Sequence X Severity Task Force

Meeting Minutes

02/08/22

Attendance 02/08/22

- Michael Deegan
- Rich Grundza
- Ben Maddock
- Christine Eickstead
- George Szappanos
- Jason Soto
- Alfonso Lopez
- Martin Chadwick
- Charlie Leverett

Agenda 02/08/22

- Review lab video/photographs
- Action item for George S. to prepare y-pipe
- Action item for labs to present flow data in the branches of the blowby tree
- Turbo discussion, boost and near boost flow characteristics of blowby gases. Review Martin plots
- Jason list of lab experiments performed to date

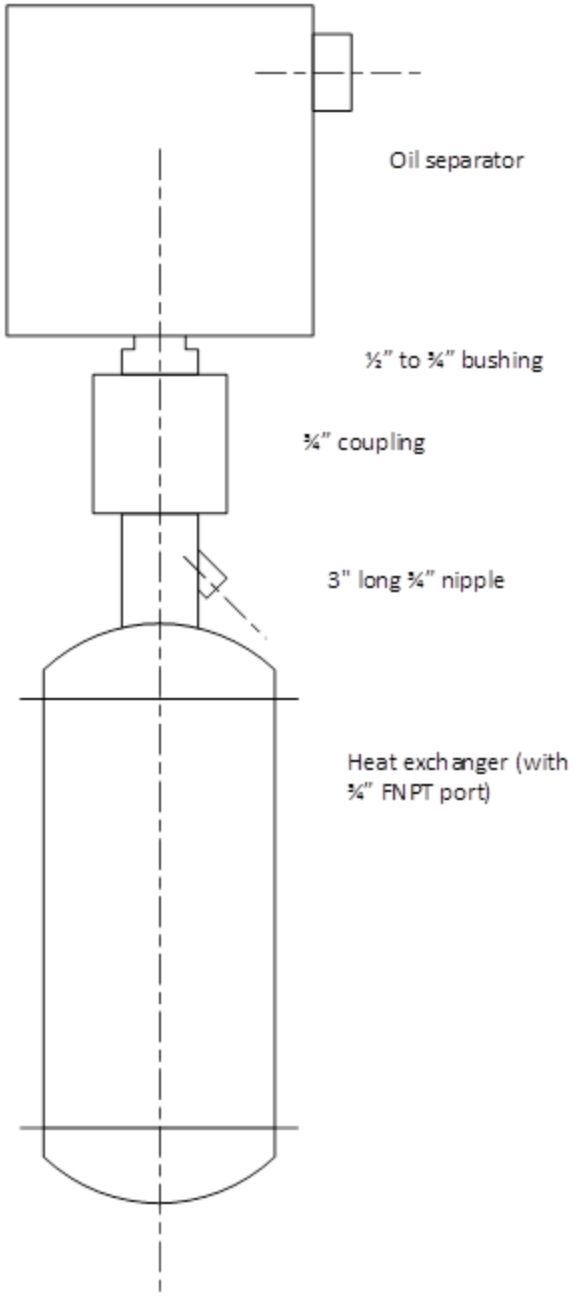
Lab Photo / Flow Data Review / Y-Pipe

- No additional photos or video were presented,
- Afton to present photos in the future

- Labs are still in the process of measuring flow rates in the blowby stack from the pcv valve to the manifold and excess blowby to the air intake.

- George presented a fabricated y-pipe that will be installed on the next reference test. The objective of this fixture is to eliminate condensation from affecting the blowby gas temperature. See slide below

LZ Y-Pipe


Oil separator
½" to ¾" bushing
¾" coupling
3" long ¾" nipple
Heat exchanger (with ¾" FNPT port)

Operational Data of Turbo and Manifold Pressures

- Martin presented manifold pressure, boost pressure, barometric pressure from precision matrix tests compared to current tests.
- Our objective was to see if there were any differences that may have affected the flow path of the blowby gases.
- See slides below. No differences were found.
- Action item for additional plots - Martin to group data by test to include the barometric pressure, manifold pressure and boost pressure.

Intertek Experiments

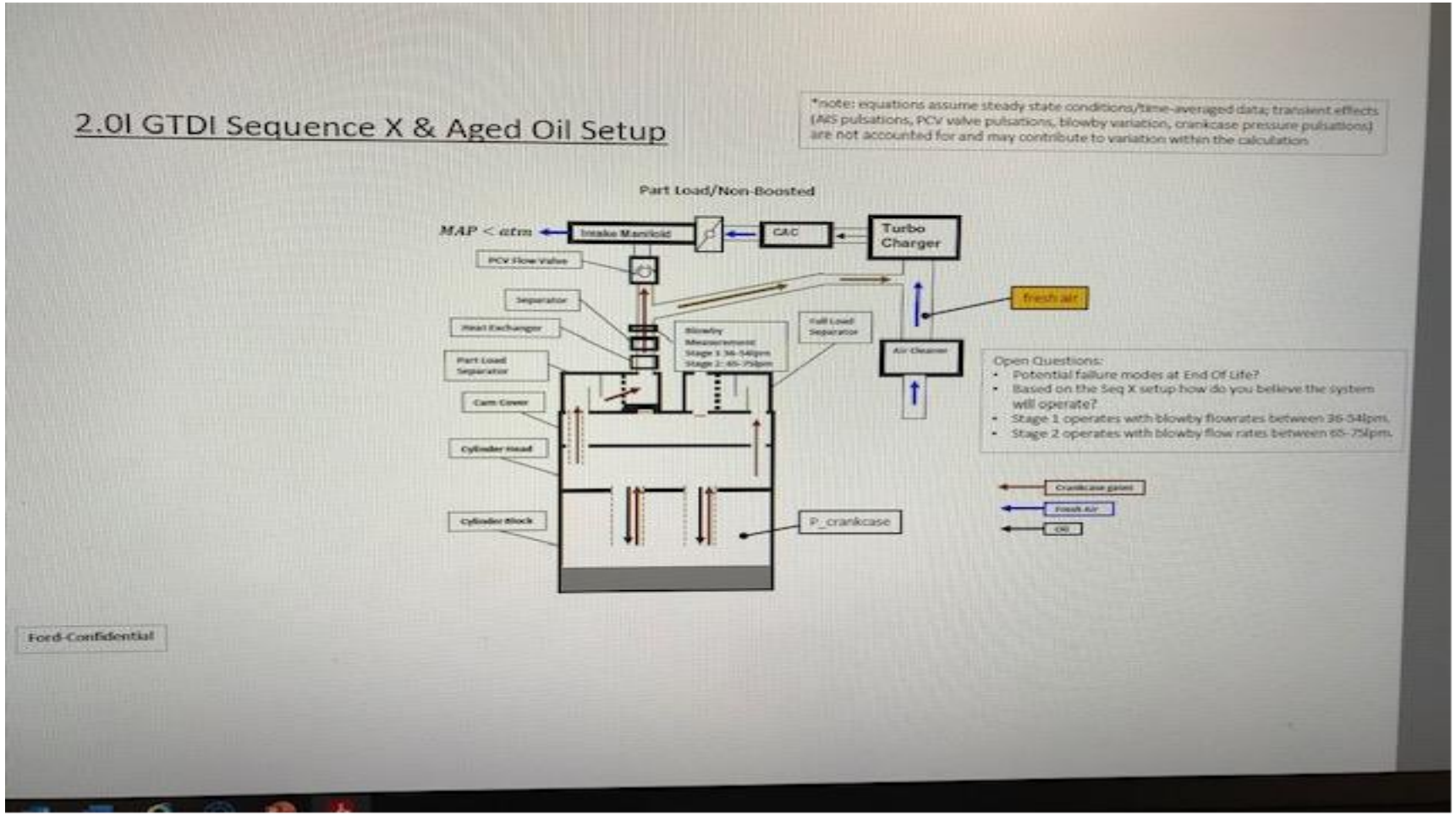
- Jason presented experimental tests preformed at Intertek.
- Details of experiments shown in table.
- Oil 271 performed mild with orifice and with oil removal.
- Severity increase was seen on oil 270 with oil removal. Oil was extracted at each oil change

Test #	TMC oil code	final % change	Comments
93-0-135	270	0.0907	Extra oil drained during oil samples to control oil consumption. Old used turbo.
93-0-134	271	0.0367	Extra oil drained during oil samples to control oil consumption. Old used turbo.
93-0-133	271	0.0352	Orifice diameter 11/64" (4.3mm)
93-0-132	270	0.0698	Invalid reference attempt. Had 15/64" orifice on for the first 44hrs.
93-0-131	271	0.0385	Orifice diameter 15/64" (5.9mm)
93-0-130	271	0.0362	Standard Reference run (failed mild).

