Shift Crew Feedback

Input from the Operators and EiCs (OP+HCC)

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LHC-OP

HWC Review -28/2/2008

Overview

- **Overall Impression**
  - Significant improvement over Sector 78
  - Mechanisms for parallel fronts exercised
  - Development of “shift crew approach” to powering tests
  - Good division of duties between Point Owner and Shift Leader

- **What needs to be addressed**
  - **Some safety aspects**
    - Personnel
    - Equipment
  - **Tuning up of some features in the software tools**
  - **Improving efficiency and throughput**
    - Tracking progress and bookkeeping
  - **Organisation**
    - The plan of attack
  - **Shift constraints:** tackling more than 2 fronts at once

Personnel Safety

- **A functional access system is needed**
  - Token system was not sufficient to cover all possibilities
  - For next sectors **need the LHC access system (in restricted access mode!)**

- **Using a functional Access system**
  - Training with new system is essential. Need to understand procedures + zoning
  - All equip groups **must understand implications to unauthorized entry** to a zone
    - Forced door =>Patrol is mandatory => no powering activity until patrol finished

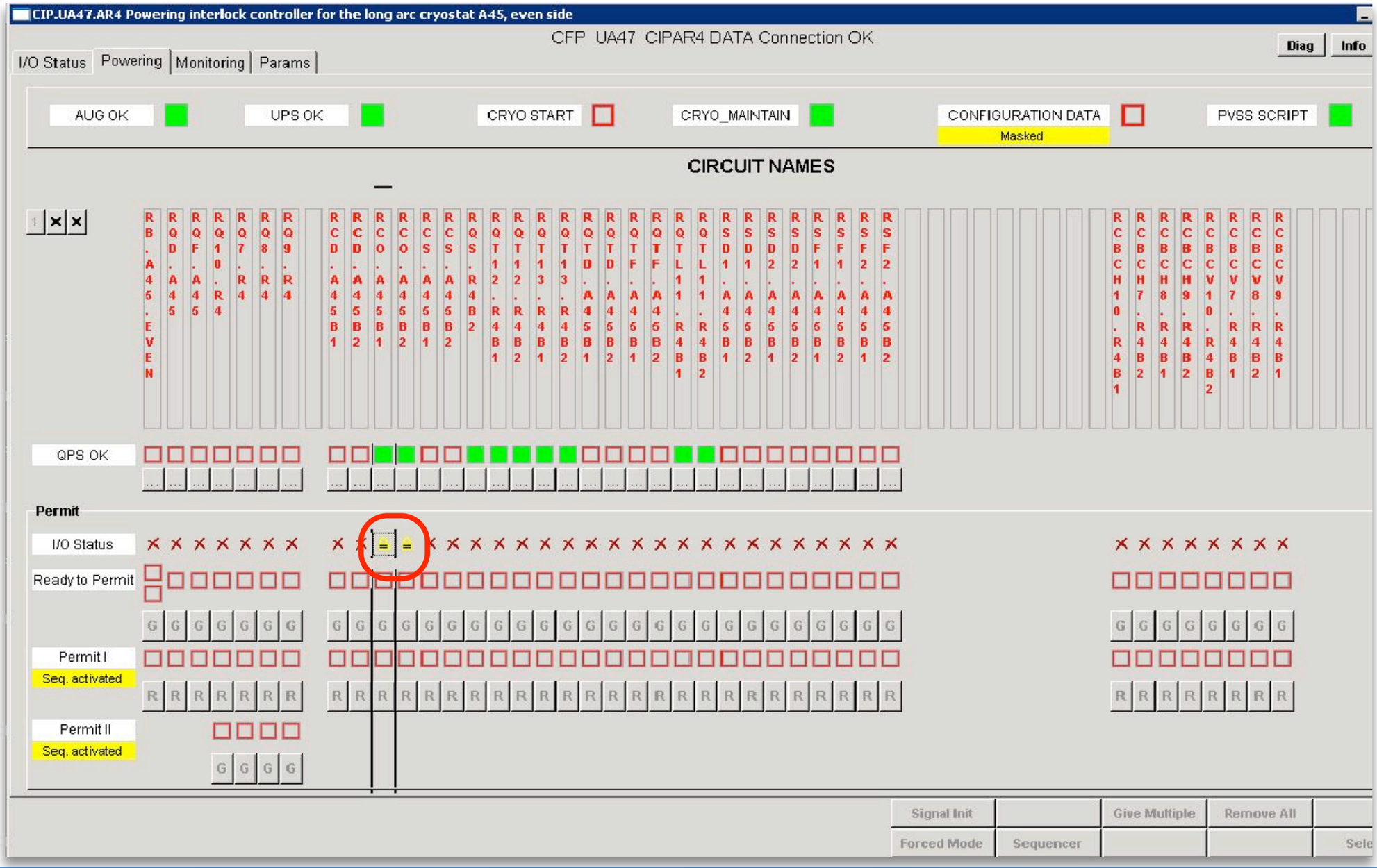
- **Access requests**
  - **All requests must go through the EiC**
    - Access requests related to powering tests: User->EiC
    - Access requests not related to powering tests: User-> Pt Owner -> EiC
  -

