

Status of LHC before exceptional closure measures due to COVID-19 18/03/2020

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TE-VSC-BVO

Room Temperature Area Activities

LSS2

| Vacuum Sector | Intervention Description | Intervention Status | Layout Database | SCADA | NEXT |
|---------------------------------|---|--------------------------|-----------------|-------|--|
| A6L2.B & R | Dismounted for the LIU TI2 (20m of machine) Exchange VMSIO RF insert | Pumping: leak detection, | Updated | - | NEG activation Wk.28 |
| E5L2.B & R | Dismount and recondition for MKI 2B exchange | Not started | - | - | Waiting MKI surface tests in wk. 28-29 then installation |
| C5L2.B & R | Dismount and recondition for MKI 2B exchange | | - | - | |
| C4L2.C (New E4L2.C) | Reconditioned after leak from gate valve Q4-D2L2.R | Done | - | - | - |
| A4L2.X & B4L2.X (New C4L2.X) | Modify the layout for new TDIS. Waiting final installation | Stand-by | Updated | Wk.26 | Waiting TDIS surface tests: Second bakeout started |

LSS4

| Vacuum Sector | Intervention Description | Intervention Status | Layout Database | SCADA | Next |
|-----------------|---|--|-----------------|---------|----------------------------------|
| New F5 + E5L4.R | Sectorization for BWS.5L4.B2 | F5L4 reconditioned E5L4 waiting for BWS | Updated | Ongoing | Waiting BWS: First test done |
| D5L4.R | BSRT mirror exchange BVO consolidation | Standby | - | - | Waiting BSRT |
| New C5 + B5L4.B | Sectorization for BGC | Standby | Updated | - | waiting for BGC acceptance tests |
| D5R4.B | - BSRT mirror exchange - BVO consolidation | Standby | - | - | Waiting BSRT |
| New E5 + F5R4.B | Sectorization for BWS.5R4.B1 | F5R4 reconditioned E5R4 waiting for BWS | Updated | Ongoing | Waiting BWS: Second test ongoing |

LSS5

| Vacuum Sector | Intervention Description | Intervention Status | Layout Database | SCADA | Next |
|---------------|-------------------------------------|---------------------|-----------------|-------|------|
| B4L5.R&B | TLC.4L5.B2 and TCTPH.4L5.B1exchange | Done | - | - | - |
| A4L5.C | Repumping due to gate valve leaking | Done | - | - | - |
| B4R5.B | Faulty VPI exchanged. | Done | - | - | - |
| A5R5.B&R | Consolidate VMTIA.A5R5.B RF inserts | Done | - | - | - |

DUMP LINES

| Vacuum Sector | Intervention Description | Intervention Status | Layout Database | SCADA | Next |
|---------------|--|--|-----------------|-------|------|
| CTD62.DR | BTVDD screen OK - VPIC inspected – Waiting to upgrade dump windows | Stand-by | - | - | - |
| BTD62.DR | <ul style="list-style-type: none"> - VPIZ consolidation - Pumping group consolidation (BVO+ICM) done | Changed 2x faulty VPIZ -> Waiting validation ICM test (TE-ABT HV test) | - | - | - |
| ATD62.DR | <ul style="list-style-type: none"> - Leak detection done (OK) - RGA MID ongoing | RGA MID ongoing | - | - | - |
| BTD68.DB | <ul style="list-style-type: none"> - VPIZ consolidation - Pumping group consolidation (BVO+ICM) done | TE-ABT HV test started week 11-12 | - | - | - |
| CTD68.DB | Waiting to upgrade dump windows | Stand-by | - | - | - |

LSS7

| Vacuum Sector | Due Date | Intervention Description | Intervention Status | Layout Database | SCADA | Next |
|---------------|----------|---|---------------------|-----------------|---------------|---------------|
| A6L7.B | Na | TCPP.C6L7.B1 and TCPP.D6L7.B1 | Not started | - | - | Waiting TCPPM |
| B5L7.B&R | Mar 2020 | - MQWA replaced by TCAPM - TCSPM.6L7.B2 | In progress | Done | - | Waiting TCSPM |
| A5L7.R | Na | TCSPM.E5L7.B2 | Not started | Done | - | Waiting TCSPM |
| A4L7.B | Na | - TCSPM.D4L7.B1 + 2 new VPIAN / VPNCA | Not started | Done | To be updated | Waiting TCSPM |
| IP7.B&R | Na | - TCSPM.B4L7.B1 + TCSPM.B4R7.B2 + 4 new VPIAN / VPNCA | Not started | - | - | Waiting TCSPM |
| A4R7.R | Nov 2019 | - TCSPM.D4R7.B2 | In progress | Done | - | Waiting TCSPM |
| A5R7.B | Na | - TCSPM.E5R7.B1 + 1 new VPIAN / VPNCA | Not started | Done | To be updated | Waiting TCSPM |
| B5R7.B&R | Mar 2020 | - MQWA replaced by TCAPM - TCSPM.6R7.B1 | Not started | Done | - | Waiting TCSPM |
| A6R7.R | Mar 2020 | TCPP.C6R7.B2 and TCPP.D6R7.B2 | Done | - | - | - |



