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Coordination

Chamonix 25 Jan 2016 AB

## YETS 2015-16: recall CMS plans

...thanks to TE colleagues for various material herein

### Top priorities:

- complete the cleaning /replacement of the cryo system (TE+EN+CMS )
- replace damaged cryo valve on 6000l dewar (Intermediate Cryostat) TE
- diagnose & fix water leaks & repair any collateral damage

### Other activities (original YETS programme):

- left-overs/snagging from LS1 activities + prep for YETS 2016-17
- repair of RPC chambers damaged by ventilation incident on 4 Jan
- major cooling system maintenance including control system upgrade
- precautionary replacement of cooling block in ECAL power supplies

### Before going any further....an important message of THANKS:

- for the excellent collaboration with TE & EN depts, as well as PH of course, in attacking the serious magnet cryogenic problems in 2015.
- and for the cooperation we also had from BE dept (also the other LHC experiments) in getting the best out of a rather sick CMS last year.

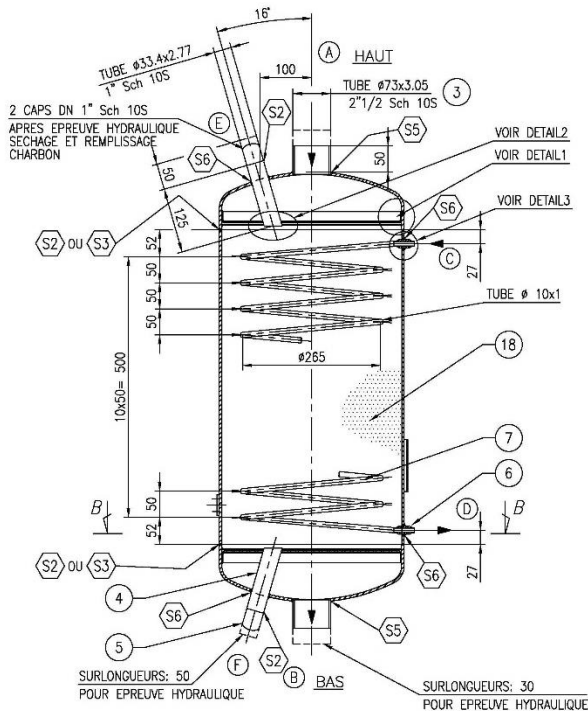


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# Cryo: Oil removal system

Oil removal equipment pressure and leak tested at factory.

Separator & Coalescer systems will both arrive end Jan.



New adsorbers delivered to CERN by Air Liquide





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# Cryo: CV273 valve replacement: UXC

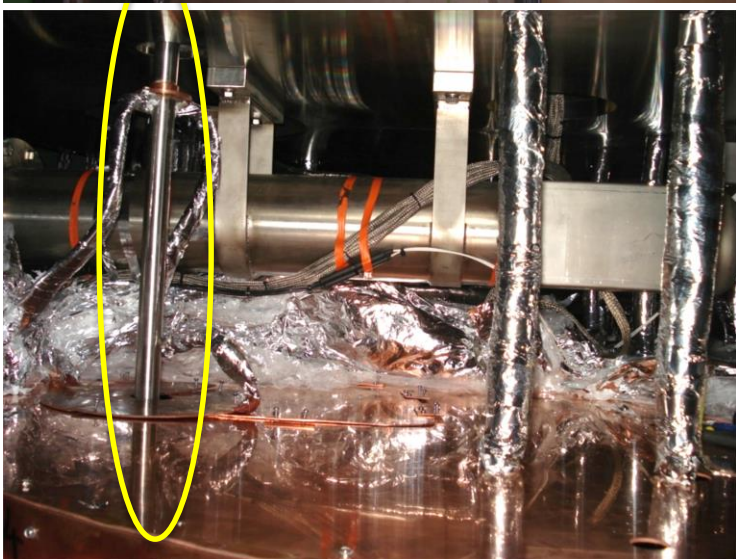


Replacement valve arrived at CERN.

All preparations for access to 60001  
Dewar complete by 18 Jan.

Repair started 22 Jan (when mech.  
interventions on the cold-box  
finished)

Tank casing lowered, MLI removed  
Next task is to cut Cu heat shield





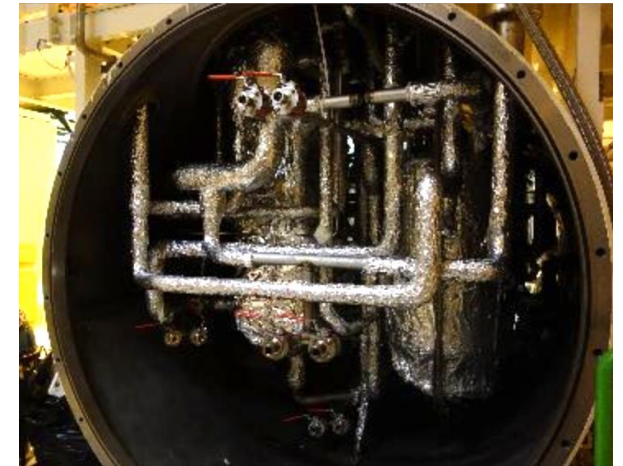
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# Cold box open both ends