- **Need to clarify access rules and unsafe conditions**
  - Powering circuits above 1kA …

- **War Map Usefulness**
  - Generally OK. If used, must be updated by EiC and Pt Owner
  - Still … more whiteboard space is needed

Safety: Blocking/Locking Circuits

- **At present:**
  - Definitively done in PIC supervisor
    - Not obvious and not passed to the powering status summary page



Equipment Safety

- **Locking/Blocking a circuit**
  - For serious long term circuit problems
    - Circuit grounded (hardware): **Responsible = HCC**
  - Circuits under consigne
    - PIC interlock: **Responsible= Point Owner**
  - Circuits blocked during tests
    - Blocked via SOC editor: **Responsible = EiC**
  - **Open Issue:** How to track what circuits are locked/blocked and reason?

- **MPP sign-off before powering: if OK => circuit can be powered**
  - Only given after ELQA
  - **Open question:** Is this a dedicated sequencer test ie included for reporting to MTF?

- **Protect against using MD mode of sequencer for sequence "shortcuts"**
  - Limit the possibility for spur of the moment changes in a sequence

- **Powering test on circuits must be run from the CCC**
  - **Running of remote powering tests on circuits not permitted**
    - ie all tests must be launched from the CCC

Software Tools

- **SACEC: review software tools on 21/2/2008**
  - Input from Shift crews: Most of tools in place but some fine tuning needed
  - **Prioritized action list now being implemented**

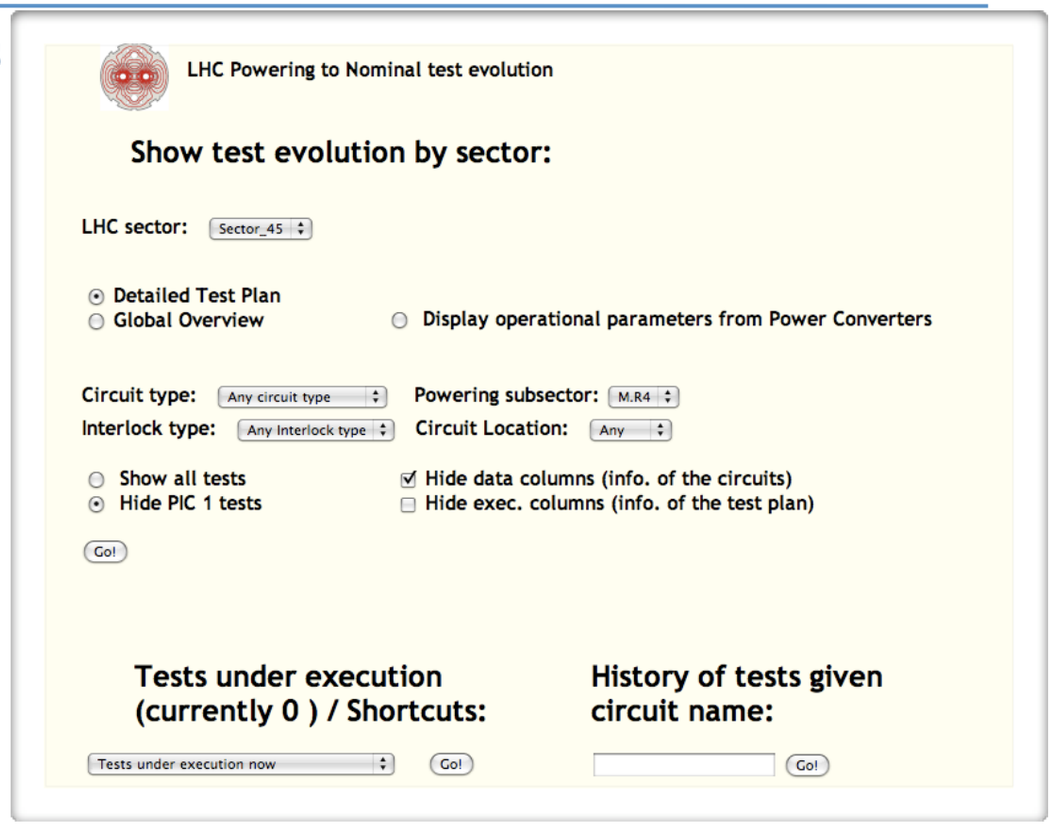
- **Key Points on the software**
  - Post mortem analysis sign-off procedure needs tiding up [In progress]
  - Streamlining operations with sequencer for running a many circuits at once
    - For 60A circuits target: 24 at once (for PCC) [How many can an operator manage?]
    - Clearly defined mechanism is needed for flagging potential non-conformities
    - Need standardized way for documenting odd features that may be problematic

