260-L LAr System Progress Report

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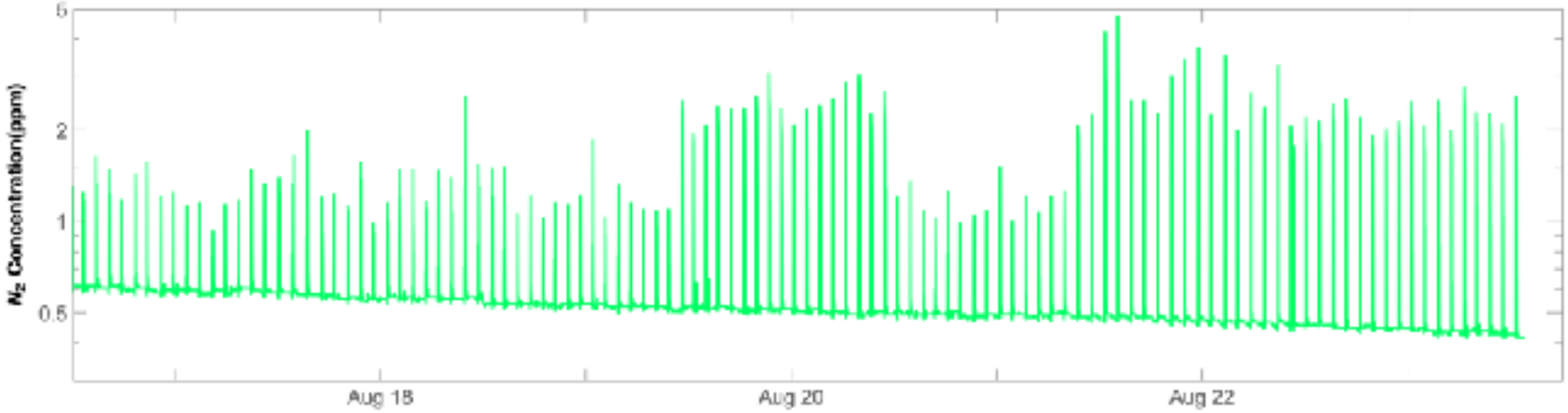
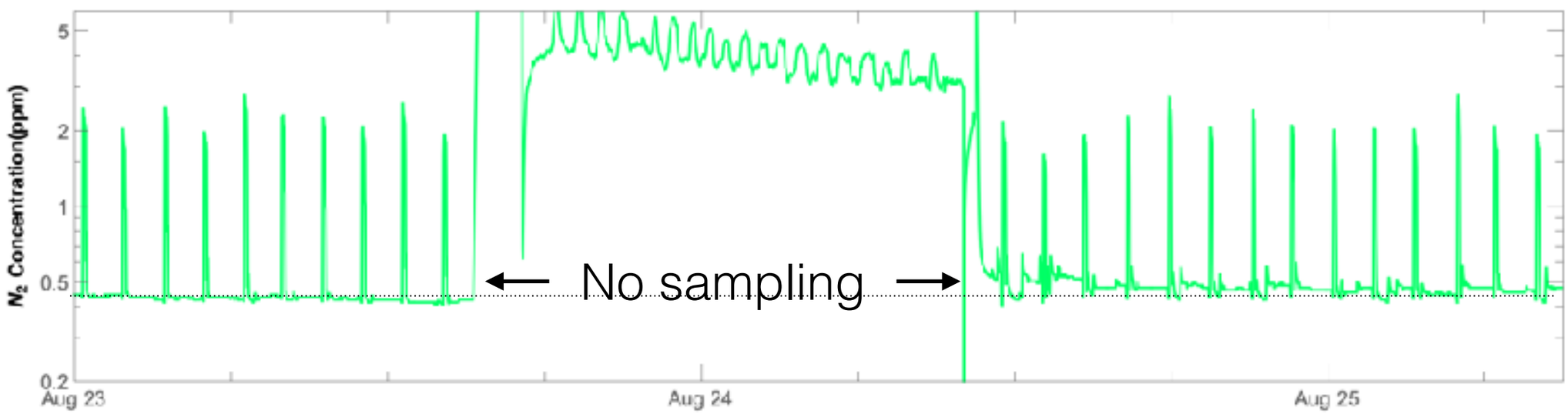
Lab Safety

