

**LHC intensity increase – check list**

Version 0.2 - 4-Oct-10

<b>Bunch pattern / intensity</b>	104 nominal bunches
<b>Start date</b>	25.09.2010
<b>Fill numbers</b>	1371, 1372, 1373, 1375
<b>Next intensity</b>	<b>Conditions are fulfilled to move to 152 nominal bunches.</b> Tuesday 28 <sup>th</sup> September 15:00
<b>Comment</b>	No UFO recorded with sufficient intensity to dump the beam. Injection of 8b.

Fill	Int B1/B2 [1E12]	Emittance [um]	Stable beams (h)	Dump reason
1371	10.5/10.5	~2.5	0	TCDQ did not start its ramp (B2). SIS and energy position interlock.
1372	11.0/11.0	~2.5	15.5	OP dump
1373	11.0/11.0	~2.8	13.0	OP dump
1375	11.0/11.0	~3.0	9.0	OP dump

## Check list

Non-conform points: the intensity increase is put on hold pending a satisfactory understanding / resolution of the issue.

<b>Magnet powering</b>	<b>Status</b>	<b>Who</b>
No unexplained IPOC failure in Post Mortem for FMCM and PIC	OK	JW
No magnet quench after beam dump in RQ4.R/L6	OK	JW
No unexplained quench of a magnet	OK	JW
No unexplained abort of the 3 previous fills by magnet powering system	OK	JW
No problems with loss of QPS_OK for main circuits following injection process	OK	JW
<b>Comments:</b>		

<b>Beam interlocks</b>	<b>Status</b>	<b>Who</b>
No unexplained IPOC failure in Post Mortem for BIC	OK	JW
No unexplained false beam dump from beam interlock system	OK	JW
No failure of BIS pre-operational check	OK	JW
<b>Comments:</b>		

<b>BLM</b>	<b>Status</b>	<b>Who</b>
Internal test (sanity checks) results must be true	OK	JW/BD
Rise time (10 to 90%) of fast losses must be larger than 200 us	OK	JW/BD
No unexplained BLM check failures	OK	JW/BD
Expected losses for the to be injected beam must be 30 % below threshold level	n/a	JW/BD
BLM system modification (ECRs) have to be agreed on, EDMS: notified persons signature is needed	n/a	JW/BD
No nonconformities in the energy transmission to the BLM crates	OK	JW/BD
<b><u>Comments:</u></b>		

<b>Collimation</b>	<b>Status</b>	<b>Who</b>
Betatron loss map	OK(1)	JW
Off-momentum loss map	NO	JW
No observed violation of cleaning hierarchy	OK(2)	JW
<b><u>Comments:</u></b>		
(1) Betatron loss map with TCTs 2sigma closer than nominal performed second half of week 38.		
(2) Based on recorded losses in collisions and PM BLM data.		

<b>Post-mortem</b>	<b>Status</b>	<b>Who</b>
Loss leakage to TCTs below 0.5% during beam dump	OK	JW
UFO occurrences	0	JW
No unexplained PM event above 450 GeV	OK	JW
<b>Comments:</b>		

<b>Orbit</b>	<b>Status</b>	<b>Who</b>
Global orbit in tolerance in stable beams (< 0.2 mm rms)	OK	JW
Orbit IR3/IR7 collimators within $\pm 0.2$ mm in stable beams	OK	JW
Check that orbit is correctly measured	OK	JW
BPM IP6 (interlock BPM) during first beam with higher intensity and different bunch pattern	OK	JW/JU
Orbit at TCTs in tolerance in stable beams ( $\leq 1$ sigma)	OK (1,2)	JW
<b>Comments:</b>		
(1) IR2 TCTH on B2 stable at -1 sigma (or just below).		
(2) In the last fill some negative vertical offsets developed in all IRs (BPM calibration?) so far at the level of a fraction of a sigma. To be followed closely.		

<b>Feedbacks &amp; operation</b>	<b>Status</b>	<b>Who</b>
OFB operational status / no anomalies	OK	JW
QFB operational status / no anomalies	OK (1)	JW
<b>Comments:</b>		
(1) Loss of signal on BBQ due to noise on the beam – filter change has improved the situation, but no fully robust. Should consider chirping systematically.		

<b>Beam dump</b>	<b>Status</b>	<b>Who</b>
Asynchronous dumps understood? Protection worked correctly?	OK	BG/JU
Parasitic asynchronous dump data show no loss of protection	OK (2)	BG/JU
No positioning errors on TCSG/TCDQ	OK	BG/JU
No settings or thresholds mistakes/wrong sequences/unexplained faults on TCSG/TCDQ	Not OK (1)	BG/JW
No unexplained MKD, MKB kicker, TSU or BETS faults	OK	BG/JU
No potentially dangerous XPOC or IPOC failure on MKD or MKB	OK	BG/JU
No unexplained synchronization problem with TSU	OK	BG/JU
Pressure and temperature rise in TDE block within tolerances	OK	BG/JU
Requalification passed OK at 450 GeV and 3.5 TeV with pilot in case of any important component exchange	n/a	
<b>Comments:</b>		
(1) The first ramp with 104b was lost due to interlocks (SIS, TCDQ B2) due to the fact that the TCDQ remained armed and did not start its ramp. The protection worked well (SIS at 470 GeV, HW energy interlock at 720 GeV)		
(2) ratio TCT/TCDQ loss all less than 1e-4		

Note: some items only relevant for increase injected intensity

<b>Injection</b>	<b>Status</b>	<b>Who</b>
Injection oscillations within tolerance for all injections	OK (1)	BG/JU
No unexplained large beam loss on TCDIs	OK	BG/JU
No issues in injection procedure, settings or tolerances	OK	BG/JU
Orbit in injection region in tolerance wrt reference (tolerance <0.5 mm)	?	BG/JU
Resetting of TL trajectories and TCDIs done when needed	TO DO	BG/JU
No increased rate of MKI flashovers	NOT OK (2)	BG/JU
No increased rate of MKI switch erratics or missings	OK	BG/JU
No unexplained MKI vacuum or temperature activity	OK (3)	BG/JU
No machine-protection related injection system hardware failures	OK	BG/JU
<b>Comments:</b>		
(1) B2V has 4mm p2p for first bunch only – MKI delay maybe to adjust. B1 has some IQC acquisition issues.		
(2) MKI flashover on B1.MKIB (as last time) during injection. Reconditioned. Beam not affected.		
(3) temperature rise of 2-4 K seen on MKI damping ferrite – temperature rise on magnetic ferrites much less (measured max 0.5 K, or 0.65 K in magnet)		