- **What's missing**
  - **Software must provide an overview** [Being addressed]
    - Status of circuits under test
    - Overview of circuit status (primarily a safety issue)
  - Fixed Displays must give quick reliable summary of the situation
    - eg Cryo status and overview with temperature snapshot of sectors

Overview: Status of circuits under test

- **OP uses Powering Status page to track progress**
  - Updated every ~2 minutes
  - Extend use of color coding
    - Show unavailable locked circuits
  - Gives ability to read LSA/MTF comments
    - Especially for failed tests

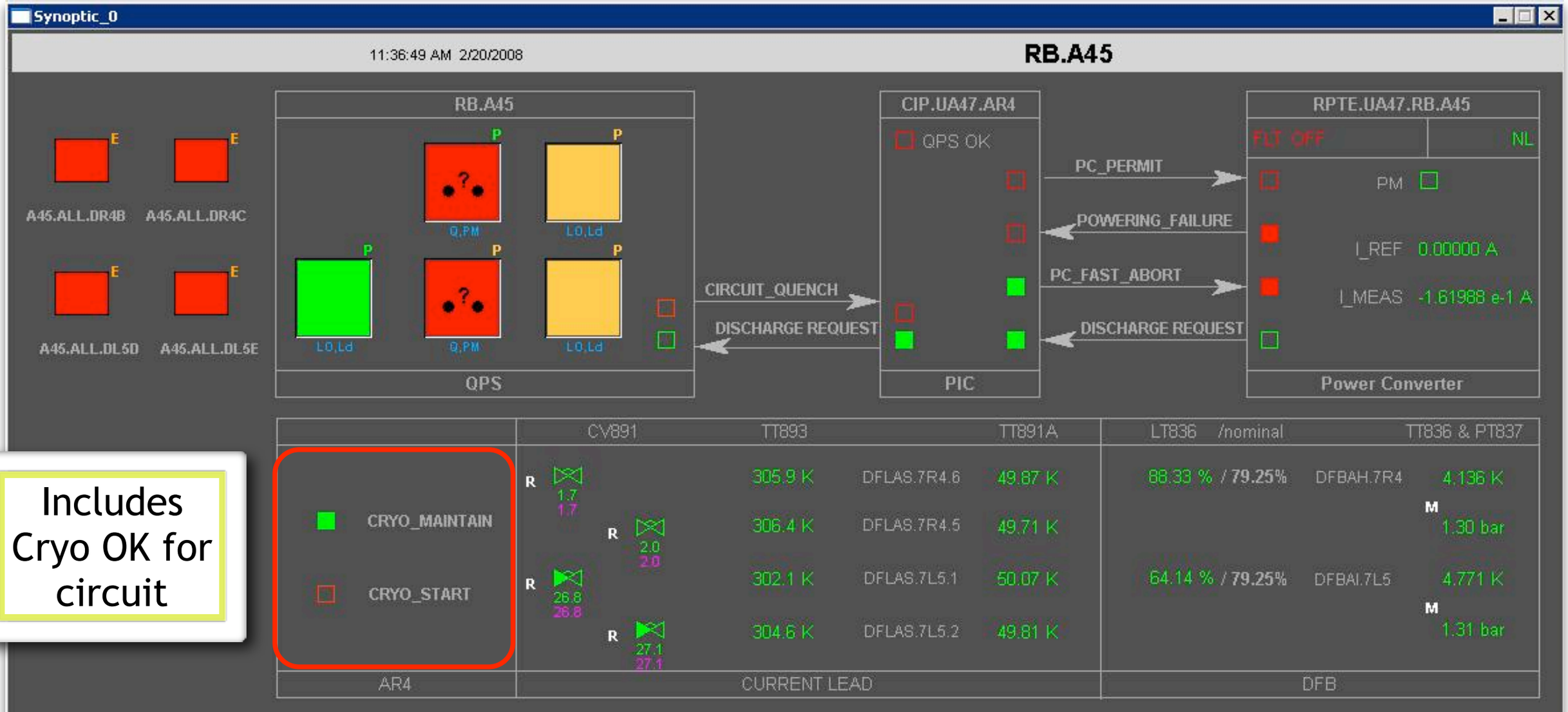
- **Develop into a Fixed Display**
  - Needs simple way to switch between sectors