- COVID level in Suffolk County is now at Medium
- Watch out for the summer students and interns
- Take the additional trainings required for all employee
  Ethics and Privacy by 9/2;
  Active shooter training by 9/30
- Properly handle and store gas cylinders
- Pay attention to gas regulator safety
- Next ESH safety inspection will be tomorrow

N2 concentration measurement

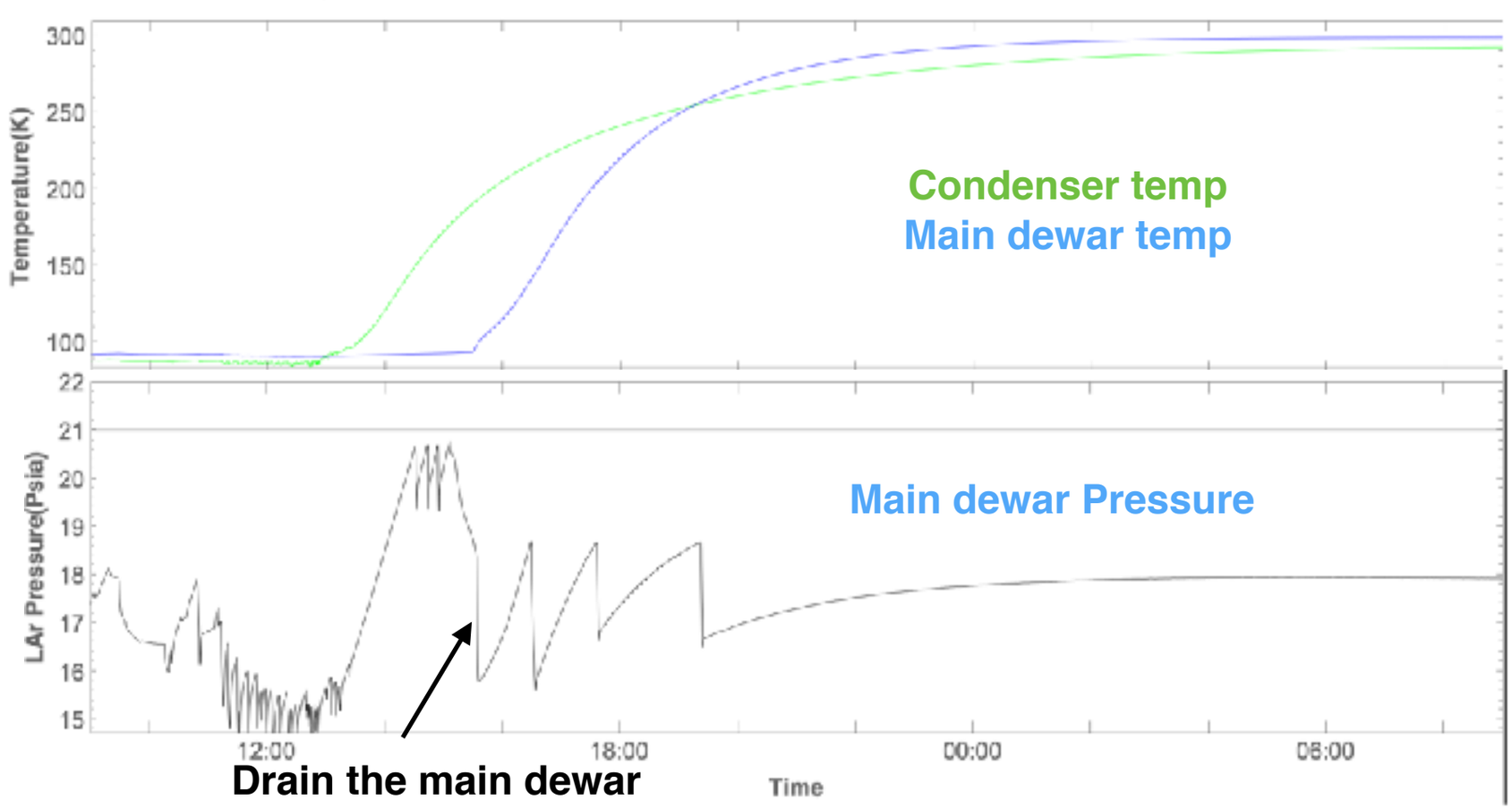
- **System was running without sampling before warming up**
  - It was observed [N2] drop with long period over the cryogenic operation
  - [N2] concentration shows no reduction after running closely
  - [N2] concentration drop caused by the sampling