Modifications to isolate cold client & divide into 4 circuits for cleaning



Warm end modifications

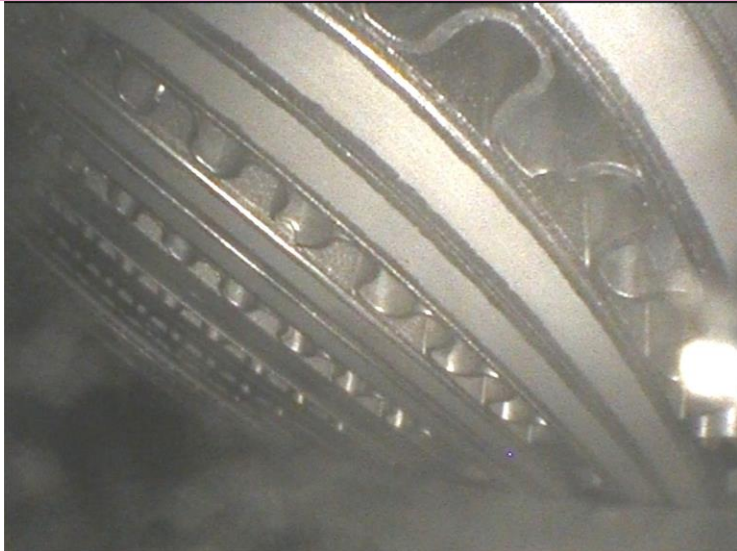


Cold end  
modifications



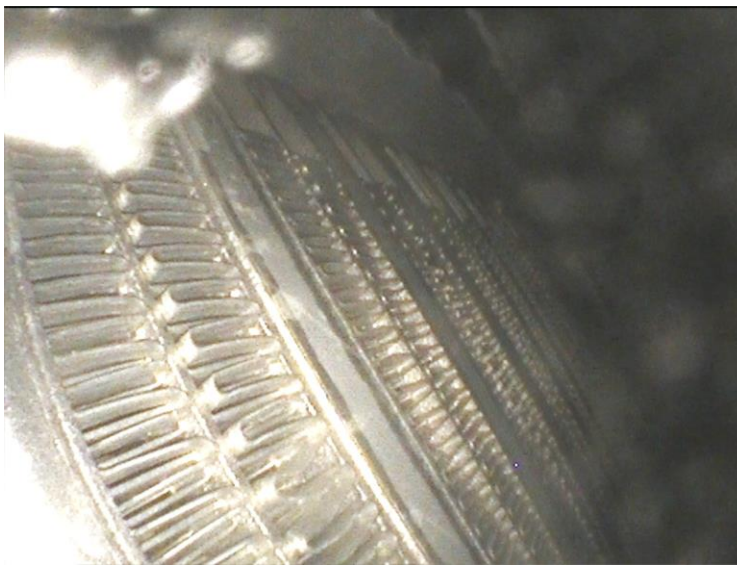
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# CMS Endoscope check inside heatex's