CIRC.NAME	CIRC. TYPE	CIRC. LOC	I.T.	I. NOM	LAST PASSED TEST	P2N EXEC. OUT OF TOT.	LAST EXEC.	SUC	UNDER EXECUTION			
RCD.A45B1	600A EE	UA47	B1	550	PNO.a3	18 / 19 (94%)	PLI3.b1	Y	_	PCL	PCC.5	PIC2 CRYO-OK
RCD.A45B2	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PNO.d3	N	_	PCL	PCC.5	PIC2 CRYO-OK
RCS.A45B1	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PNO.d3	N	_	PCL	PCC.5	PIC2 CRYO-OK
RCS.A45B2	600A EE	UA47	B1	550	PLI3.d3	14 / 19 (73%)	PLI3.e1	WPM	_	PCL	PCC.5	PIC2 CRYO-OK
ROD.A45B1	600A EE	RR53	B1	550	PCS	10 / 19 (52%)	PLI3.b1	N	_	PCL	PCC.5	PIC2 CRYO-OK
ROD.A45B2	600A EE	RR53	B1	550	PLI3.e1	13 / 19 (68%)	PLI3.d3	WPM	_	PCL	PCC.5	PIC2 CRYO-OK
ROF.A45B1	600A EE	RR53	B1	550	PCS	10 / 19 (52%)	PLI3.b1	N	_	PCL	PCC.5	PIC2 CRYO-OK
ROF.A45B2	600A EE	RR53	B1	550	PCS	10 / 19 (52%)	PCS	Y	_	PCL	PCC.5	PIC2 CRYO-OK
RQS.A45B1	600A EE	RR53	B1	550	PLI3.e1	15 / 19 (78%)	PNO.d3	WPM	_	PCL	PCC.5	PIC2 CRYO-OK
RQTD.A45B1	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PLI3.e1	Y	_	PCL	PCC.5	PIC2 CRYO-OK
RQTD.A45B2	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PNO.d3	N	_	PCL	PCC.5	PIC2 CRYO-OK
RQTF.A45B1	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PNO.d3	N	_	PCL	PCC.5	PIC2 CRYO-OK
RQTF.A45B2	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PLI3.e1	Y	_	PCL	PCC.5	PIC2 CRYO-OK
RSD1.A45B1	600A EE	UA47	B1	550	PLI3.e1	14 / 19 (73%)	PLI3.e1	Y	_	PCL	PCC.5	PIC2 CRYO-OK
RSD1.A45B2	600A EE	UA47	B1	550	PNO.d3	15 / 19 (78%)	PNO.b1	N	_	PCL	PCC.5	PIC2 CRYO-OK
RSD2.A45B1	600A EE	UA47	B1	550	PCS	10 / 19 (52%)	PLI3.b1	N	_	PCL	PCC.5	PIC2 CRYO-OK

