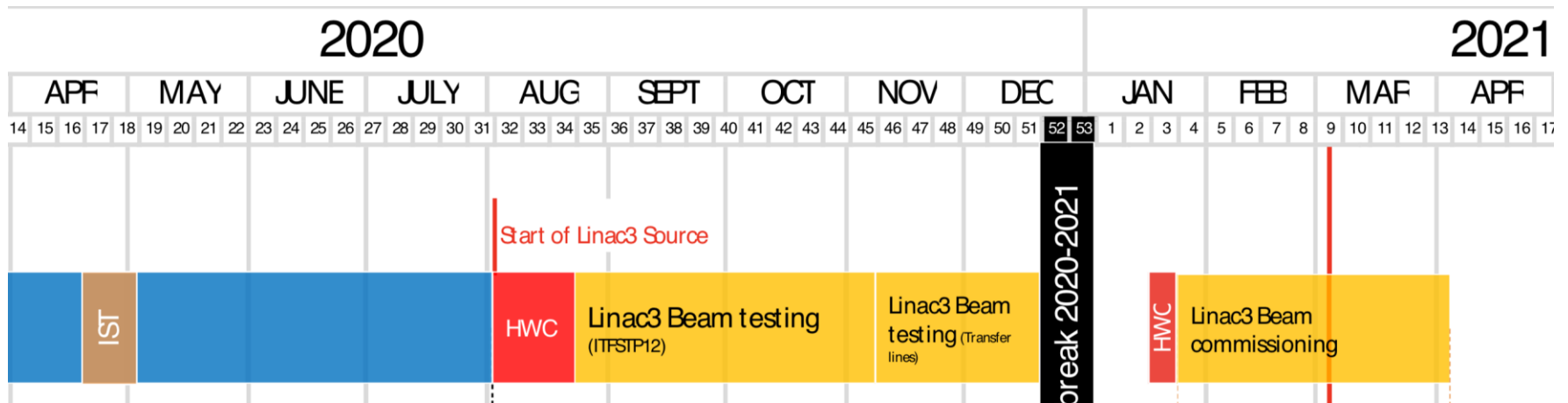


LINAC3 and LEIR HWC Planning

C. Wetton, R. Alemany Fernandez, R. Scrivens

LINAC3 – Proposed Schedule



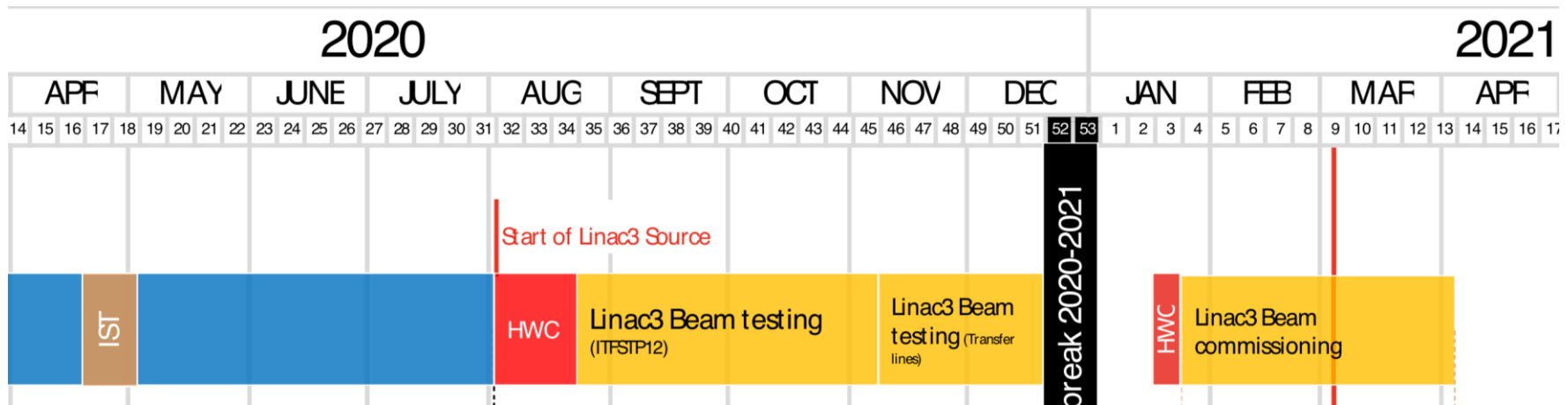
Separate IST and HWC periods

- LINAC3 IST W17-18 2020 (before PS Switchyard IST)