Additional Discussion

- Action item for George to check on the batch of critical hardware he is using. There concern that critical components may have changed without our knowledge. The crank gears are a visual difference with and without the diamond washers. The chains have no identification to compare old and newer batch.
- Lab visits were discussed. Mike to visit the San Antonio labs the week of the 21st.
- Next task force meeting TBD.

Chain Wear Engine Crankcase Ventilation



Action List

Task Force Formed	June 2020	First Meeting August 2020		Action
Operational Data Review	March 2021	Travis presentation	Fuel correlation to mild shift found	
Fuel COA analysis		Met with Haltermann, no differences found between batches	Christine met with SWRI fuel team, no other analysis was recommended	
Crankcase Experiments	Ongoing	IAR, Valvoline ran tests, fixed orifice in BB stack. Valvoline 1011 on target (.1258 Yi=). More sludge and emulsion noticed in the engine. Oil 270 on target (.1165)	LZ test showed correlation, ran high CC pressure by accident	Done, all tests on target with orifice
		Oil separator filter		
Ln Transform Review	Ongoing	Stats group meeting regularly	Transform options to be presented	
Oil 271 Suspended	04/07 - 06/07	Panel Motion		
Cylinder honing	4/13/2021	Labs commonized honing techniques. Ra target 9-13	Revised procedure, agreed to hone new blocks as well as used. May want to look at other surface parameters	Done - ballot
Torsional Analysis		Driveline Manufacturere	Called Machine Services - no change in material or design, same stiffness	done no change
		Clutch pack	Called OHT - no change	
		Crank/Hub	Engine batches changing but labs using sme harmonic balancer from original engines	Review combination. Ask engineering on possible missmatch
Hardware batch timeline	5/25/2021	Lab Review	No correlation found with a change of hardware	
Chemistry		Travis - slides on TAN, TBN, water. No correlation seen	Amol recommendation to review oxidation, nitration, pentanes, TAN, TBN	Method of reporting, which should we use?
CC Pressure Data		Missing data on TMC site	Rich completing review of CC correlation	Labs to input data
Action on Amol		Test on 271 w/orifice plate		Done on target
		Chem analysis on orifice plates	Travis plots	Done - review was inconlcusive
Water Analysis		Is there another method that best distinguishes the 3 modes of water in oil	Currently used method D6304 Karl Fischer	
Heat exchanger flow directon. Procedure mismatch		Labs to commonize	E ballot - procedure corrections	Done - ballot

Action List

PCV design change	1/18/2022	M Deegan to verify PCV valve print and any changes	No changes since 2012	Done
Build Data	1/18/2022	Lab to compare build data	IP issue - no participation	
Lab Visits		On hold due to Covid	Video reviews	LZ, IAR, SWRI, Valvoline complete
Piping between the HX and the oil separator	1/18/2022	No standard in the procedure	Labs to measure and photograph	LZ, IAR, SWRI, Valvoline complete
Hose diameter from the BB valve to the air box tube	1/18/2022	No standard in the procedure	Labs to measure and photograph	3/4 standard
Review map data in second stage	1/18/2022	Need to re-analyse and compare to barometric pressure. May be a boost influence on the pcv valve	Plots for review on Feb 8th	Martin Plots reviewed. Additional Plots requested
Meassure BB flow rate	1/18/2022	Determin distribution of flow in first and second stage. Measure both legs, vary torque near boost		
MD PCV review	1/18/2022	Mike to consult with Ford engineer on the flow characteristics of our stand set up. Near boost condition, at different pressures.		
BB Gas T/C	2/8/2022	Orientation may be influenced by drainback	George design to be installed in next reference	
Mike D to visit SA labs Feb 21st	2/8/2022			