Circuit Overview: Status of an individual

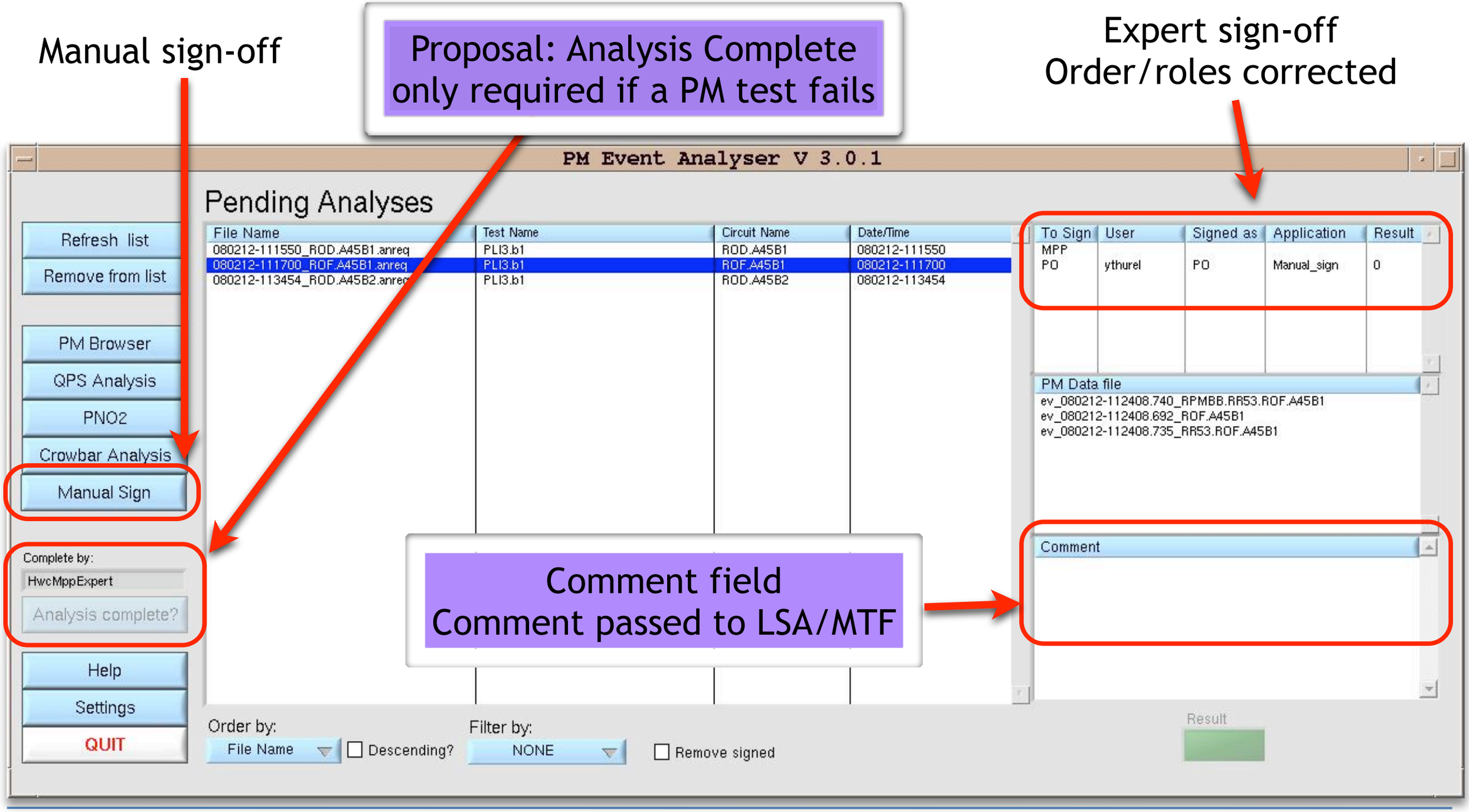
- **New Circuit Synoptic**
  - Shows circuit and dependancies
    - **Needs to be done for 60A circuits as well**
  - Gives the EiC a safety overview
  - Avoids sequencer being used as the safety reference