LSS8

| Vacuum Sector | Due Date | Intervention Description | Intervention Status | Layout Database | SCADA | Next |
|------------------------------|----------|---|---------------------|-----------------|---------|--|
| A5L8.R | Na | <ul style="list-style-type: none">- Add a BPM on the internal line- VPS test with B. Henrist | Magic box installed | Done | - | Waiting BPM acceptance tests |
| A4R8.X & B4R8.X (New C4R8.X) | Na | Modify the layout for new TDIS. Waiting final installation | Ongoing | Updated | Ongoing | Waiting TDIS surface tests then installation |

Cryogenic Area Activities

ARC

overview

wk.25

| ARC | Status | BVO Consolidation | Final Leak detection | Next activity | Left | Final pump down |
|-----|---------------|-------------------|---|--|---|-----------------|
| 12 | Pump down | Done | Done | TCLD bakeout (wk. 27/28) | - | - |
| 23 | Pump down | | Foreseen - LD pumping ports (20% left) | TCLD integration, validation and bakeout | - | - |
| 34 | Pump down | | Done | - | - | - |
| 45 | Pump down | | Done | - | - | - |
| 56 | Pump down | | Done | - | - | - |
| 67 | Pump down | | Done | Venting for 11T-TCLD activities (?) | <ul style="list-style-type: none"> LD new PIMs TCLD integration and bakeout | - |
| 78 | Static vacuum | | Foreseen - LD pumping ports (100% left) | - | - | - |
| 81 | Pump down | | Done | - | - | - |

ARC67

- Reinstallation of protection sheets and visual inspection ongoing [AL4030]

ARC12

- Exchange pumping group in Q7L2 after failure. Volume 11L2-7L2 in static vacuum since 9 Mai. Pump down restarted

SMA18

- Installation sector valves and instrumentation on LENRB bypass cryostat completed and leak tested



Activities for next weeks

ARC

12

- Bakeout TCLD (after SCADA update) – wk.27/28

23

- Finish leak detection of pumping ports (20 % left)

67

- Venting for 11T-TCLD activities (?)