LINAC3 – Proposed Schedule

Task name	Duration	Start date	Finish date	May, 2020																										
				17	18	19	20	21	22	23	24	25	26	27	28	29	30	01	02	03	04	05	06	07	08	09	10	11	12	13
LINAC3_LS2_ISTS	223d	01/04/2020	01/03/2021																											
Pre-requisites	105d	11/03/2020	12/08/2020																											
DeminerIALIZED Water	0d	01/04/2020	01/04/2020																											
Town Water Station	0d	13/07/2020	13/07/2020																											
Electrical Services	0d	01/04/2020	01/04/2020																											
End Ventilation installation in Linac3 Hall	0d	11/03/2020	11/03/2020																											
Ventilation Linac3 Operational	0d	12/08/2020	12/08/2020																											
CO Services	0d	20/04/2020	20/04/2020																											
Vacuum ITH+LBS	0d	20/04/2020	20/04/2020																											
Vacuum All Linac	0d	31/07/2020	31/07/2020																											
Patrol Switchyard - if necessary	1d	17/04/2020	17/04/2020																											
DSO tests Switchyard	0.5d	20/04/2020	20/04/2020																											
Deconsignation Switchyard Converters	0.5d	20/04/2020	20/04/2020																											
Deconsignation Linac3	0.5d	29/06/2020	29/06/2020																											
Deconsignation Linac3-WIC rack	0.5d	20/04/2020	20/04/2020																											
ISTS SwitchYard (ITH+LBS)	6d	21/04/2020	28/04/2020																											
Access required - Details to be co-ordinat	6d	21/04/2020	28/04/2020	Access required - Details to																										
WIC	2d	21/04/2020	22/04/2020	WIC																										
Power Converters	2d	23/04/2020	24/04/2020	Power																										
Magnet Tests	2d	27/04/2020	28/04/2020	Magt																										
Beam Instruments	4d	21/04/2020	24/04/2020	Beam Instru																										
HWT Switchyard	4d	27/04/2020	30/04/2020																											
WIC/Power Converters/Magnets	2d	29/04/2020	30/04/2020	WIC																										
Beam Instruments ITH	2d	27/04/2020	28/04/2020	Beam																										
ISTS+HWT Linac3	135d	21/04/2020	30/10/2020																											
Source (with ventilation perturbations)	15d	03/08/2020	21/08/2020																											
WIC (Linac3 - no magnet powering)	9d	21/04/2020	04/05/2020	WIC (Linac3 - no magnet powering)																										

LINAC3 – Proposed Schedule



Separate IST and HWC periods

- LINAC3 IST W17-18 2020 (before PS Switchyard IST)
- Start LINAC3 Source W32 2020
- Progressive HWC from W32 2020
- HWC following YETS 2020-21 W3 2021

LINAC3 – Proposed Schedule

Task name	Duration	Start date	July, 2020					August, 2020					September, 2020				October, 2020			
			26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
WIC	2d	21/04/2020																		
Power Converters	2d	23/04/2020																		
Magnet Tests	2d	27/04/2020																		
Beam Instruments	4d	21/04/2020																		
HWT Switchyard	4d	27/04/2020																		
WIC/Power Converters/Magnets	2d	29/04/2020																		
Beam Instruments ITH	2d	27/04/2020																		
ISTs+HWT Linac3	135d	21/04/2020																		
Source (with ventilation perturbations)	15d	03/08/2020																		
WIC (Linac3 - no magnet powering)	9d	21/04/2020																		
RF	59d	03/08/2020																		
Beam Instruments (ITL+ITM)	5d	03/08/2020																		
Beam Instrumentation (ITF)	5d	31/08/2020																		
Stripper, Slits and Stoppers	5d	03/08/2020																		
Power Converters - ITM, IA, ITF (could m	3d	17/08/2020																		
Magnet Tests ITM, IA, ITF	2d	21/08/2020																		
WIC - BE-OP test of chain	1d	20/08/2020																		
BEAM CONDEMNATION - ITF.BHZ14	32d	26/06/2020																		
Remove ITF. BHZ14 CONDEM	0d	10/08/2020																		
BEAM CONDEMNATION - ITF.BEAMSTC	59d	10/08/2020																		
Put ITF.BEAMSTOPPER CONDEM	0d	10/08/2020																		
Remove ITF. BEAMSTOPPER CONDEM	0d	30/10/2020																		