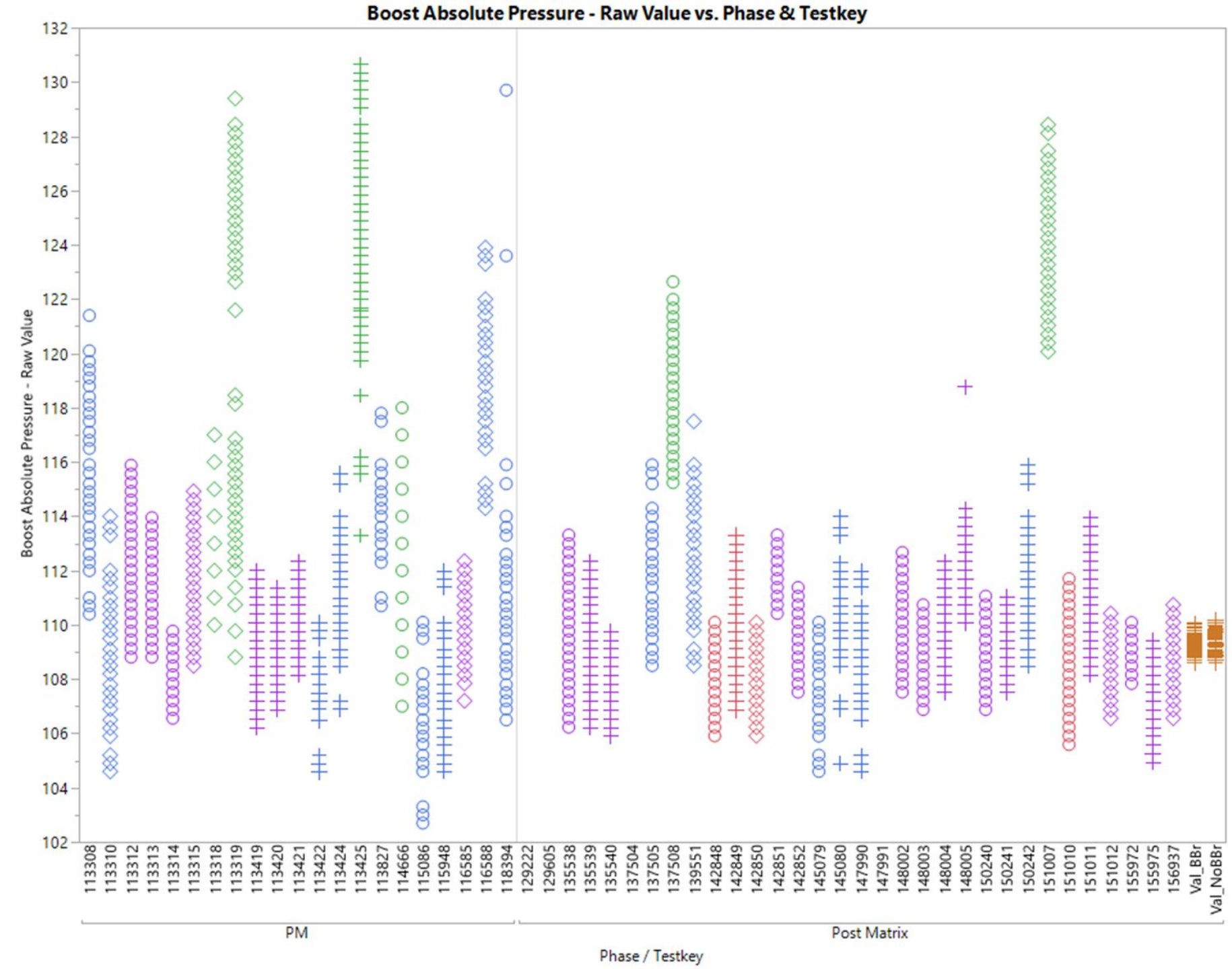
Seq X Phase 2 Boost & MAP Summary

Martin Chadwick

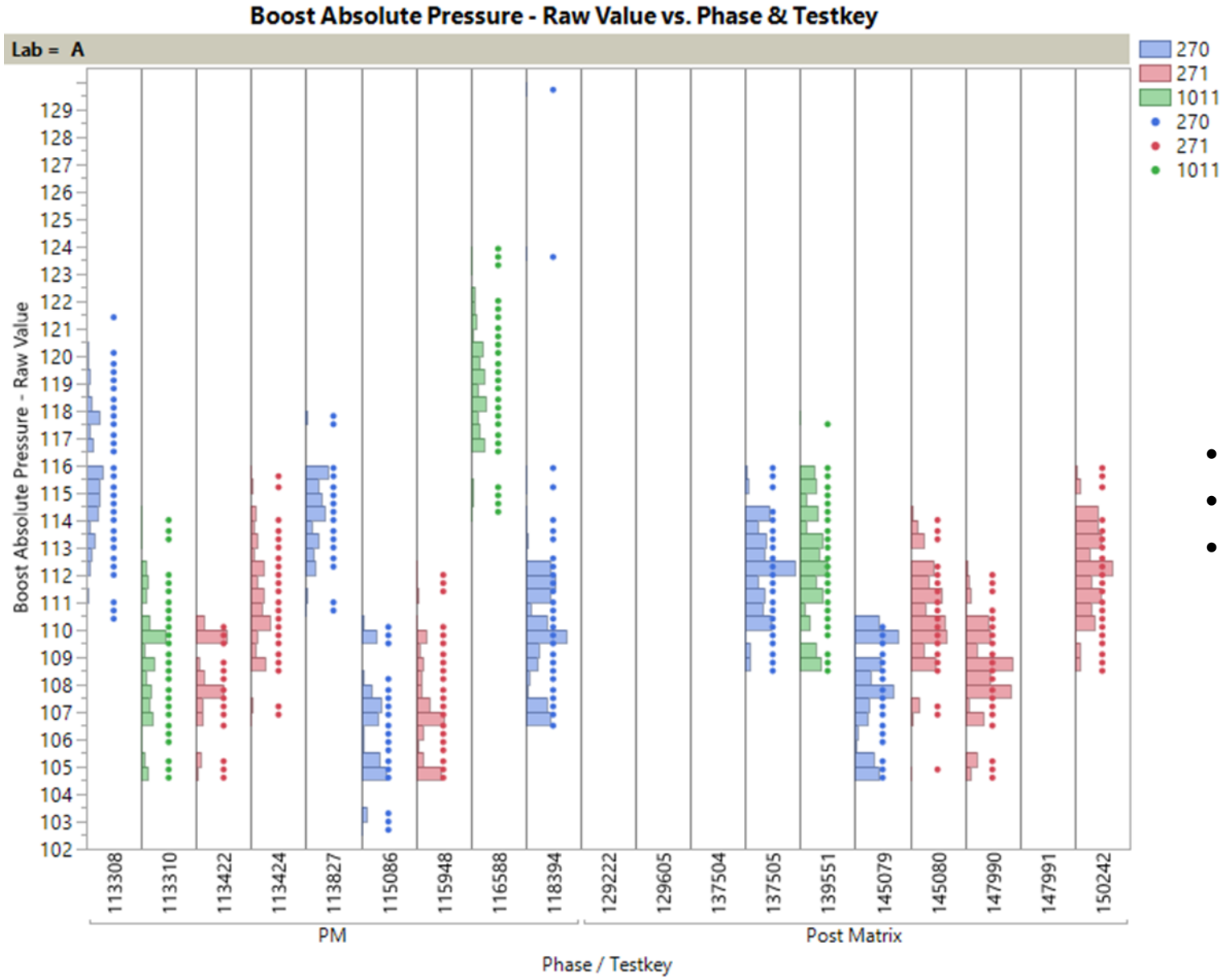
February 8, 2022

Data Summary

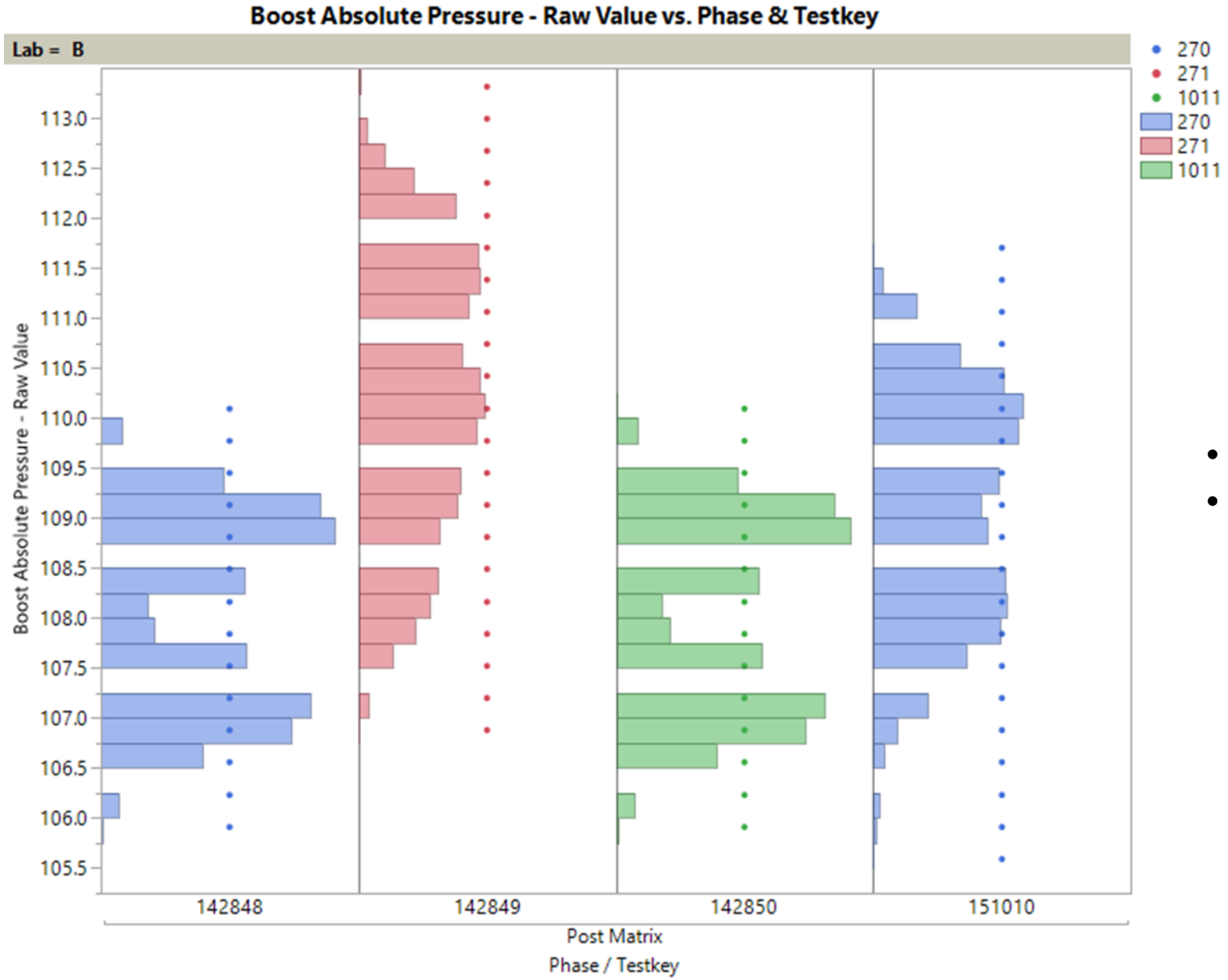
- Data sets used.
  - Matrix data from “https://www.astmtmc.org/ftp/refdata/gas/x/data/Misc Develoment Data/Chain Wear Combined Operational Data Erroneous Removed.csv” dated 10/19/2016
  - Post Matrix data from Travis Kostan posted on TMC site at “https://www.astmtmc.org/ftp/refdata/gas/x/data/CHST_AllRawData_2ValvTests.csv” dated 01/31/2022. Thank you Travis!
- The data set variable names, formats, and fields available were not the same in both files. In the time available for review I did not get a chance to incorporate some of the quality-of-life fields that would improve the data review.
- The following slides are in Test Key order as opposed to date order. Test Key order, post-matrix, is similar to date order. If precise date order is needed I will need more time with the files.
- The PM data file did not include Yi results so additional time will be needed if a comparison to test severity for all tests is desired.