78

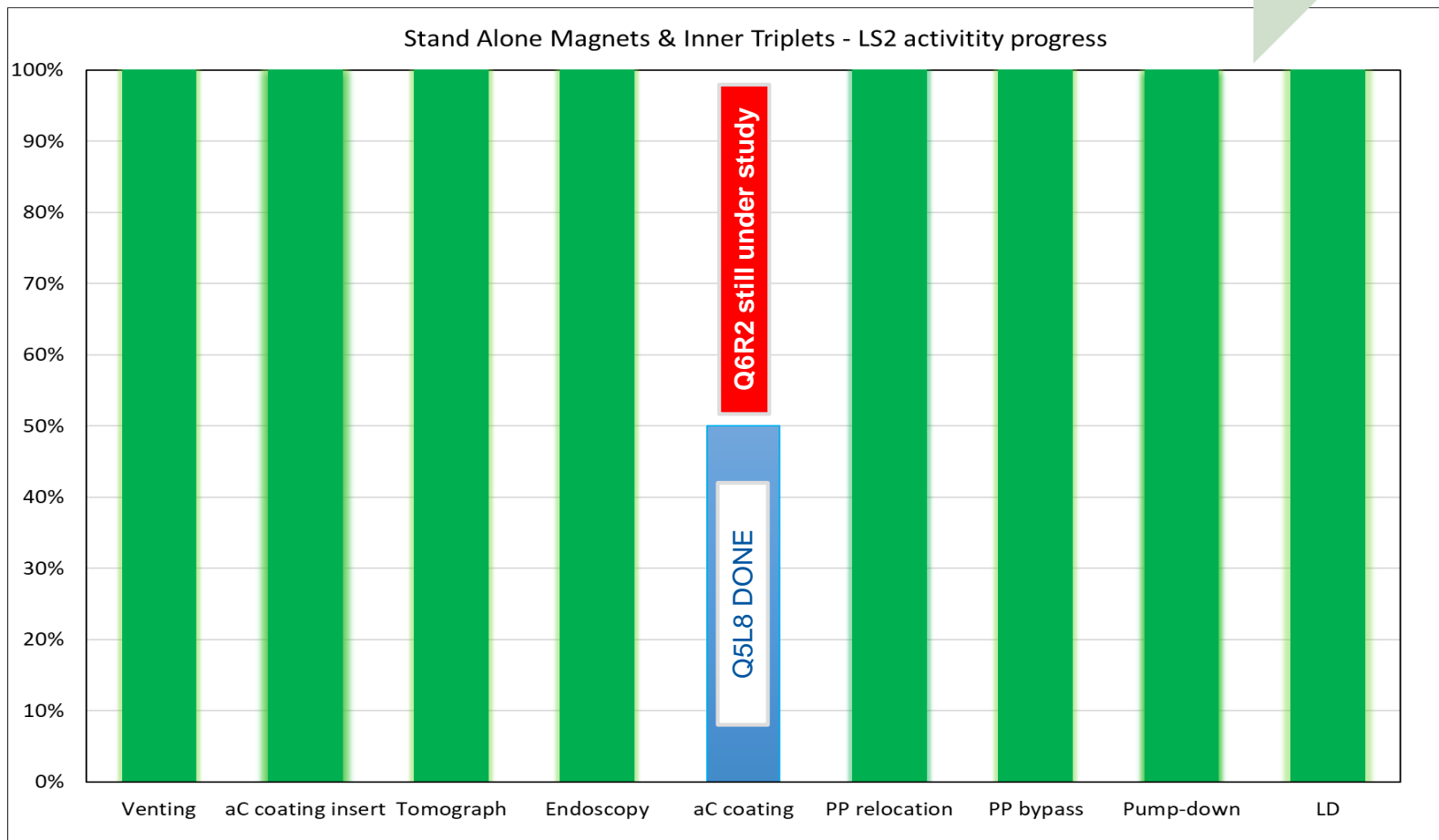
- Restart pump down for leak detection of pumping ports (100% left)