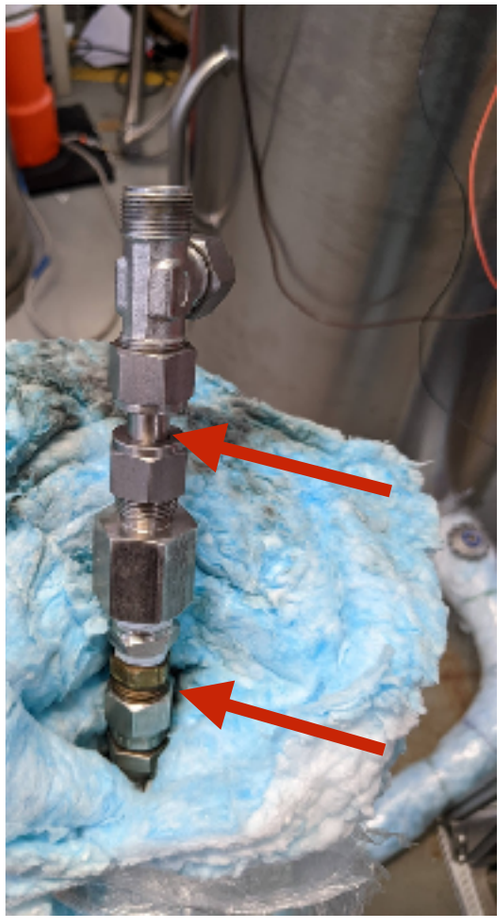
260L LAr System warming up

- **260L LAr system cryogenic operation stopped last Friday**
  - The run from 8/12-8/26
    - Cryogenic System runs smoothly with no interruption
    - LN2 supply with 6000-gallon LN2 tank only, will small consumption (Level from 110” drops to 95”)
  - Residual LAr back filled into the supply dewar
    - ~5 ft height difference from 260L main dewar to the supply dewar valve
    - ~3 psi+ pressure difference is sufficient to drive the LAr
  - First warming up so far without damaging burst disk
    - Burst disk always broken in the previous warm up due to residual LAr evaporation
    - Automatic pressure relief with a solenoid valve implemented for pressure relief
    - The system warming up takes about a day to room temperature