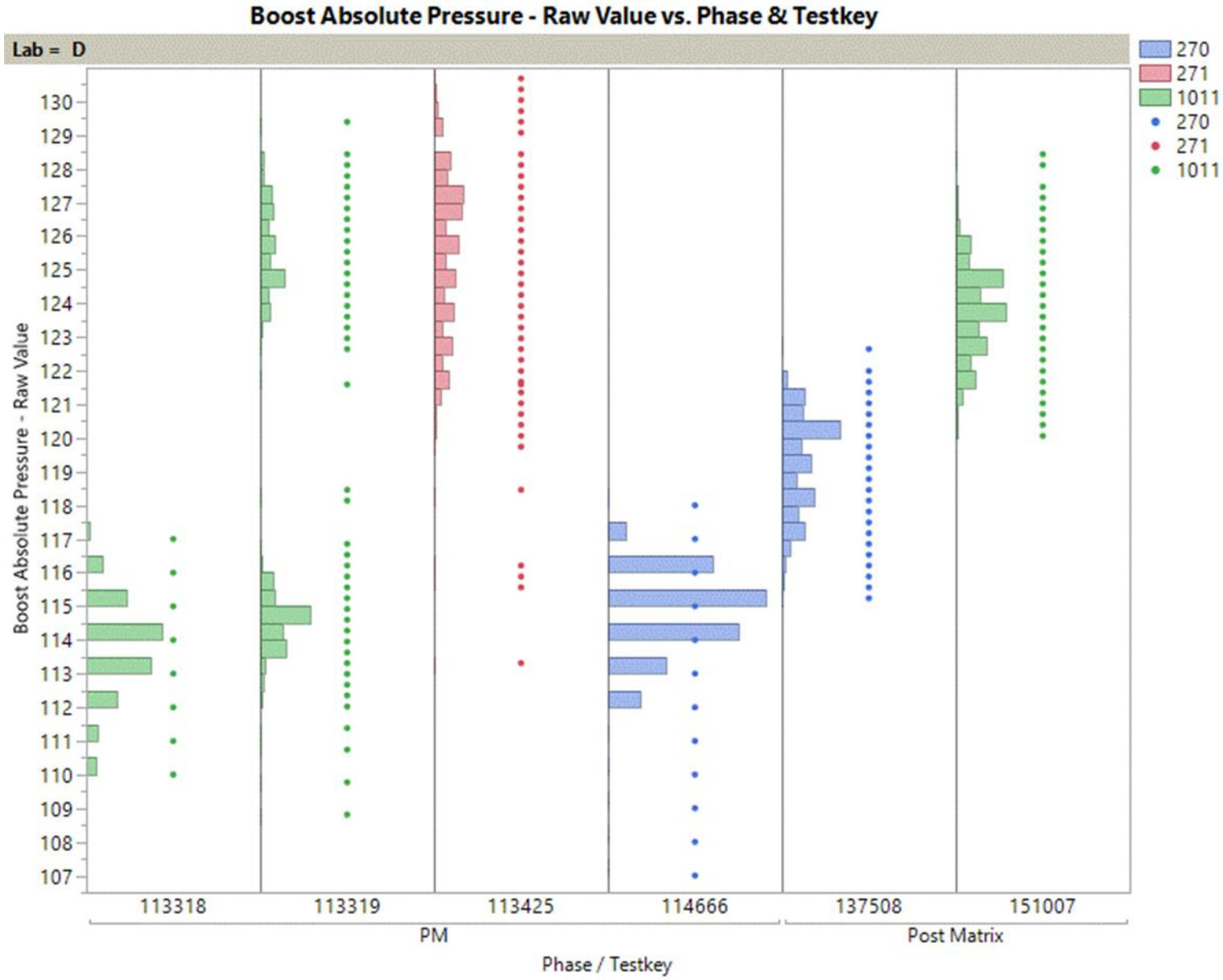
- **Boost Absolute Pressure Comments**
- Lab D runs in different range from other labs.
- Lab F has different resolution from other labs.
- No clear difference from Matrix to recent tests.



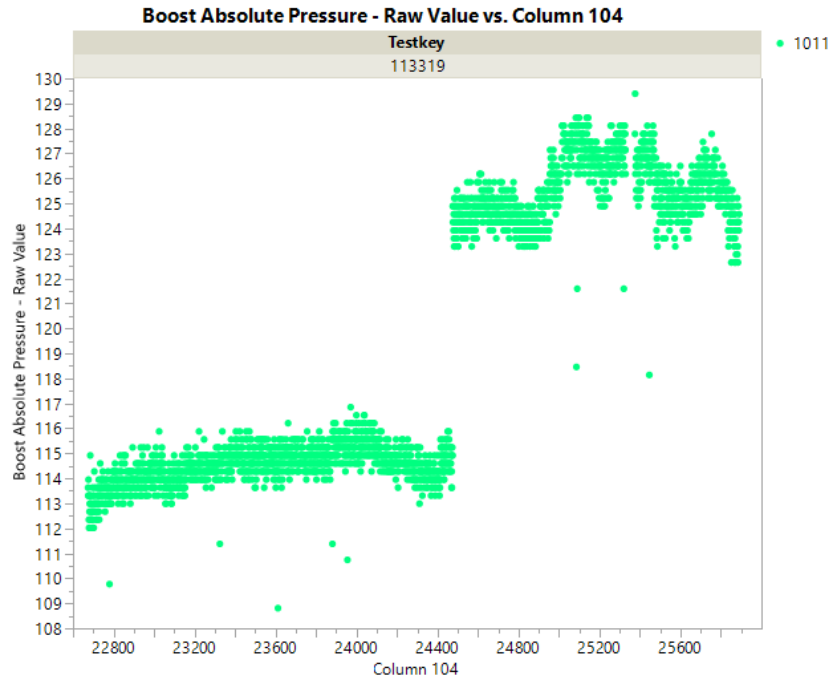
- **<u>Boost Absolute Pressure Lab A Only</u>**
- Data missing from four post matrix tests.
- Complete overlap of PM and post-matrix tests range.