Includes Cryo OK for circuit

PM Event Analysis Sign-off

- **PM Event Analyzer**
  - New version developed: **Available for Sector 56**



Sign-off of PM analyses : Streamlining

- **Post Mortem event Analysis Sign-off needs refining**
  - **Clear sign-off procedure + up-to-date sign-off list must be in place**
  - Define what is required for “Analysis complete” sign-off

- **Proposals for streamlining the procedure**
    - Maintain sign-off by different equipment experts/teams
    - Only require “Analysis Complete” sign-off if equip expert fails PM analysis
      - If “Analysis Complete” sign-off is required, it this is done by the EiC
        - If the sequence aborts then remove event from PM event analyzer

- **Implications:**
  - “Analysis complete” sign-off is only required when something is not right
    - If all expert PMs passed, “Analysis Complete”automatically
      - then ... next test unlocked by sequencer
    - Equip expert PM sign-off only done if expert analysis is complete and final.
    - The on-shift expert on shift is responsible for sign-off
      - Different people can analyze the PM, but on-shift expert does the sign-off

Tracking Progress

- **Tracking of test results and non-conformities**
  - MTF is chosen as the default but what are tools to analyze data?
    - How do we cross check what is being logged?
    - How does shift crew flag potential non-conformities/concerns
      - Comment fields in sequencer pop-up windows
    - Concern: Is MTF operational for sector 56? [Answer is now Yes]

- **Status of powering tests**
  - Power Circuits status page (Alvaro's page): Excellent page
    - Based on status of tests as seen by LSA
    - Gives a snapshot of powering tests
      - Needs more color codes eg for locked circuits

  - E-logbook. Standard tool for OP. Useful for working out what happened
    - **Proposal**: Automatic entries in logbook from sequencer, access system
      - Must be careful to define and constrain ... but potentially useful
        - eg entry (circuit name, reason) if circuit fails test

Tracking features/observations

- **Comment Fields: tracking of features from PMEA or sequencer:**
  - Need to clarify how HWC wants to use this field

Comments from PM analysis

Need to comment on why sequence failed

CIRC. NAME	CIRC. TYPE	P.SUB	CIRC.LOC	TEST NAME	START TIME	END TIME	CIRCUIT COMMENTS	SUCCS	MTF	OPERATOR
RCBYV6.R4B2	80-120A	MR4	UA47	PNO.e1	12-FEB-08 20:22:10	12-FEB-08 20:33:00	_	Y	WPM	avergara
RCBYH6.R4B1	80-120A	MR4	UA47	PNO.e1	12-FEB-08 20:21:47	12-FEB-08 20:33:02	_	Y	WPM	avergara
RQ6.L5	IPQ	LL5	RR53	PNO.c3	12-FEB-08 20:06:37	12-FEB-08 21:16:41	_	Y	WPM	avergara
RQ5.L5	IPQ	LL5	RR53	PNO.c3	12-FEB-08 20:06:10	12-FEB-08 21:16:34	_	Y	WPM	avergara
RU.R4	600A EE	MR4	UA47	PCC.5	12-FEB-08 19:48:02	12-FEB-08 19:58:43	Sequence Failed	N	T	malbert
RCBYV6.R4B2	80-120A	MR4	UA47	PNO.d1	12-FEB-08 19:43:55	12-FEB-08 19:54:10	Manual_signMPP catalan CROWBAR AnalysisPO ythurel	Y	T	avergara
RCBYH6.R4B1	80-120A	MR4	UA47	PNO.d1	12-FEB-08 19:31:07	12-FEB-08 19:43:55	CROWBAR AnalysisPO Test OK jthomsen Manual_signMPP catalan	Y	T	avergara
RU.R4	600A EE	MR4	UA47	PCC.5	12-FEB-08 18:21:22	12-FEB-08 19:44:32	Sequence Failed	N	T	malbert

Features that impact operations throughput

- **Repetition of sequence due to inconsequential failure in a sequence step**
  - Avoidable: Modify sequencer mode of operation
    - **Default mode of sequencer = modified "Safe mode"**
      - Gives EiC ability to not abort sequence if only trivial step failure
      - If sequence step skipped, EiC can add reason/comment to LSA/MTF
    - MD mode still available to EiC. Only needed in exceptional circumstances

- **Management of SOCs: Standardise SOCs**
  - **Proposal**: Deploy standard set of SOCs. These are the default SOCs
  - Maintain flexibility: Define ad-hoc SOCs when needed for problematic circuits