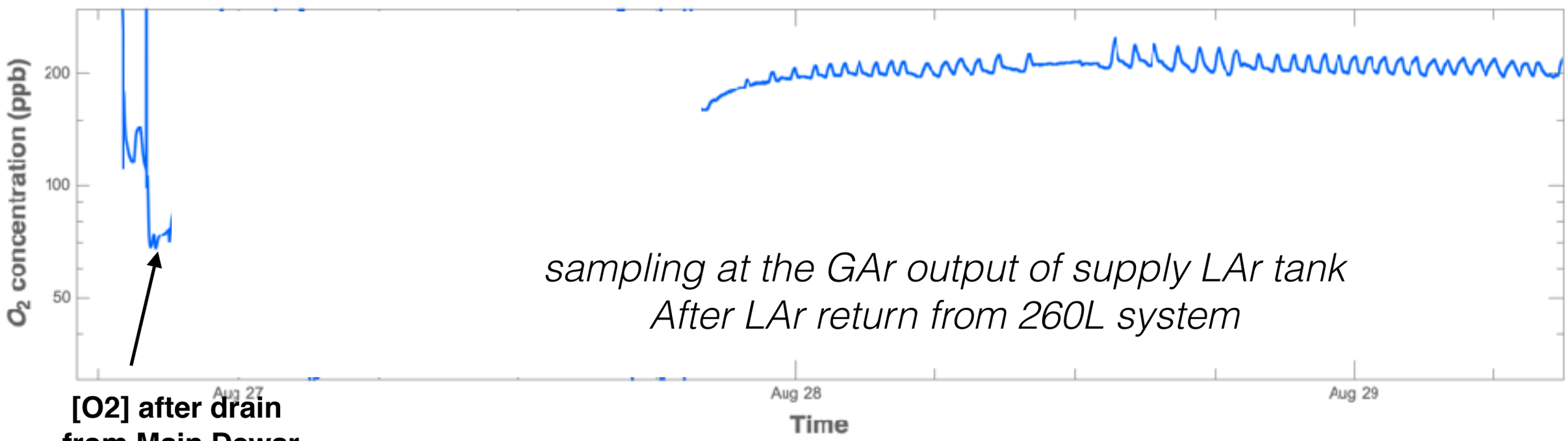
260L LAr System warming up

- **Gross leak found on the filling hose between 260L main dewar and inline filter**
  - Excessive LAr leakage observed when draining LAr from 260L main dewar
  - Two gross leaks on the plumbing found after warming up
  - This could be the reason of the high impurity level in this run
  - Getting new fittings to reduce the number of connections on the line
  - The fill line must be pump-and-purge in the next run



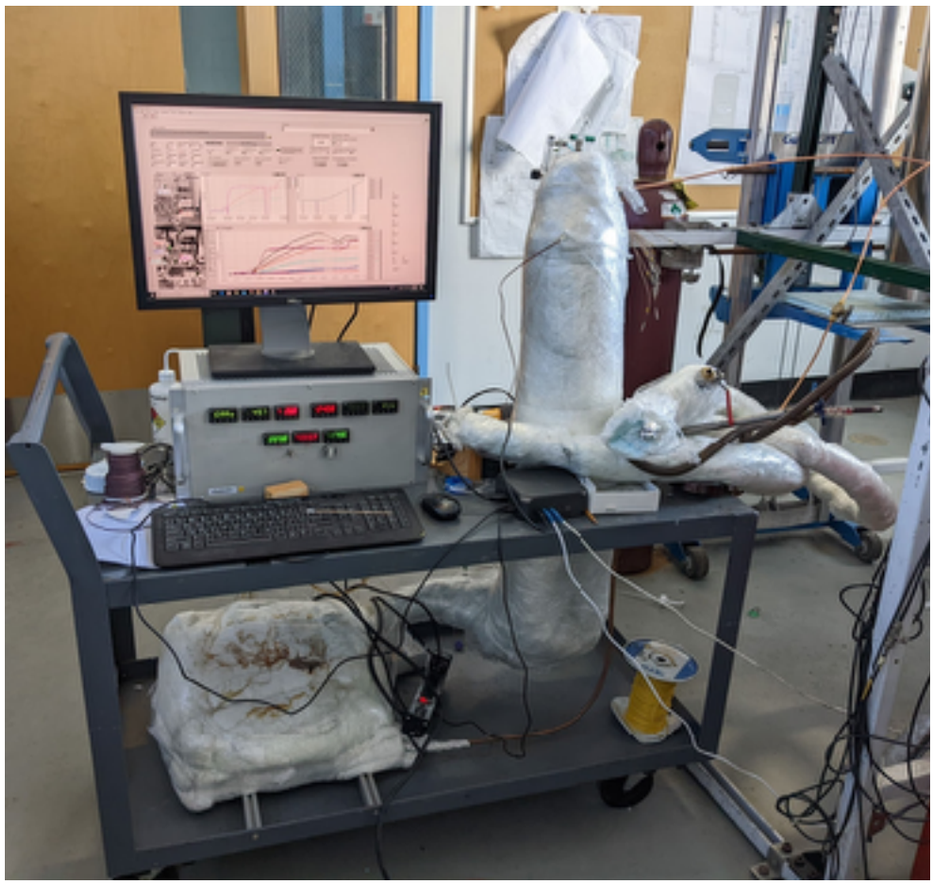
260L LAr System warming up

- **Purity significantly improved during the cryogenic operation**
  - Supply commercial Ar [O2]~600 ppb
  - Immediate after draining from the 260L LAr dewar, the [O2] reading at the GAr output of the supply dewar is ~ 70 ppb
  - Now [O2]~ 200ppb
  - Purification of the 260L LAr system is working