LINAC3 – Other Tests

NO DSO tests or beam permit required.

Beam tests:

W46 – 51 2020: Beam test of Transfer Lines.

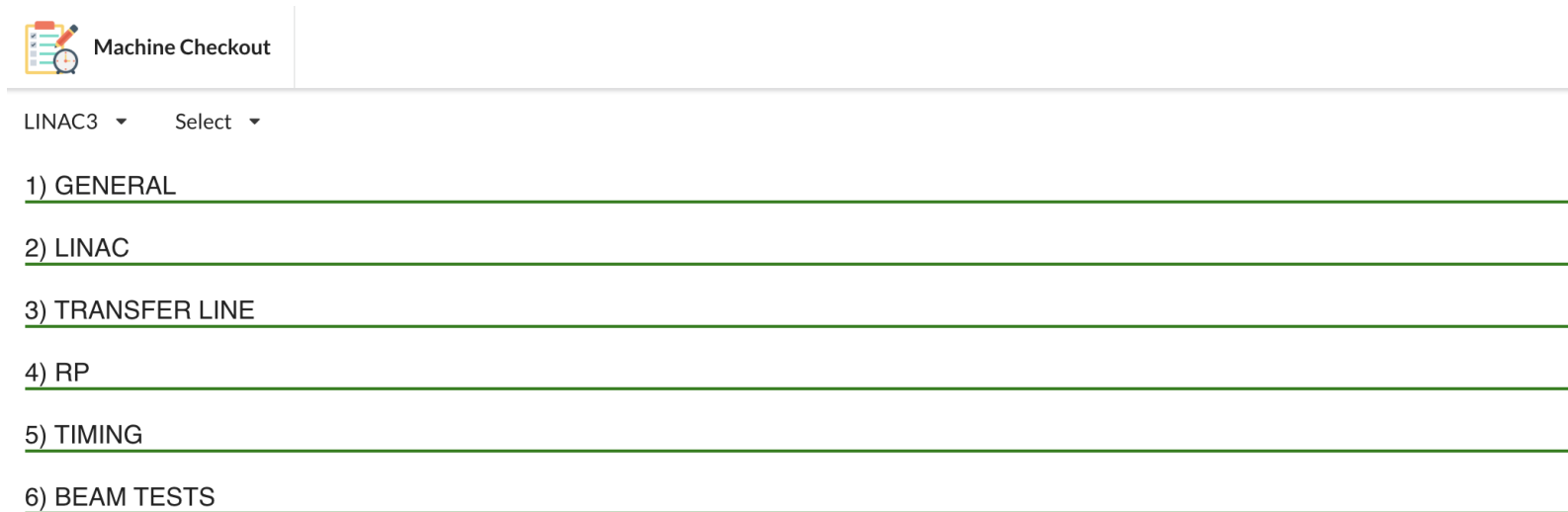
Testing of beam line from the ITFSTP12 beam stopper in LINAC3 to the end of the ETL line of LEIR.

- Pre-requisites:
 - LEIR DSO checks OK.
 - LEIR Partial Beam Permit Validated
 - LEIR ETL.STP20 Consigned @ IN position
 - LEIR ETL.STP10 and ETL:BHN10 taken out of chain
 - LEIR ETL.BHN20 and EI.BHN10 Consigned OFF
- Includes test LTB, LBE and LBS lines with ions

LINAC3 – HWC Checklists

Will re-use the standard LINAC3 checklists that have proven successful when used the previous few years.