SAM&IT

IT1R: Dismount pumping group and pinchoff

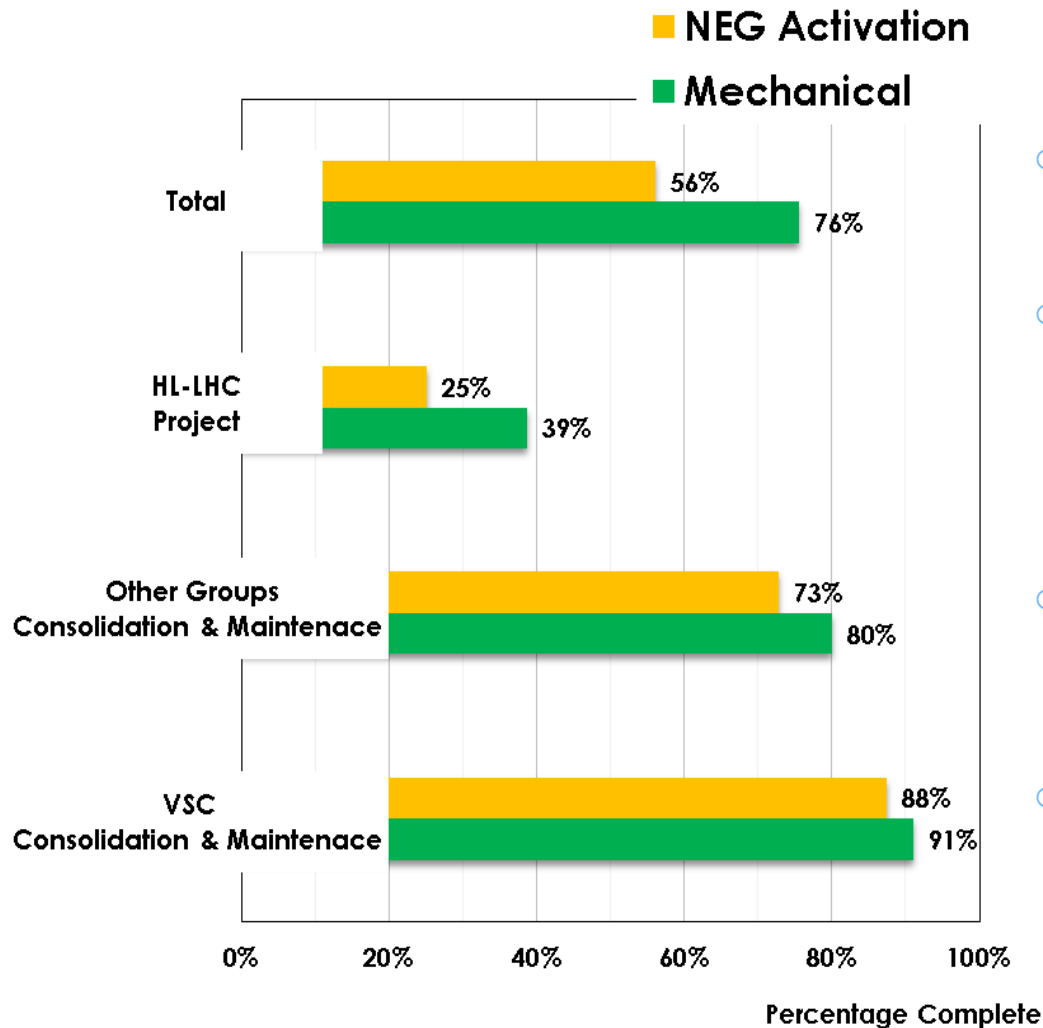
Q6L3: Venting for valve VVF exchange

Overview of SAMs & ITs Beam Vacuum Activities



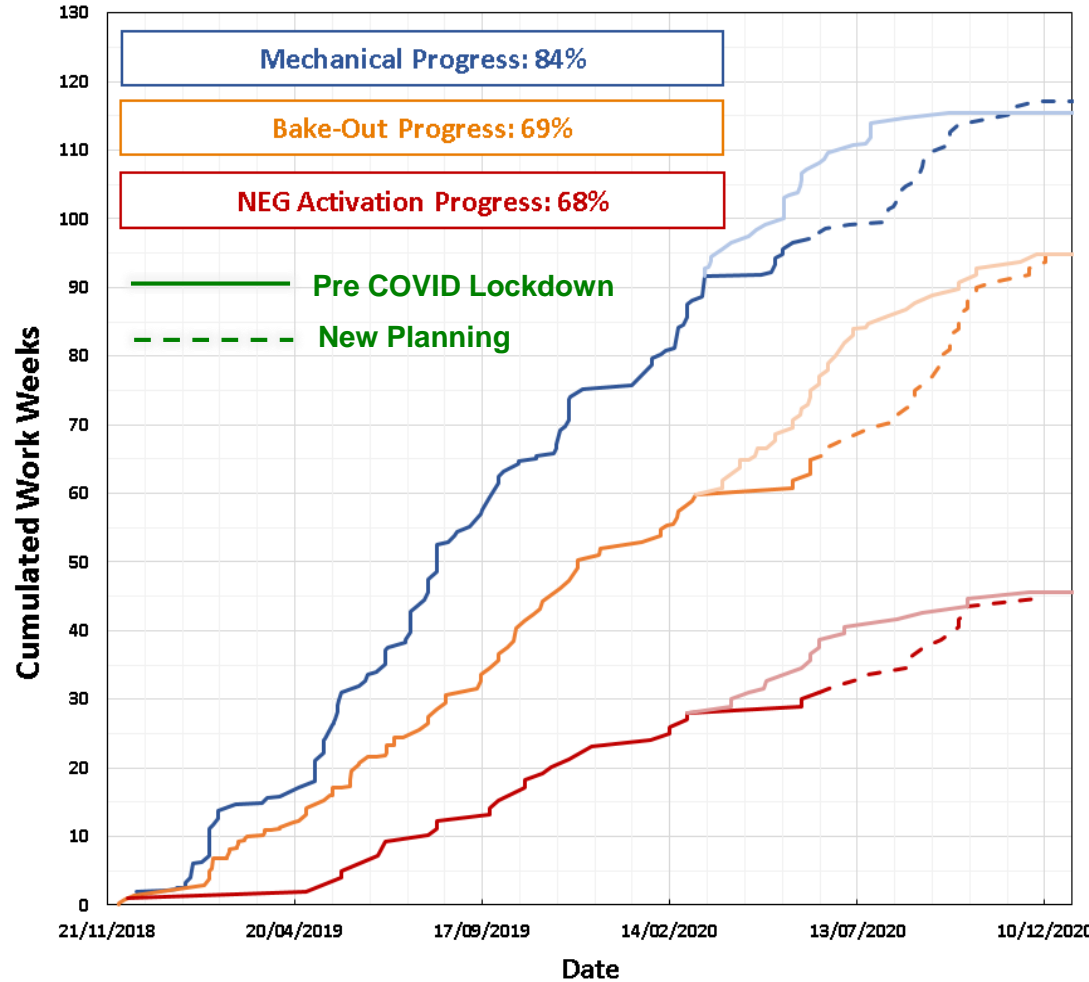
Dashboards & Impact on the planning

LHC Beam Vacuum: Activity Progress Status



- Very good advancement of the activities with already $\frac{3}{4}$ of the mechanical ones already completed;
- For other groups consolidation: most of the components have arrived or have been already validated in our VSC lab: soon will be installed giving margin and flexibility for other tasks;
- HL-LHC main activities (TCSPM & TDIS & MKI) start to arrive and we are confident we could cope with the planning;
- VSC maintenance will be done at the end of all the activities during the final validation steps.

Dashboard & resources availability



