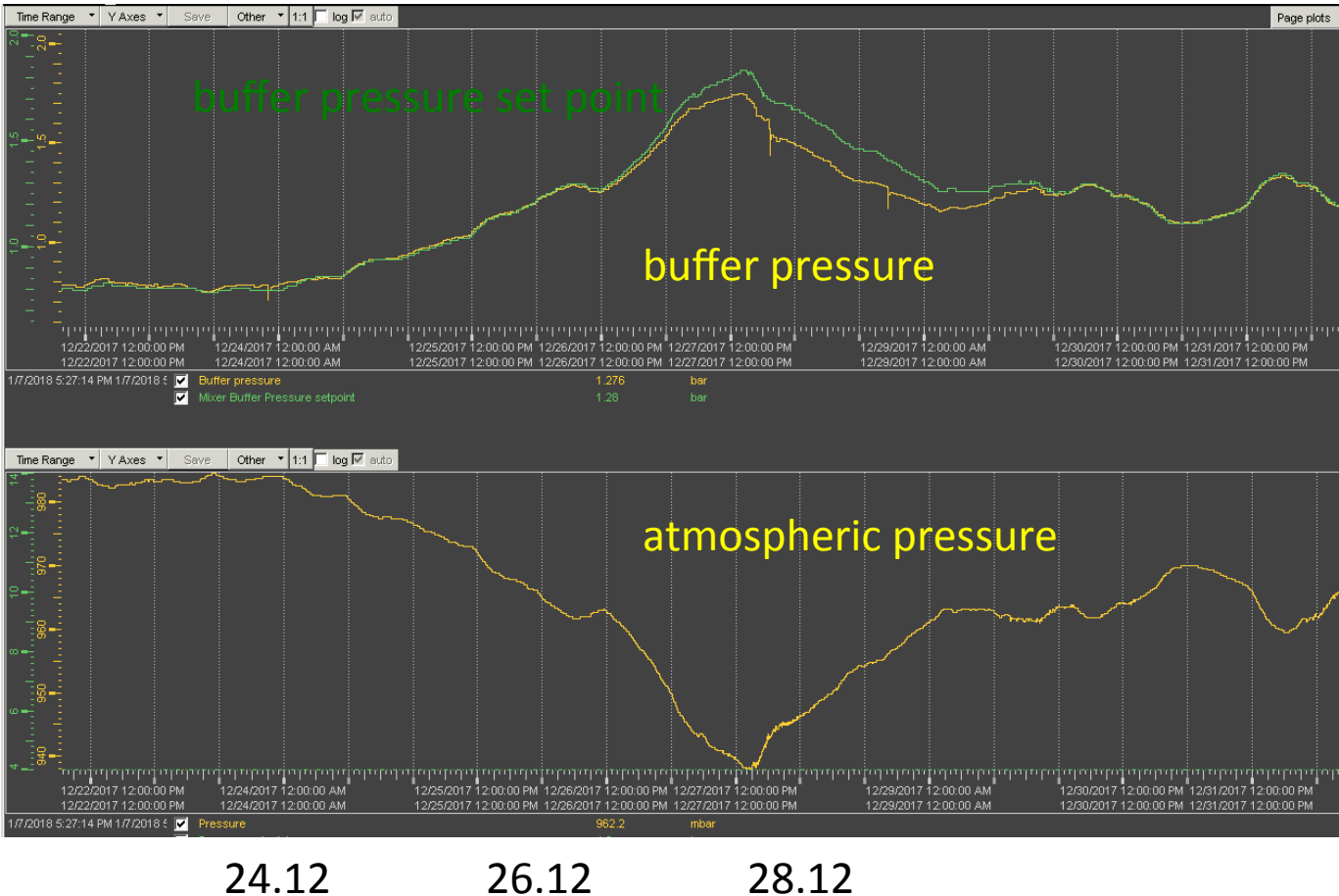
Reminder: how the gas system works



- Flow through detectors is set at the distribution in CR5
- Chamber overpressure is regulated at Pump
- Flow and overpressure are independent
- If no leak, total volume in system is constant; extra gas stored in high pressure Buffer