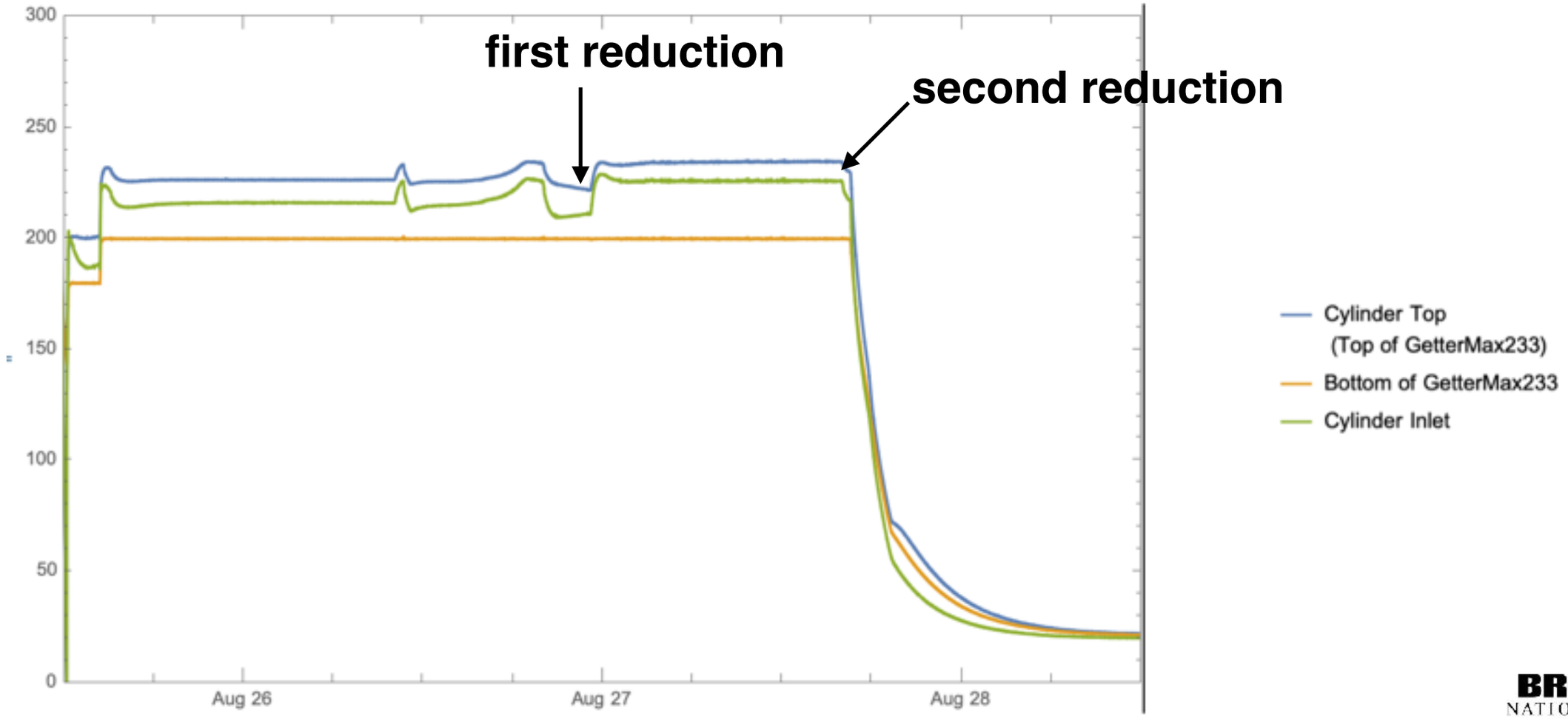
Inline filter activation

- **Inline Filter Activation**
  - Inline filter cart moved close to the 20L system for gas supply
  - Gas vent plumbing in parallel to a flow meter and the gas analyzers
  - Heating tape at gas inlet problem due to broken fuse fixed
  - Activation was conducted during the warming up of 260L system



Inline filter activation

- **Inline Filter Regeneration**
  - No excessive water condensation observed
  - Bed temperature reduction observed after ~ 24hrs
  - [H2O] reduction observed after seeing the bed temperature drop
  - Bed temperature increased with additional flow to the gas analyzers
  - Not response to flow rate after the first reduction