The early restart after the COVID lockdown allows to:

- Get back some delays and finish some unexpected works related to the LSS5 global alignment campaign;
- Fully restart the vacuum acceptance tests lab allowing to be ready and quickly react once the new components or subassembly started arriving: BPM cables, MoGr blocks, TDIS, BWS, etc..

Need to avoid peak activities between July-September and give some time for logistic reorganization: New planning agreed with the coordination.

More than 95% of the activities will be finalized between October-November: The only activity still not in the planning is the new dump windows: Expected in January

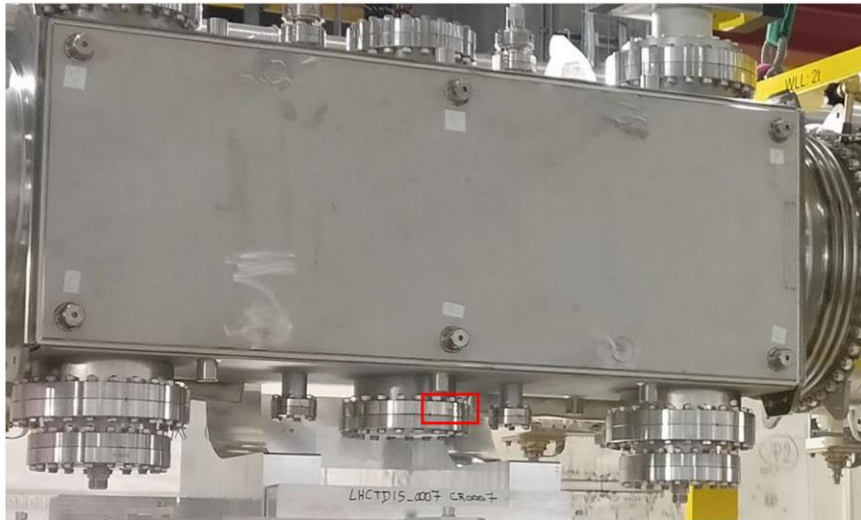
LHC experiments vacuum chambers production well on time: Also in this case avoiding co-activities would help to keep the high-quality standard and experienced personnel on each task