The total amount of gas is known; the pressure in the buffer can be predicted. Leaks trigger fresh gas injection from mixer. Alarm if leak larger than nominal

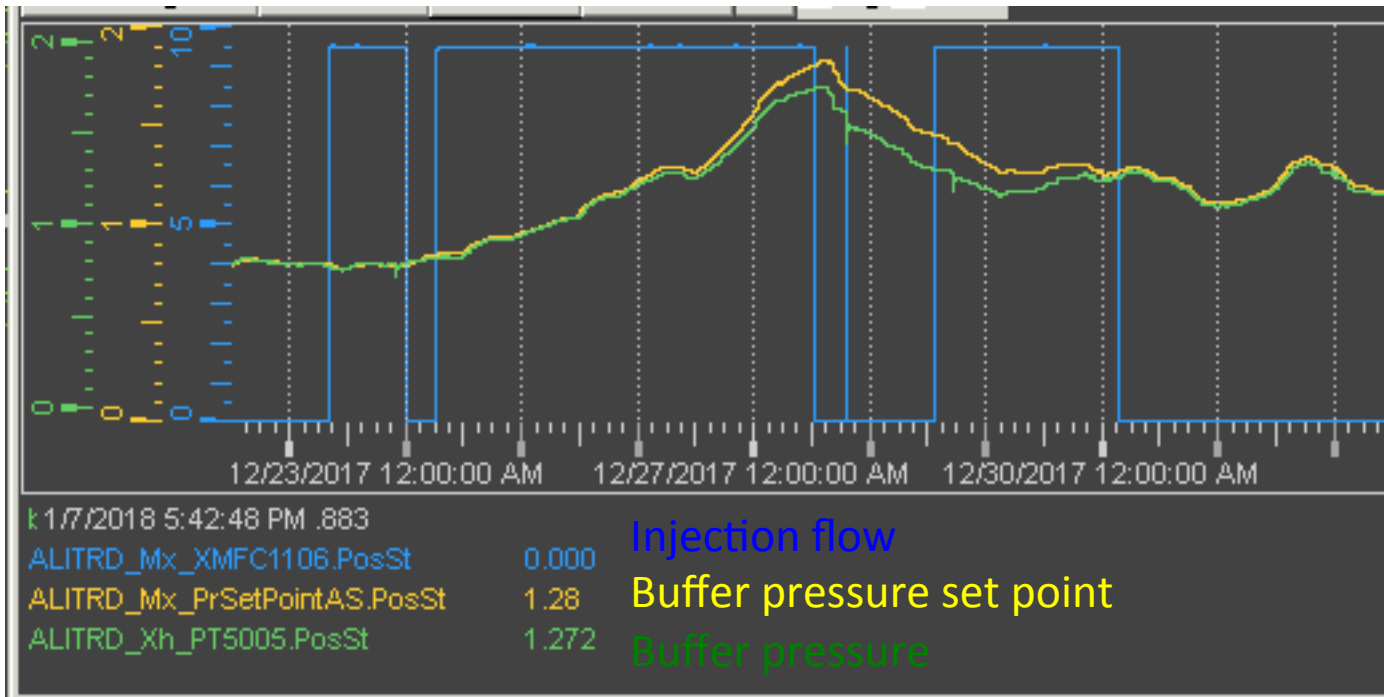
Events over Christmas



- Atmospheric pressure dropped to 938.1 mbar
- Mixer was injecting continuously until it was manually switched off