HWC checklist exists in OPWebtools



Machine Checkout

LINAC3 ▾ Select ▾

- 1) GENERAL
- 2) LINAC
- 3) TRANSFER LINE
- 4) RP
- 5) TIMING
- 6) BEAM TESTS

LINAC3 – HWC Checklists – to add

Following Low Level RF change to a new digital system there will be a number of modifications or additions to be made to the existing check list.

These modifications will be made as seen during the progressive HWC period.

LINAC3 – Proposed Shift Organisation

As during the normal Run and Physics period:

- Source/Oven Specialists available from Source start-up
- Equipment Specialists must be available for initial HWC periods
- Standard Day Shift: Mon – Fri 8:30 – 17:30

- LEIR OP and/or Physicist available for transfer line beam tests
- Standard Day Shift: Mon – Fri 8:30 – 17:30

LINAC3 – Other Meeting Proposals

No new meetings should be required.

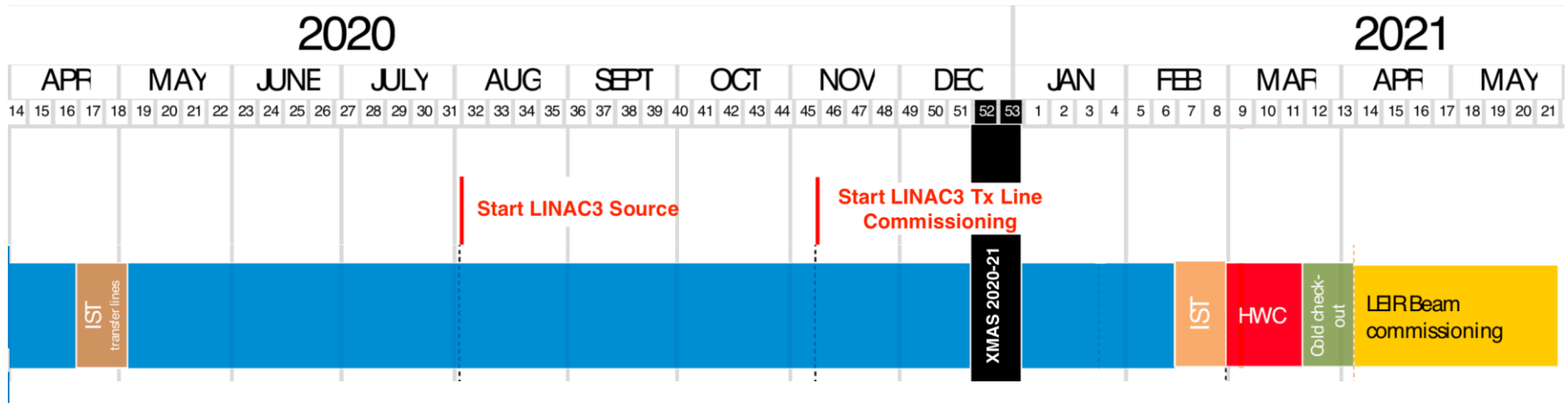
- LINAC3 coordinators meeting continuing to take place every Monday

❖ *LINAC3 and LEIR coordinators will arrange a meeting to clarify the safety aspects for IST's - especially for racks/convertors*

LINAC3 – Conclusion

- IST checks before PS Switchyard closure
- Source switch ON: Start August (W32), followed by L3 IST/HWC
- Progressive IST/HWC from W32 – 43
- Progressive beam test from W35 – 51 (depends on RF HWC program)
- During second stage of Beam Testing, requires LEIR transfer lines available.
 - LEIR must request a partial beam permit
 - LEIR Stoppers and bending magnets to be consigned in safe positions
- Following YETS 2020-2021 – One week HWC before start of beam commissioning period.
- Reuse existing HWC check lists – some modifications required for new RF system