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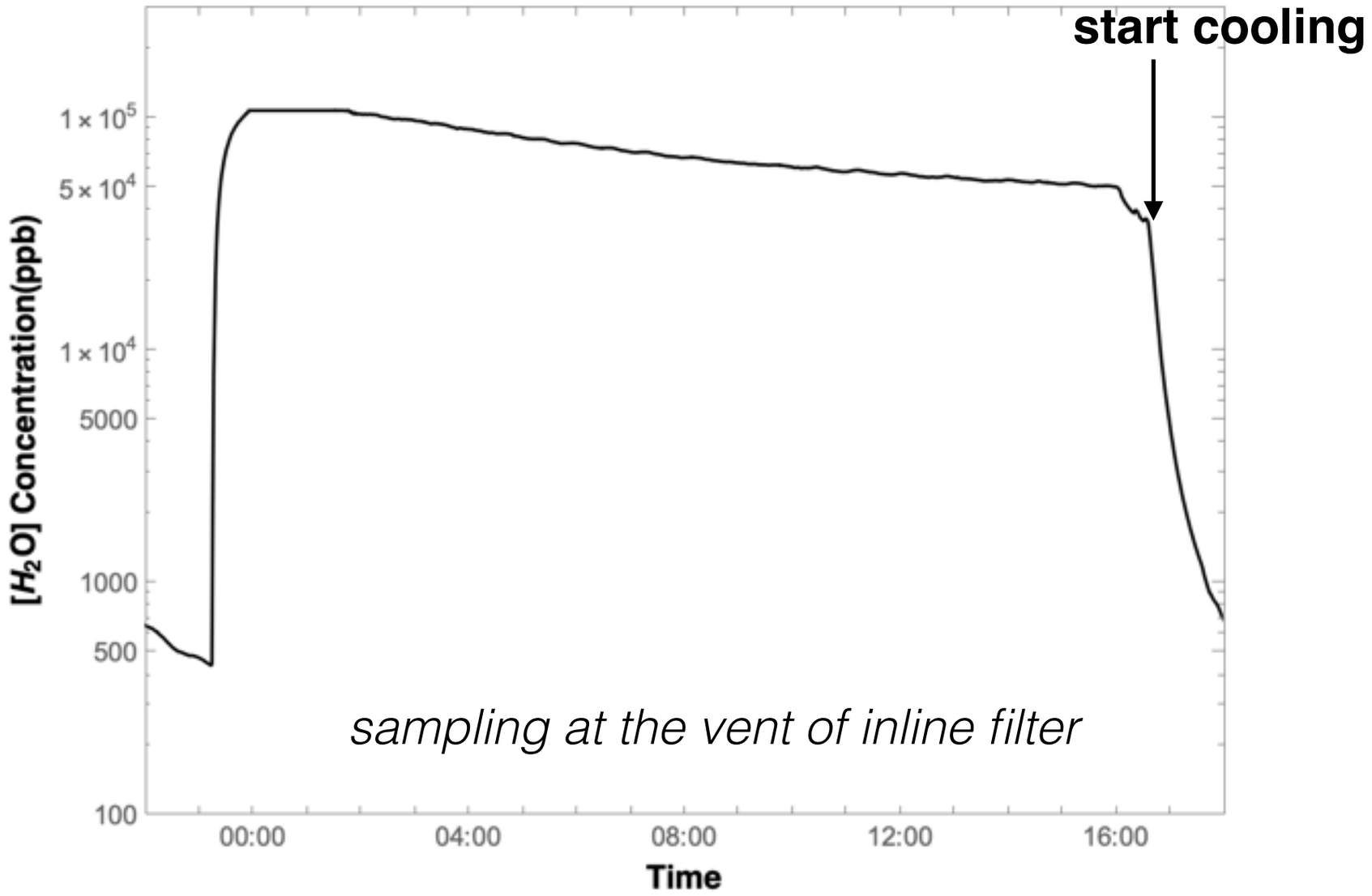
Inline filter activation