Bakeout & NEG Activation Planning

| NEG Activation | LSS | Vacuum Sector | First | Second | Support if needed | Wk. | Column1 | Lenght |
|----------------|-------|---------------------|----------|----------|-------------------|-------|-----------------------------|--------|
| 1 | 4 | F5L4.R | Ivo | Giuseppe | Nicolas | 17 | | 25 |
| 2 | 6 | A4L6.R & B | Ivo | Simone | Michele | 19 | | 180 |
| 3 | 4 | F5R4.B | Simone | Ivo | Sergio | 22 | | 25 |
| 4 | 6 | A4R6.R & B | Giuseppe | Michele | Julia | 25 | Consolidation | 180 |
| 5 | 6 | IP6.B | Michele | Orlando | Eric | 25 | Consolidation | 155 |
| 6 | 8 | A4L8.C | Cesar | Didier | Piotr | 31 | TANB | 50 |
| 7 | 4 | A6R4.R & B | Cesar | Piotr | Nicolas | 32 | Consolidation | 60 |
| 8 | 8 | C4R8C | Piotr | Didier | Chiara | 32 | TANB | 36 |
| 9 | 1 | A5L1.R + B4L1.B | Orlando | Michele | Josef | 38 | Wire collimators | 26.2 |
| 10 | 2 | A4R2.C | Eric | Josef | Giuseppe | 39 | TCLIA | 50.2 |
| 11 | 6 | IP6.R | Chiara | Josef | Jerome | 41 | BTVE Consolidation | 155 |
| 12 | 8 | A7R8.R & B | Jerome | Sergio | - | 42 | Ti8 Intervention | 20 |
| 13 | 5 | A6L5.R | Ivo | Piotr | Gregory | 44 | Totem | 23 |
| 14 | 5 | A7R5.B | Michele | Didier | - | 46 | Consolidation | 22.5 |
| 15 | 5 | A6R5.B & R | Orlando | Nicolas | - | 47 | Totem | 56 |
| 16 | 5 | A7L5.R | Nicolas | | | 48 | alignement | 24 |
| 17 | 4 | IP4.B + B5R4.R&B | Nicolas | Didier | Giuseppe | 49 | Cavity exchange | 81.5 |
| 18 | 2 | B4L2.C | Michele | Eric | | 6 | TDIS adjacent | 8.6 |
| 19 | 8 | Ti8 | Gregory | Michele | Didier | 7 | Ti8 Intervention | |
| 20 | 8 | A4R8 | Michele | Didier | Gregory | 7 | TDIS adjacent | 6.9 |
| 21 | 8 | A6R8 | Michele | Didier | Gregory | 8 | Ti8 Upgrade | 119.2 |
| 22 | 3 | B5L3.B | Ivo | Sergio | | 9 | Sector valve exchange | 79.1 |
| 23 | 7 | A6R7.R | Didier | Ivo | | 10 | TCPPM Upgrade | 70.3 |
| 24 | 5 | B4L5.R & B | Julien | Michele | | 24 | Wire collimators upgrade | 24.4 |
| 25 | 5 | A5R5.R&B | Julien | Michele | | 25 | Alignement LSS5 | 38 |
| 26 | 5 | B4R5.B | Julien | Michele | | 24 | Ion pumps Leak | 22 |
| 27 | 2 | A6L2.R & B | Cesar | Karl | | 27 | Ti2 Intervention | 116.8 |
| 28 | ARC12 | TCLD.11L2.B1 | Cesar | Karl | | 28 | TCLD | 1 |
| 29 | ARC23 | TCLD.11R2.B1 | Cesar | Karl | | 33-34 | TCLD | 1 |
| 30 | 4 | C5L4.B + B5L4.B | Orlando | Alex | Giuseppe | ??? | BGC | 28.6 |
| 31 | 7 | IP7.R & B | Didier | Julien | | ??? | TCSPM | 165.8 |
| 32 | 4 | D5L4.R | Orlando | Alex | Giuseppe | ??? | BSRT & BWS Sectorization | 21.5 |
| 33 | 4 | D5R4.B | Orlando | Alex | | ??? | BSRT & BWS Sectorization | 21.5 |
| 34 | 7 | B5R7.B&R + A4R7.R | Eric | Ivo | | ??? | MQW Upgrade & TCSPM Upgarde | 118.1 |
| 35 | 7 | A5L7.R & A5R7.B | Didier | Julien | | ??? | TCSPM upgrade | 58.4 |
| 36 | 2 | MKI Exchange | Eric | Alex | | ??? | HL-LHC MKI Upgrade | 4.5 |
| 37 | 7 | B5L7.R & B + A4L7.B | Eric | Ivo | | ??? | MQW Upgrade & TCSPM Upgarde | 118.1 |
| 38 | 7 | A6L7.B | Didier | Ivo | | ??? | TCPPM Upgrade | 69.6 |
| 39 | ARC67 | TCLD.8L7.B2 | Cesar | Karl | | ??? | TCLD | 1 |

Encountered problem

- TDIS leak open at the end of the bakeout cycle
- Leak in the range of $5E-5$ up to $1E-4$ mbarl/s
- Possible reason was problem on a welding. It was retaken in situ.
- We have restarted the bakeout. It should finish back this week



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