From injections and pressures, the gas loss is estimated to be around 800 l

Injection history

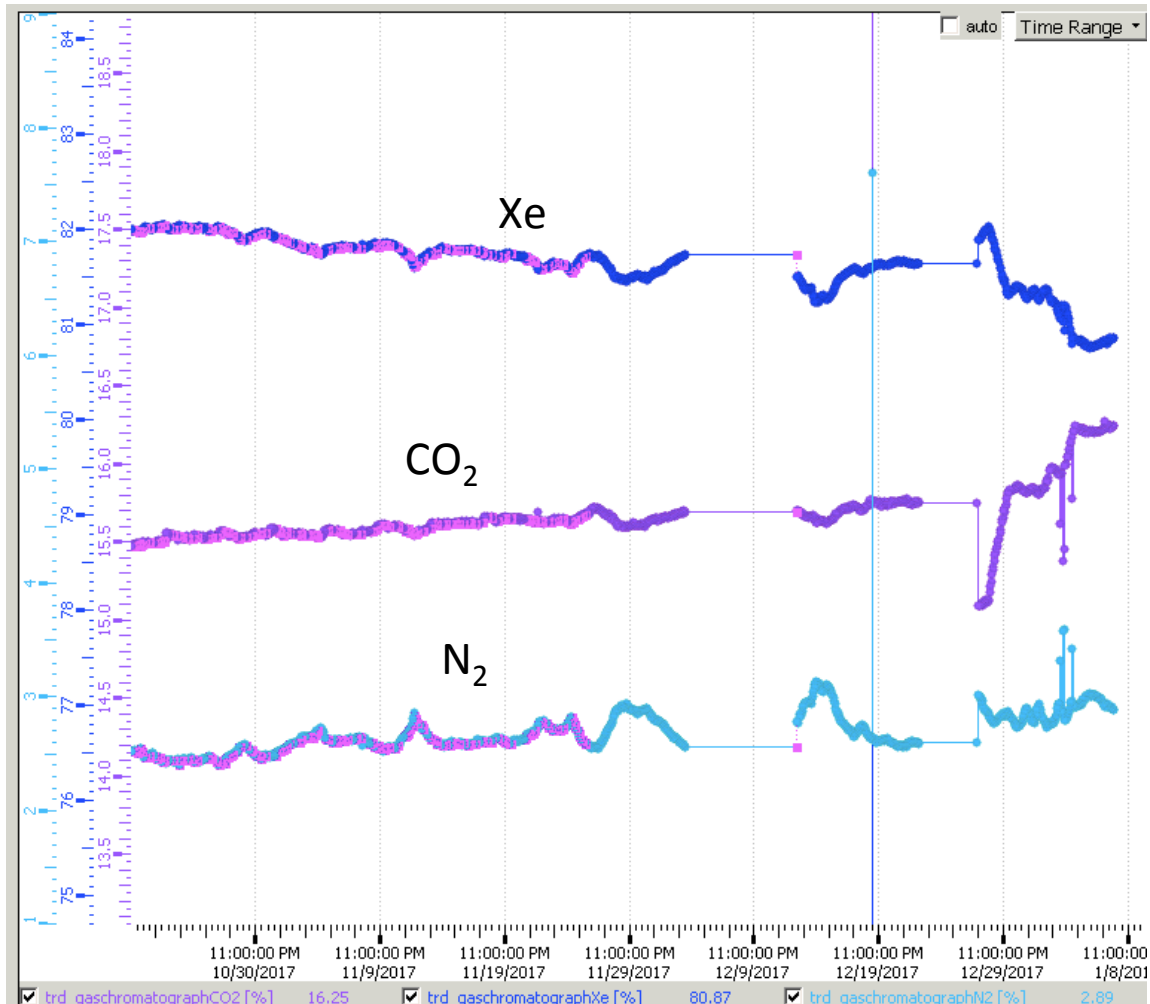


System was injecting gas for > 3 days non-stop (usually it injects for 5 hours every 4 days)