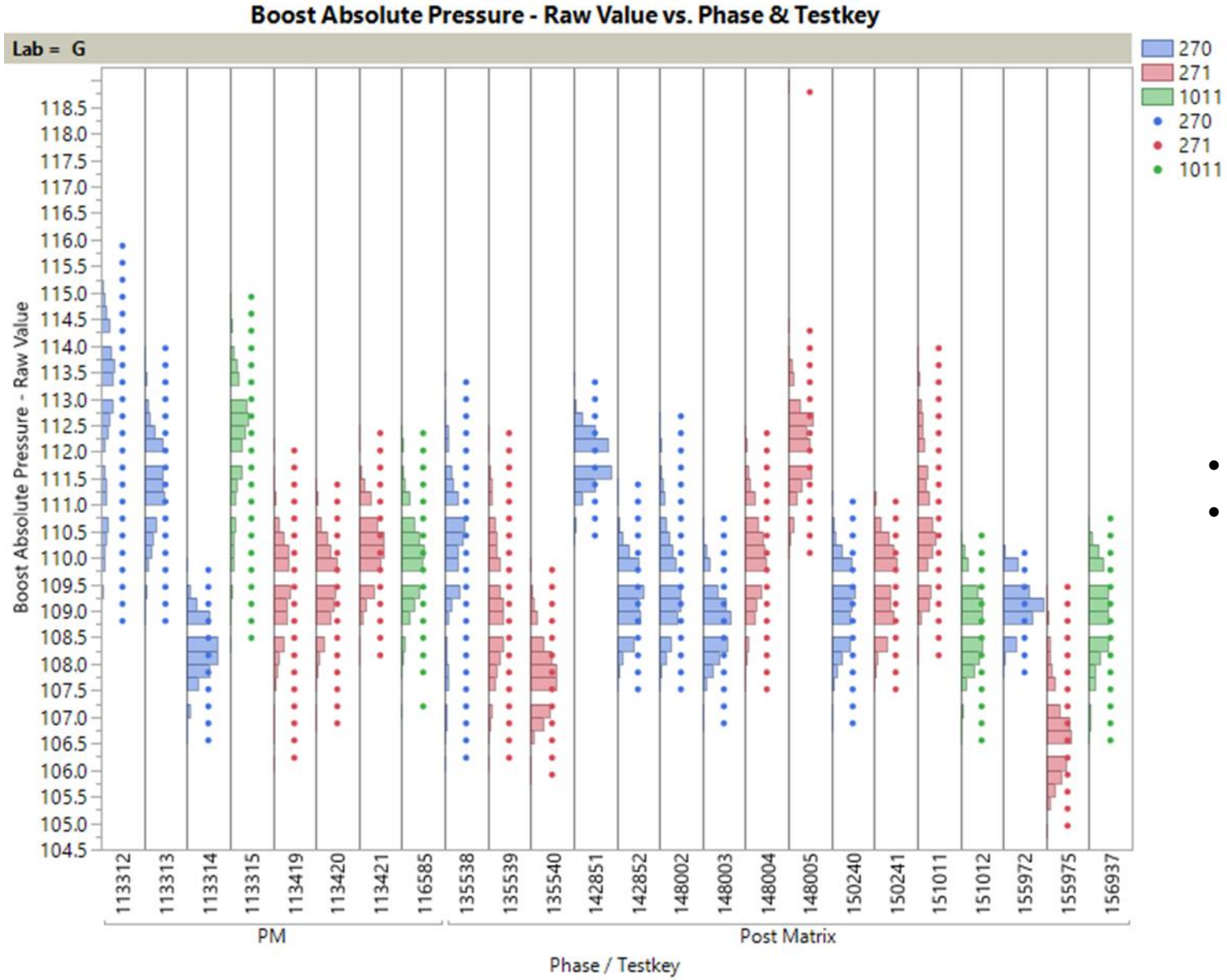


- **<u>Boost Absolute Pressure Lab B Only</u>**
- No PM data available.

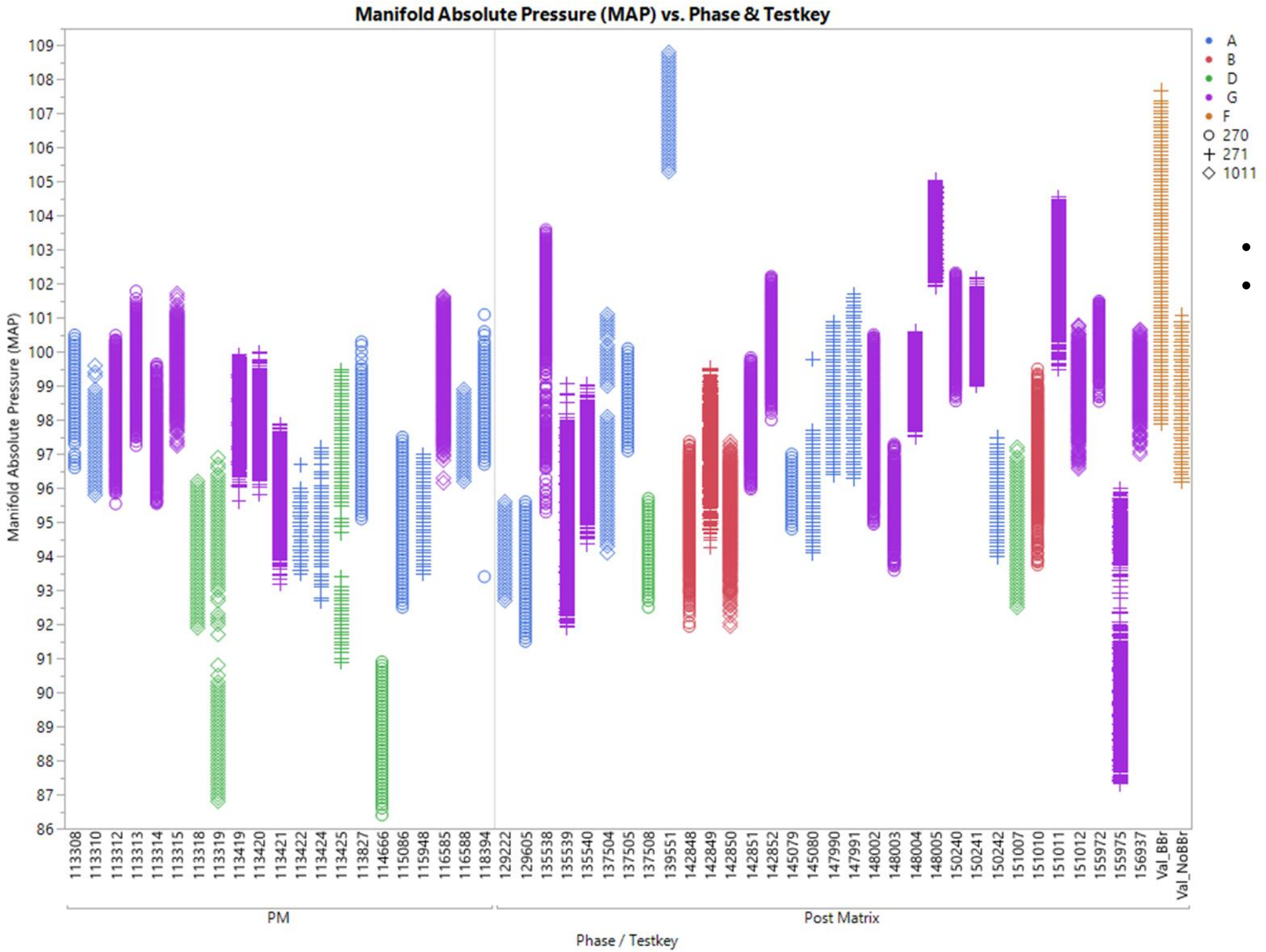


- **<u>Boost Absolute Pressure Lab D Only</u>**
- 113319 (Yi = 1.17) shifted up halfway through phase 2 based on the data available.