- **What takes time/dictates throughput**
  - Expert PM analysis: Take time to make sure the test was OK
    - Equip experts should **not** succumb to pressure to increase throughput

- **Cross checks prior to powering**
  - Clarify if parameters can be forced. eg current lead temperatures in DFBs
    - If so, then issues/risks for powering the circuit,
      - If parameters forced, we need circuits locked OFF via PIC by Pt Owner

Issues from the CCC

- **The LHC Island in the CCC**
  - EiC is responsible for maintaining an efficient working environment
    - EiC can remove people from the LHC Island
      - Includes: Tourists, journalists and photographers, bystanders etc
    - **Important:** People need to give the shift crew space to work/breathe
  - EiC is point of contact for anything related to powering tests
    - This must be the EiC phone in the LHC Island: **Phone # is 77600**

- **Documentation for the EIC**
  - Assumes Powering procedures updated and correct
    - Circuit name links to up-to-date EDMS version of procedure
    - Reference set of procedures printed and in CCC
  - Request for clear updatable reference documentation in CCC
    - Drawings of sector, geographical layout, access routes and zoning description

- **Organization:** Is there a need for an on duty HC Coordinator?
  - This question needs clarification
    - If this is an on-call role to deal with larger issues then ... **Yes**
    - If this is a day-shift CCC-based role then .... **No**. Too many layers

HC Reporting and Planning: A proposal

- **Daily situation**
  - Prior to start of powering test shifts
    - Minutes of 8:30/16:30: **Responsibility: Point Owner**
  - Once shifts have started
    - Shift summaries at the end of each shift. **Responsibility: EiC**

- **Short to medium term planning**
  - **Mission for the next day. Responsible: Point Owner + EiCs of the day**
    - Planning based on daily RAT meetings + progress of the day
    - Drafted by Pt owner after 16:30 RAT, revised by EiC from afternoon shift
    - Released at 23:00 on night before

- **Reporting of progress from the past week**
    - Summary of progress and issues. **Responsible: Point Owner**
    - Given on Friday afternoon?

- **In all cases:** format, availability and web links needs to be properly defined
- **In all cases:** A clear and agreed means is needed which planning/progress is reported

Shifts: Questions and Observations

- **General observation from Sector 45**
  - Shift crews worked well:
    - Equipment and OP teams were flexible and adjusted to demands of test program
- **Shift related questions**
  - Does the baseline stay at 2 shifts per day, 5 days a week?
  - How useful is the hour between 7:00 and 8:00
    - Is 8:00-16:00 & 15:00- 23:00 better than 7:00-15:00 & 14:00- 22:00?
  - What defines a shift crew
    - 1 Shift Leader + N operators. N to be determined. [Sector 45: N=2 was good]
    - Expert teams on shift: MPP, PO, PM, QPS
    - Pt Owners: Available
    - HWC Coordinator - On call
- **Shift Objective:**
  - Defined by Mission statement. Confirmed by RAT meeting
  - Teams in place to ensure work of the day
  - **Proposal:** Formalize the shift handover
    - EICs (+ Point Owner?) take 30 minutes at handover to review issue

Manning Shifts: Comments from OP

- **Nominal allocations for HWC shift work**
  - 18 people available for HWC shifts
    - 5 Hardware Commissioning Engineers (HCE)+ 6 OP (EiC) + 7 OP operators
  - OP personnel limited to max of 50% shift work (due to 2nd job: beam commissioning)
- **Multiple Fronts Assumption** (more than 2 fronts)
  - Assume there is **1 SL + N operators per shift**
  - Shift Leader (SL): must orchestrate, coordinate, document, etc.
    - ie Shift Leader cannot also run a front.
- **What does this imply?**
  - The 1 SL/shift is drawn from the pool of 11 HCEs and EiCs.
  - The N operators/shift: drawn from remaining pool of HCEs+ EiCs +OP operators
    - If N = 4, => need 10 people per day => staff work 10/18 of the time on shift
  - **Question:** Is N =4 reasonable? ie (resources, space in CCC, expert teams etc).
- **Notes**
  - N=4 does not restrict the shift crew to only 4 fronts.
  - This assumes 2 shifts/day 5 days a week