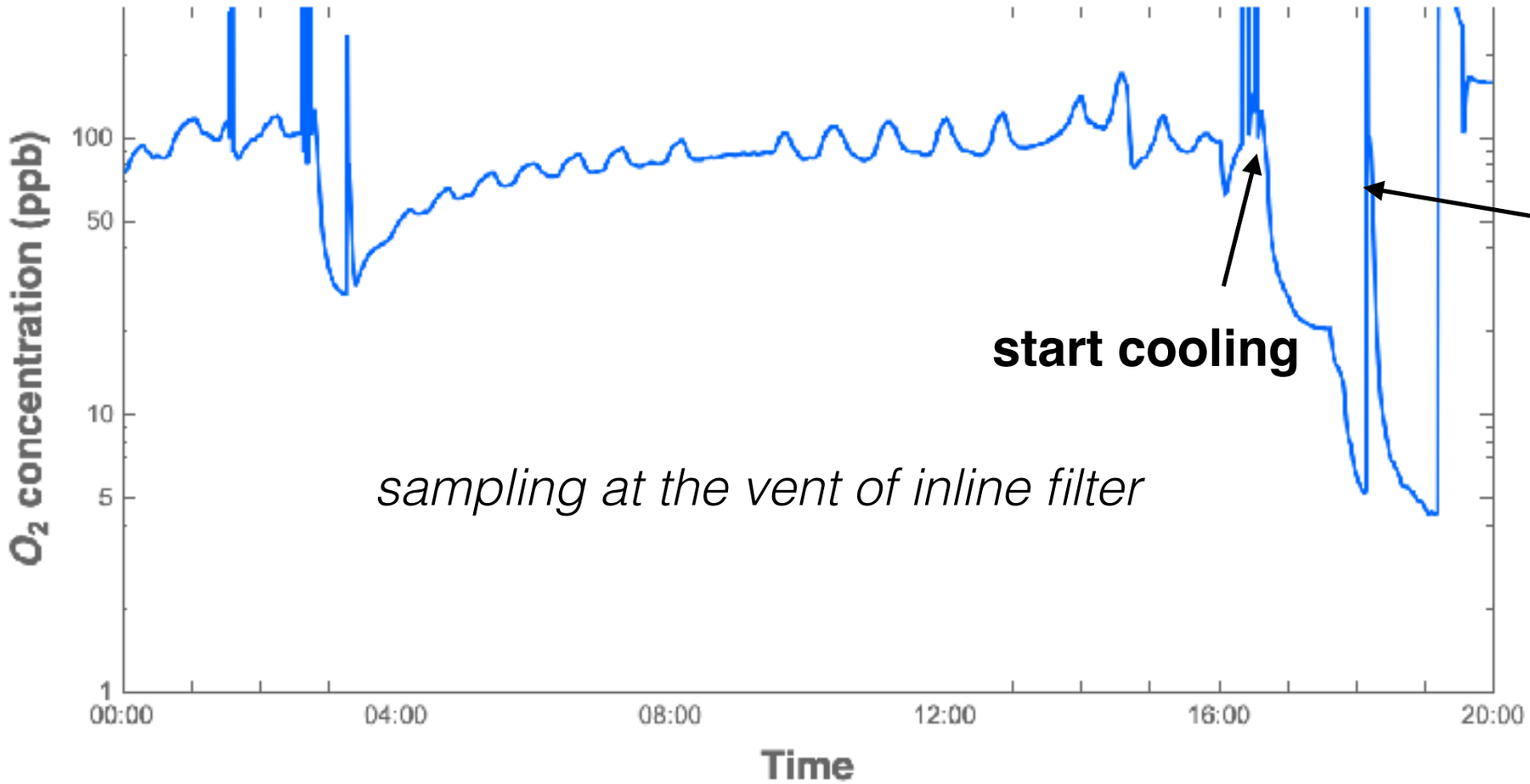
- **Inline Filter Activation**
  - [H2O] reading starts after seeing the first temperature reduction
  - [H2O] saturated the analyze for ~ 2 hours then reduced to content, agrees with previous observation after full activation
  - Inline filter is fully activated