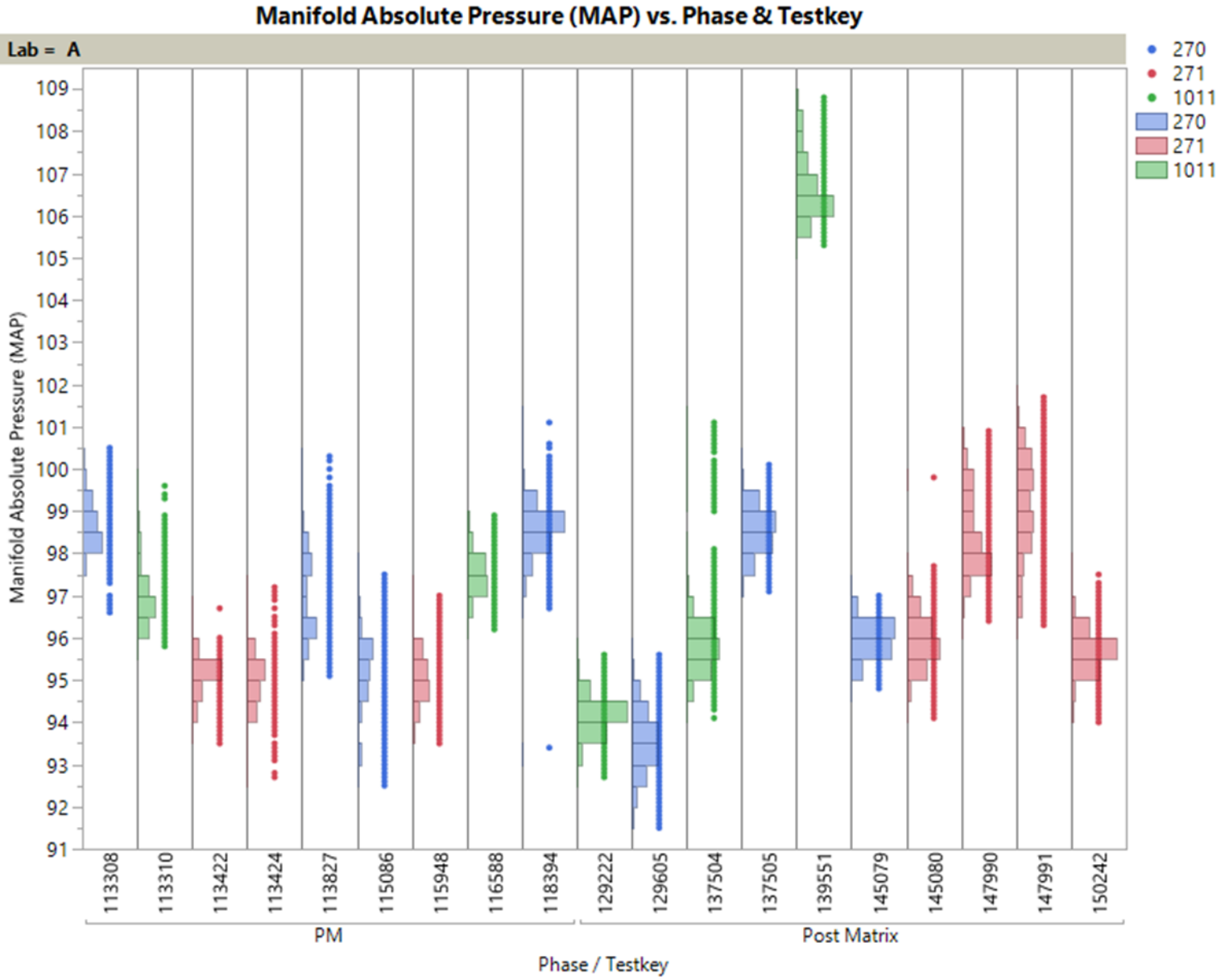




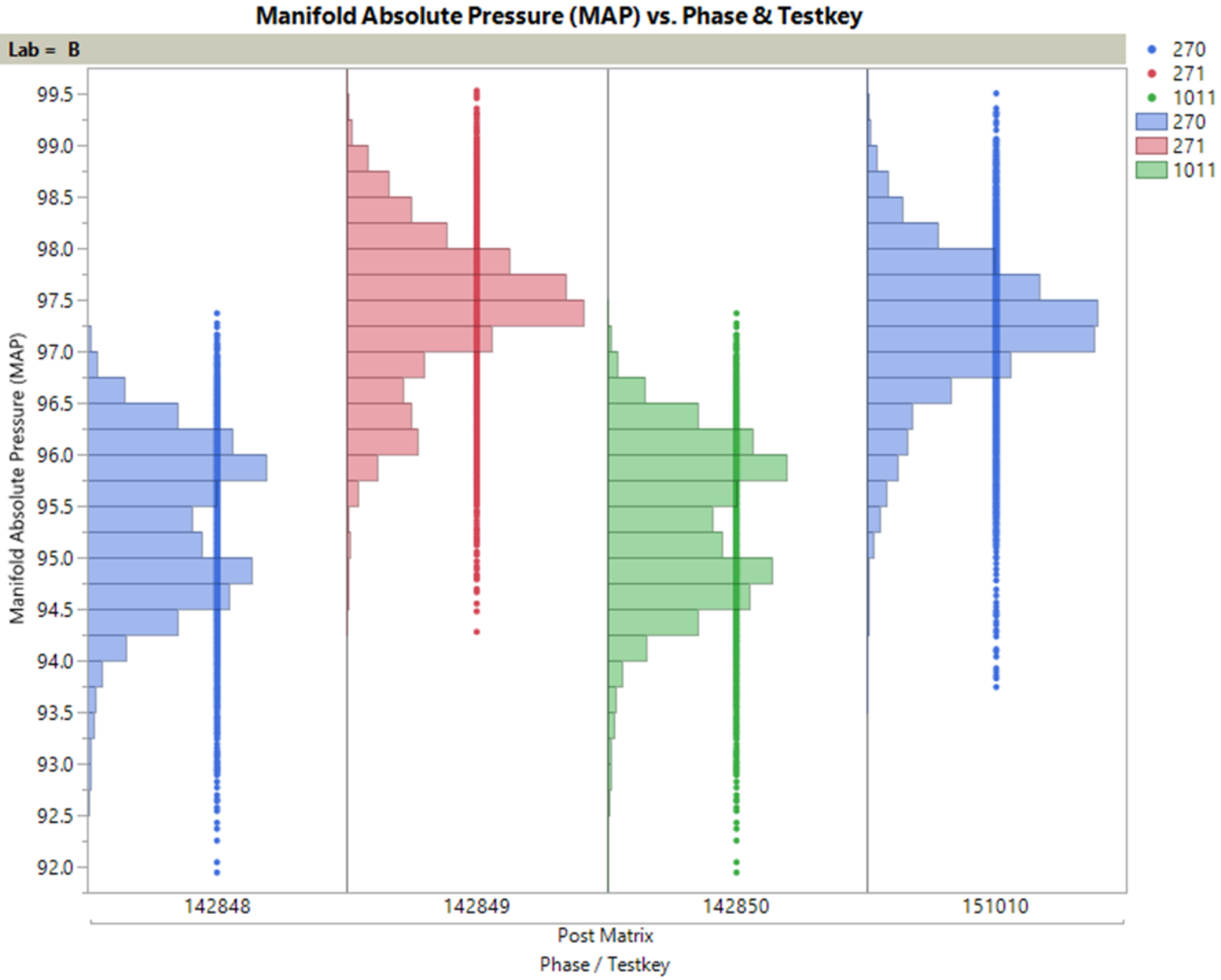
- **<u>Boost Absolute Pressure Lab G Only</u>**
- 113312 with the highest Boost pressure was the second matrix test in the stand following 113315.