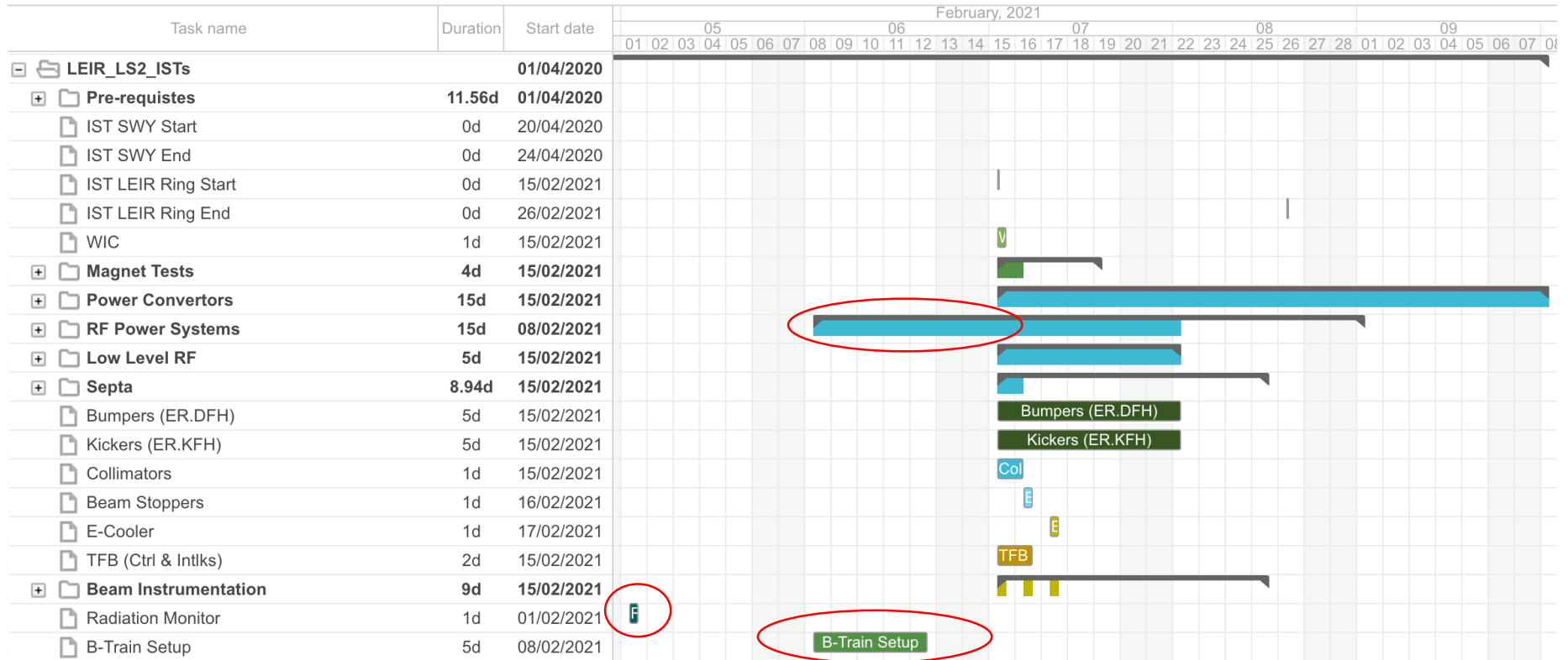
LEIR – Proposed Schedule



Two Separate IST/HWC periods

- LINAC3/LEIR/PS Transfer lines W17-18 2020 (before PS Switchyard IST)
- LEIR Ring W7- 9 2021
- Four week HWC/Cold checkout period W9 - 13 2021

LEIR – Proposed Schedule



LEIR – Proposed Schedule

Two Separate IST/HWC periods

- LINAC3/LEIR/PS Transfer lines W17-18 2020 (before PS Switchyard IST)
- LEIR Ring IST W7-8 2021
 - Radiation Monitor to be back in service before IST period
 - B-Train set-up - electronics calibration and transmission tests in simulated mode, to be made prior to IST's to be available for other equipment.
 - B-Train Set-up - to be finalised during HWC period
 - RF Power systems checks to start prior to IST period due to resource availability.
 - Power convertor Tests to extend into HWC period
- Four week HWC/Cold checkout period W9 – 13 2021