sampling at the vent of inline filter

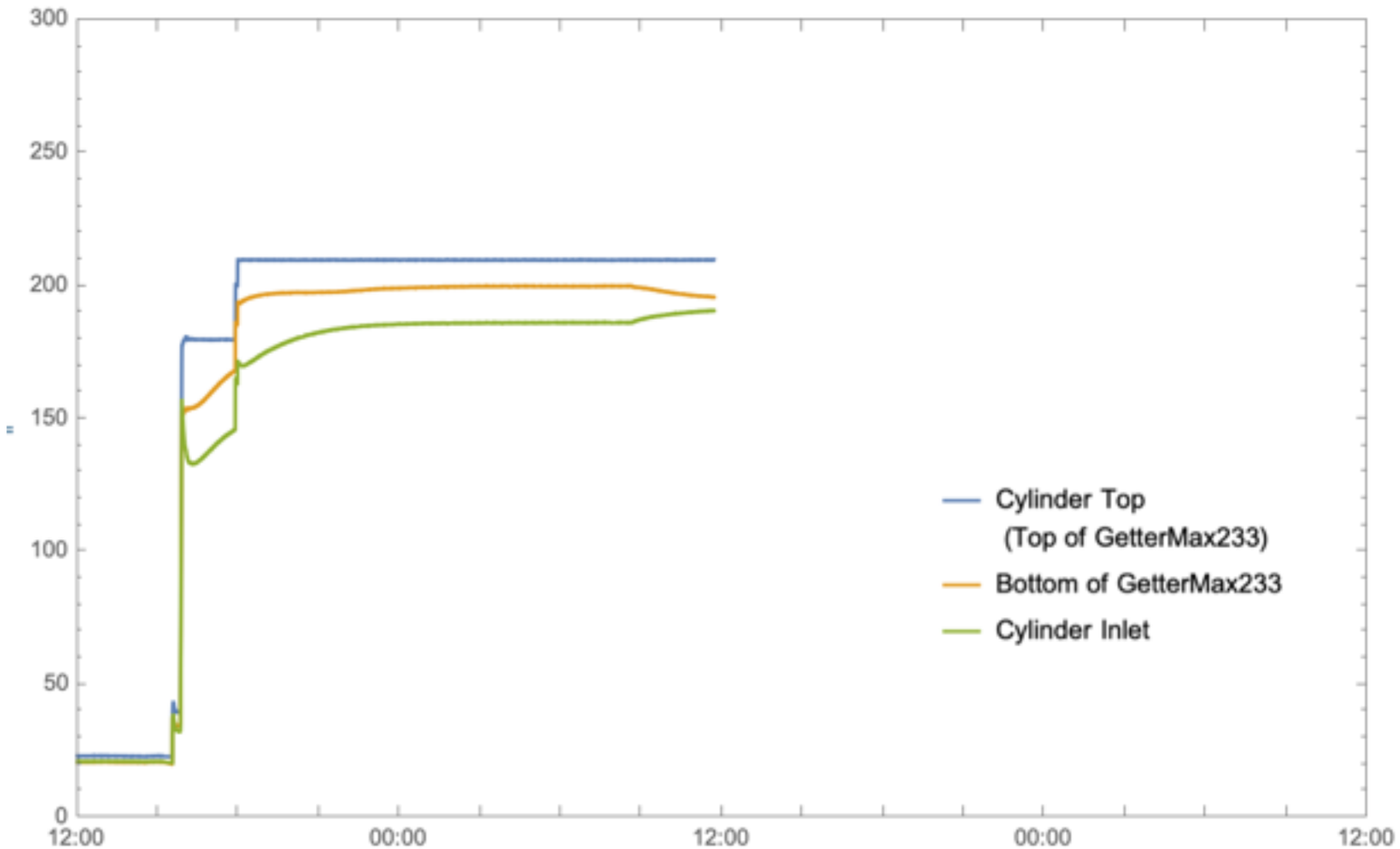
Inline filter activation

- **Inline Filter Performance Validation**
  - Compressed Argon with ~800ppb [O2] flush the inline filter during cooling down
  - Flushing the scrubber cylinder with high flow GAr with 25 psig to cool down
  - “Zero” reading observed on O2 analyzer, minimum [O2] is 4.4 ppb, limiting with the fitting at the flow mater
  - Inline filter performance validated



260L Purifier Activation

- **260L Purifier Activation in progress**
  - No excessive water condensation observed
  - Bed end temperature peaked and reducing
  - The activation is expected to be done by the end of today
  - Will conduct the similar validation test



Summary

- This run lasted for 2 weeks with 6000-gallon LN2 tank refilling portable dewars, the running mode worked well
- 260L system warmed up with no issue
- Purification capability partially demonstrated
- Inline filter activated with performance validated
- 260L on-system purifier activation in progress, performance indirectly validated, need further test
- Next is check the 260L LAr system contamination level
- Potential reason of high impurity level in the run located