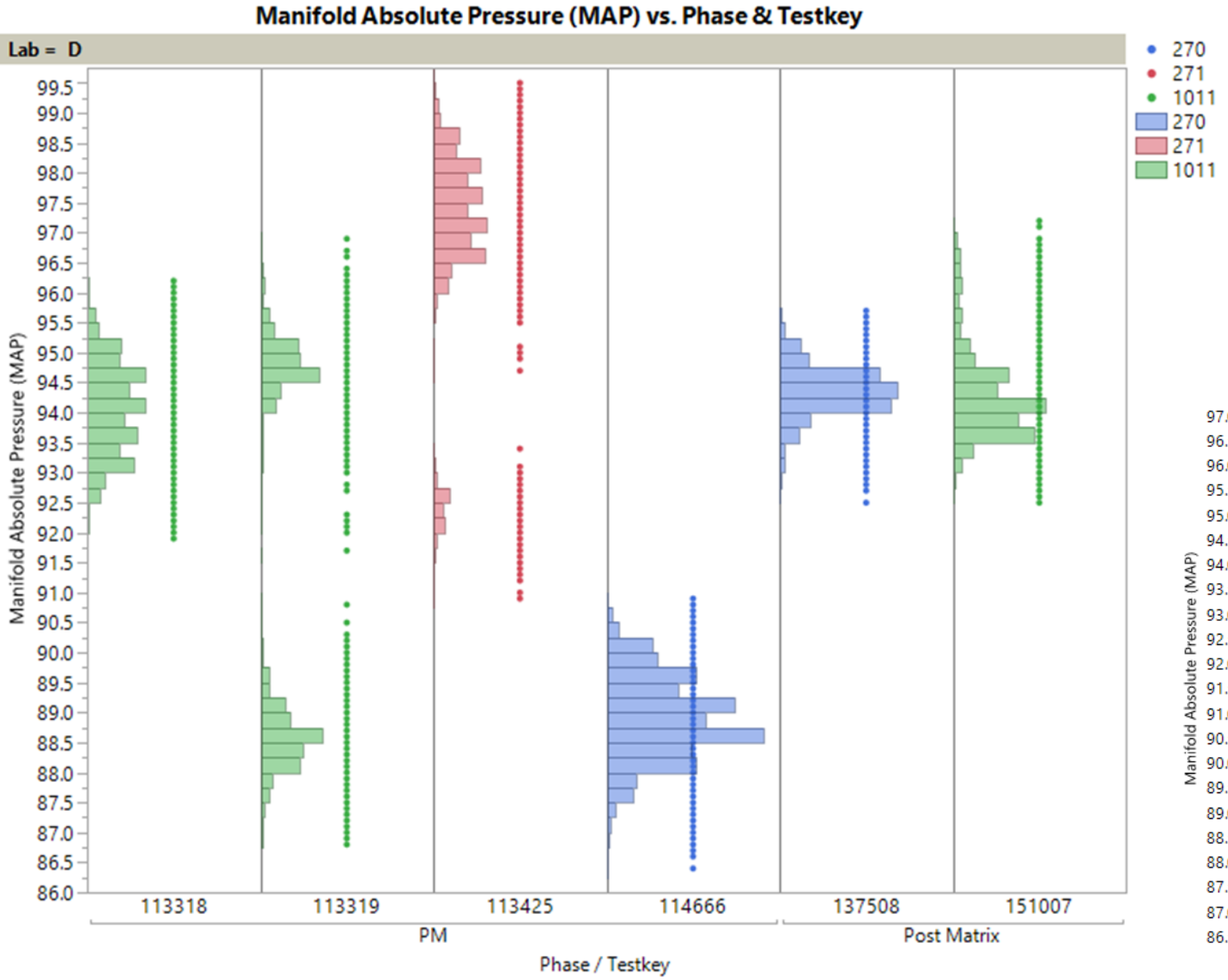
- **<u>MAP Comments</u>**
- Some occurrences of higher MAP seen post matrix.



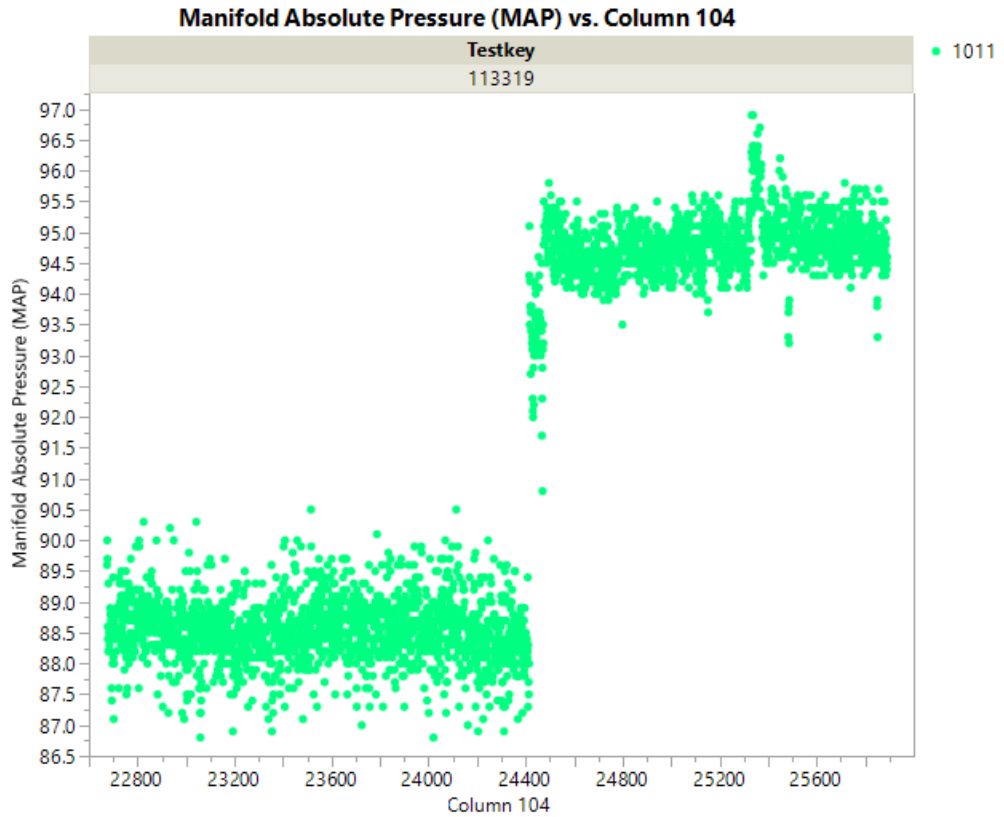
- **<u>MAP Lab A Only</u>**
- More variability between tests post matrix.
- 139551 was acceptable with Yi = 0.02.