LEIR – Proposed Schedule

	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12									
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun			
	22/2	23/2	24/2	25/2	26/2	27/2	28/2	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3	13/3	14/3	15/3	16/3	17/3	18/3	19/3	20/3	21/3	22/3	23/3	24/3	25/3	26/3	27/3	28/3			
Powering tests and magnets (IST)	Tests cont. from IST																																					
PRE- REQUISITES								◆-----◆																														
<u>Access System</u>								◆-----◆																														
MAD, PAD, Intercom OK																																						
<u>Electricity</u>								◆-----◆																														
All lockouts put back in service																																						
No power limitations foreseen																																						
<u>Fire Detection / Fire Brigade</u>								◆-----◆																														
Fire detection online (No IS37 active)																																						
All Fire extinguishers OK (in place/valid inspection dates)																																						
<u>Cooling and Ventilation</u>								◆-----◆																														
Water circuits On and OK (flow/pressure)																																						
Compressed air OK																																						
<u>Radio Protection</u>								◆-----◆																														
PAXN detector OK																																						
<u>Safety</u>								◆-----◆																														
Consignations/lockouts OK																																						
Patrol OK																																						
DSO tests OK																																						
Full beam Permit received																																						



LEIR – Proposed Schedule

	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
LEIR IST End					◆																														
LEIR HWC Start								◆																											
LEIR HWC END																																			
TIMING SYSTEMS CHECK																																			
Run timing systems sequence																																			
Safety devices																																			
Moves in/out																																			
Interlocks when chain breaks																																			
Beam Instrumentation																																			
Vacuum																																			
Movement OK (in/out)																																			
Controls OK (PVSS and Sequencer)																																			
Measurements OK																																			
Collimeter																																			
Movement OK																																			
Controls OK (equipstate and sequencer)																																			
Collimeter Test sequence OK (1-2 days or 1 WE)																																			
RF																																			
Powercycle OK																																			
Controls OK (equipstate / Sequencer)																																			

	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12						
	ue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
LEIR IST End				◆																															
LEIR HWC Start							◆																												
LEIR HWC END																																		◆	
Electron Cooler														◆																				◆	
Electron Cooler: Solenoid																																			
Electron Cooler: Motor																																			
Electron Cooler: Beam																																			
Aux Solenoid																																			
Expert setup OK																																			
Logging OK																																			
Magnet and Power Convertors														◆																				◆	
Quadrupoles																																			
Quadrupoles (M1553)																																			
Polarity Check OK																																			
Powercycle OK																																			
Controls OK																																			
LSA trims OK																																			
Oasis signals OK																																			
Quadrupoles (FGC)																																			
Dipoles																																			
Main Bends																																			
Sextupoles																																			
Septa																																			
Kickers																																			
Magnet Heat Run																																			
Heat Run / Failure test OK (1 WE)																																			



LEIR – Other Tests

- DSO tests needed before LINAC3 transfer line beam testing
 - Will require partial beam permit to allow beam in the transfer lines ONLY
 - Access System can be changed to supervised mode during this period
 - EIS elements to be consigned @ safe: Stoppers IN, Bends OFF
- Second DSO test to be performed to validate full beam permit

LEIR – HWC Checklists

(1)

Existing HWC Checklist a little complicated.

- Multiple repetitions of the same tests:
 - Same equipment have same tests but 3 or 4 different versions declared
 - Similar tests use different names – ON, OFF, Power ON
 - Multiple versions of same test declared for different systems
- Organised by section (ETL, ETH, ER.....) instead of equipment – is this better?
- Not user friendly to edit and reorder
- Extraction (CSV file) via OPWebtools missing information: Equipment names etc.
- Manual extraction (Excel) and sorting took a long time

LEIR – HWC Checklists

(2)

- Reorganised by domain and equipment type – some equipment “missing” tests
 - Devices grouped by class
 - Equipment grouped by section ie ETL, ER, ETP
- Simplified, grouped generic test naming to allow reuse
 - ON, Standby, OFF, POWER ON etc -> Power Cycle
- Created in Excel for simplicity
- MS Project simplified planning schedule created

LEIR – HWC Checklists – to add

- Easy way to upload Excel checklist to OPWebtools
- Comments to be added to checklist with some instructions for the tests to be made.