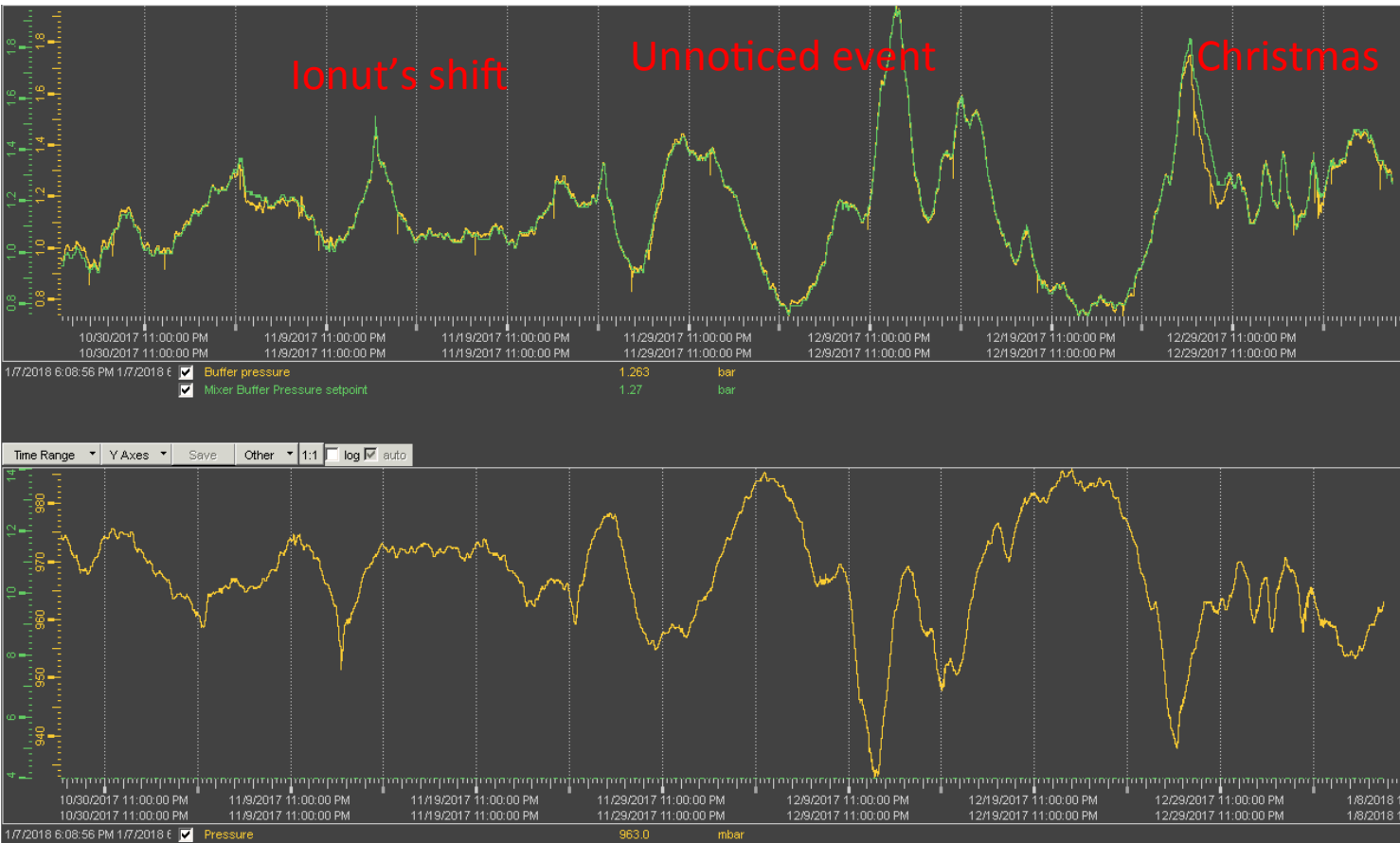
When found out, Mixer was stopped, then CO₂ was injected instead of Xe to recover the pressure (use manual valves)

Issue was discovered because the TPC mixer stopped, thus triggering an alarm to the gas piquet, who called me

Composition change



Not the lowest atmospheric drop



- No leak in previous 'low atmospheric' events

Origin of leak

- Unknown
- After the event, leak rate went to normal
- Suspect a safety valve (HP buffer) that went off due to the high pressure
- Some ~200 l of the losses were lost when restarting the system (after some debugging) in the purifier
 - bug found in software; gas group to fix

Conclusions

- A leak with rate > 10 l/h happened at some point
 - atmospheric pressure was quite low
- The leak was detected by our DCS alarm system
- The leak disappeared on its own
- We have to find the origin of the leak
- We may wish to restore the gas composition (inject more Xe and remove CO₂ through membranes)
- Gas group to debug and fix gas recuperation from purifier at restart
- No alternative to leaving the gas system running over breaks when detectors under xenon