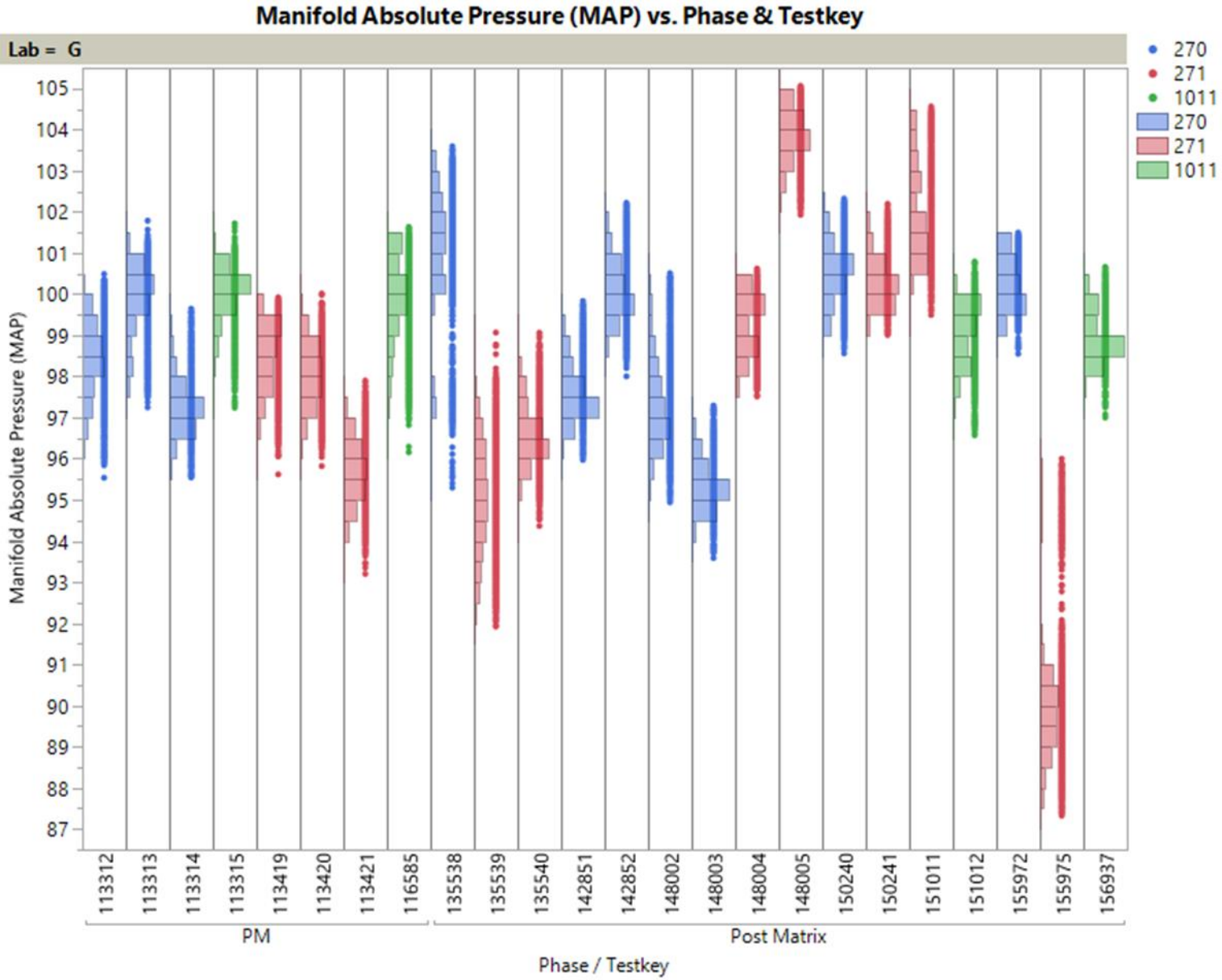


- **<u>MAP Lab B Only</u>**

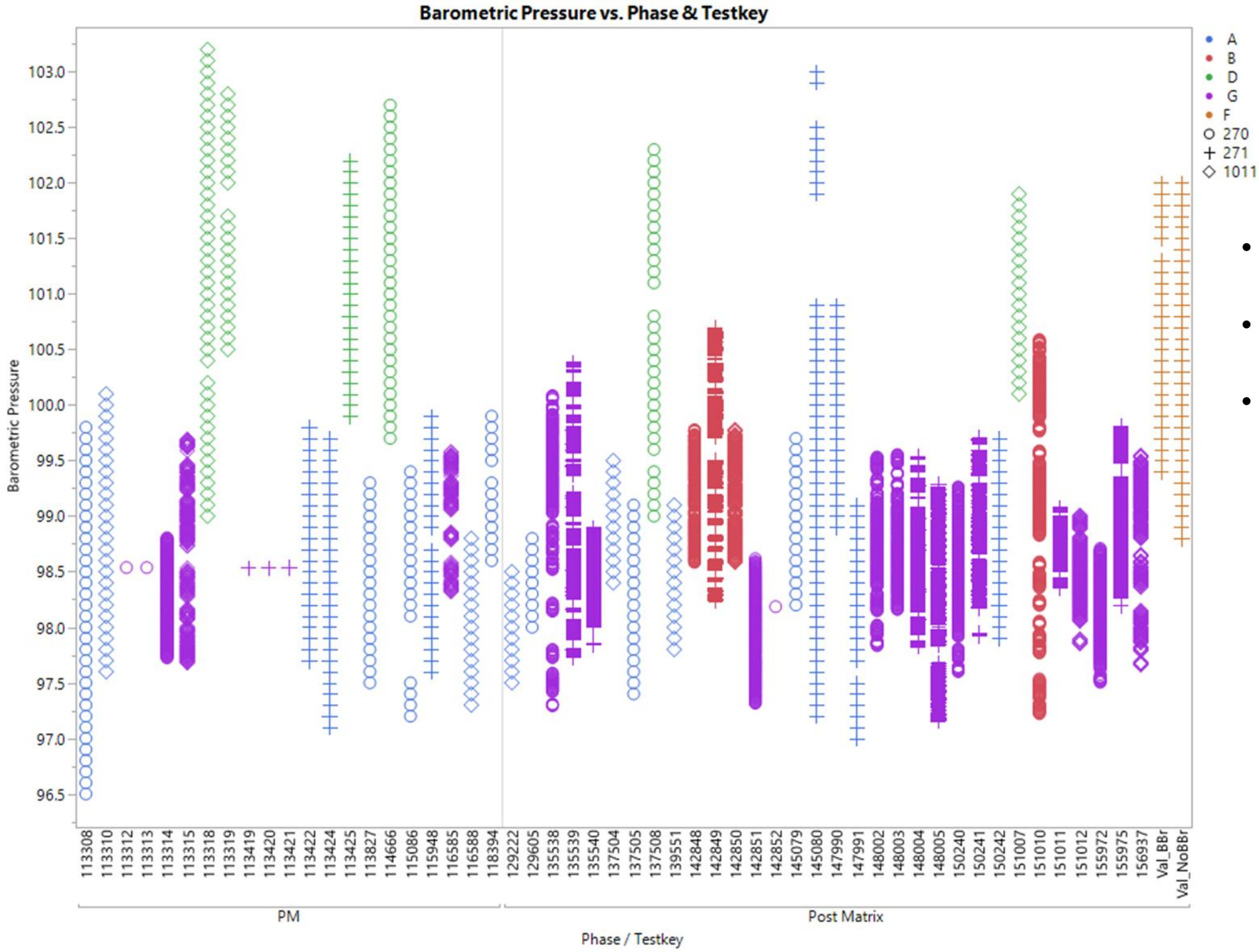


- **<u>MAP Lab D Only</u>**
- 113319 (Yi = 1.17) MAP shift foots with Boost shift.





- **<u>MAP Lab G Only</u>**
- More variability between tests post matrix.
- 155975 was unacceptable with Yi = -4.04, similar Yi to 151011 and 150241.



- **Barometric Pressure Comments**
- Pressure differences by lab location as expected.
- Resolution differences between labs A, D, & F and B & G.