LEIR – Proposed Shift Organisation

LINAC3 Transfer Line Beam tests:

- Tests performed in collaboration with LINAC3 Specialists during working hours
- LEIR Physicist/OP should be available during this period.

LEIR HWC / Cold Check Out

- HWC Tests performed by LEIR OP/Physicist during working hours
- Hardware Specialists should be available in case of issues
- Cold Check Out/Failure Tests to be performed over several days/weekend.
 - Sequencer programmed testing with escape
 - Does not need constant supervision – checks can be made remotely (?) or by CCC OP.

LEIR – Conclusion

- Separate IST for Transfer lines (2020) and Ring (2021)
- DSO test to be performed after switchyard IST and prior to L3 testing (2020)
- Radiation monitor and B-Train to be initially setup prior to Ring IST
- RF Power manpower resources limited, so need to start IST in week prior to official IST period – Do we need LS2C approval?
- Power convertor IST and testing by EPC extends into HWC period
 - Some HWC tasks should start only following completion
 - 2nd DSO test to be performed for full beam permit
- Existing checklist tool requires some improvements to be made
- Checklist reorganised and “simplified” in excel format – requires upload tool
- Meeting with HSE, LINAC3, LEIR and Equipment groups to clarify IST safety requirements

Questions ?

	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	22/2	23/2	24/2	25/2	26/2	27/2	28/2	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3	13/3	14/3	15/3	16/3	17/3	18/3	19/3	20/3	21/3	22/3	23/3	24/3	25/3	26/3	27/3	28/3
Control Room Software Applications								◀	▶																										
Vacuum supervision - PVSS																																			
Diamon																																			
Equipstate																																			
IPM																																			
LEIR AutoQ																																			
LEIR BTV																																			
LEIR Fixed Display																																			
LEIR Inspector																																			
LEIR LSA App suite																																			
LEIR Monitor																																			
LEIR Sequencer																																			
Matlab																																			
OASIS																																			
Parameter Config																																			
Qmeter																																			
SIS																																			
Spyder																																			
TFB Inspector Control																																			
TIMBER																																			
Tomoscope																																			
WIC LEIR																																			
YASP																																			
TIMING SYSTEMS CHECK																																			
Run timing systems sequence																																			



	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	22/2	23/2	24/2	25/2	26/2	27/2	28/2	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3	13/3	14/3	15/3	16/3	17/3	18/3	19/3	20/3	21/3	22/3	23/3	24/3	25/3	26/3	27/3	28/3
Safety devices								◀																											
Moves in/out																																			
Interlocks when chain breaks																																			
Beam Instrumentation																																			
Beam Screen																																			
PowerCycle																																			
Movement OK (In/out, rotation)																																			
Filters Ok																																			
Camera Image OK																																			
Calibration OK																																			
BPM																																			
Oasis Signals OK																																			
YASP calibration and Offset OK																																			
BCT/BCTDC																																			
Aquisition OK																																			
Oasis Signals OK																																			
Calibration OK																																			
LEIR Monitor signals OK																																			
IPM																																			
Application OK																																			
Aquisition OK																																			
Calibration OK																																			
SEMGRID																																			
Application OK																																			
Movement OK (In/out)																																			



	WEEK 8							WEEK 9							WEEK 10							WEEK 11							WEEK 12						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	22/2	23/2	24/2	25/2	26/2	27/2	28/2	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3	13/3	14/3	15/3	16/3	17/3	18/3	19/3	20/3	21/3	22/3	23/3	24/3	25/3	26/3	27/3	28/3
Schottky																																			
Application OK																																			
Aquisition OK (?)																																			
Vacuum																																			
Movement OK (in/out)																																			
Controls OK (PVSS and Sequencer)																																			
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Powercycle OK																																			



	WEEK 8						WEEK 9						WEEK 10						WEEK 11						WEEK 12								
	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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