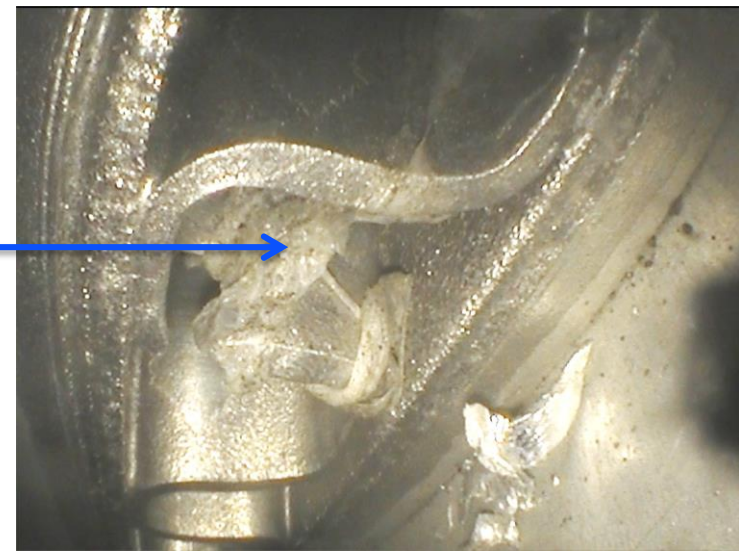


Clean except for

v. small metal chips



One small piece of  
soft material  
(few mm) —————→  
- likely MLI



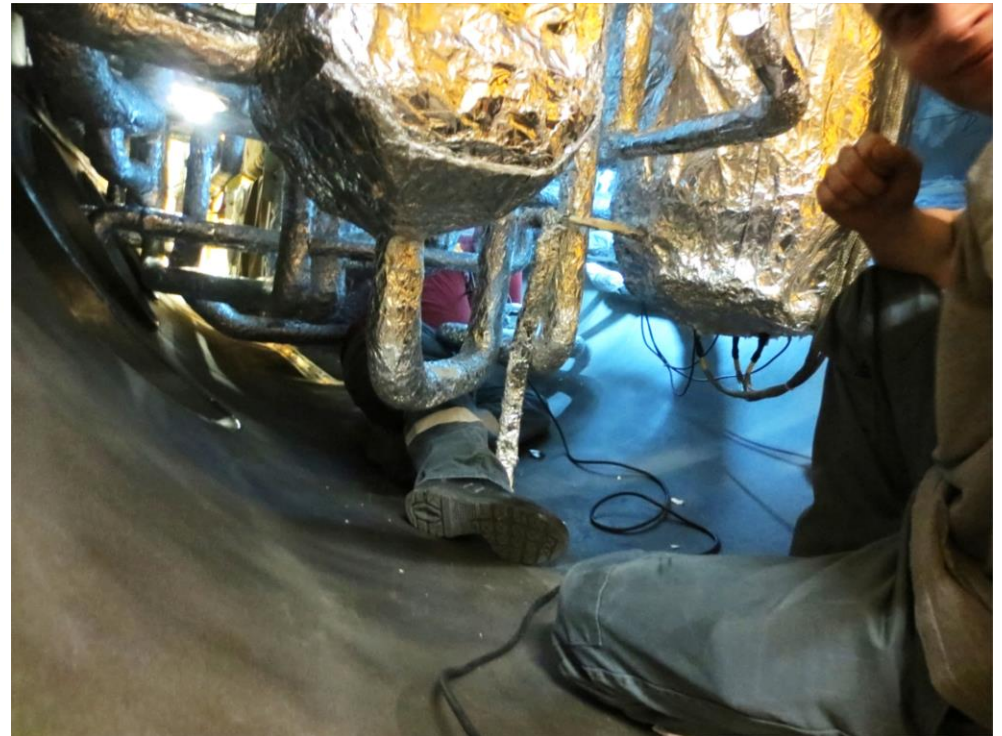
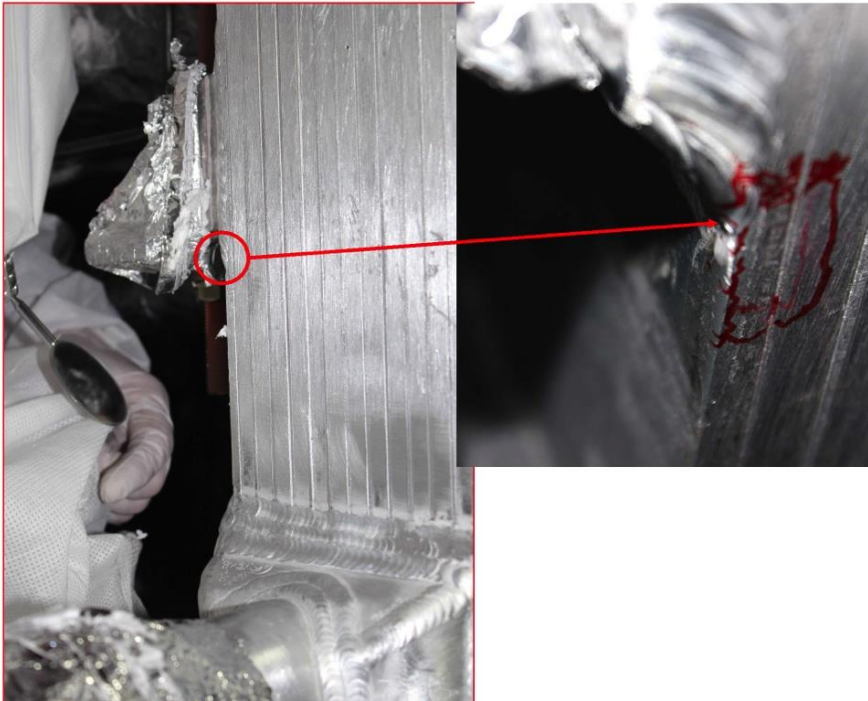


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## N2 pre-cooler leak repaired

Spot the welder : puzzle # 3



Exchanger accessed  
Leak identified

Repaired by specialist company  
-preliminary leak check looks good  
-final check after CB cleaning complete



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## Dryer condenser: installed USC -2

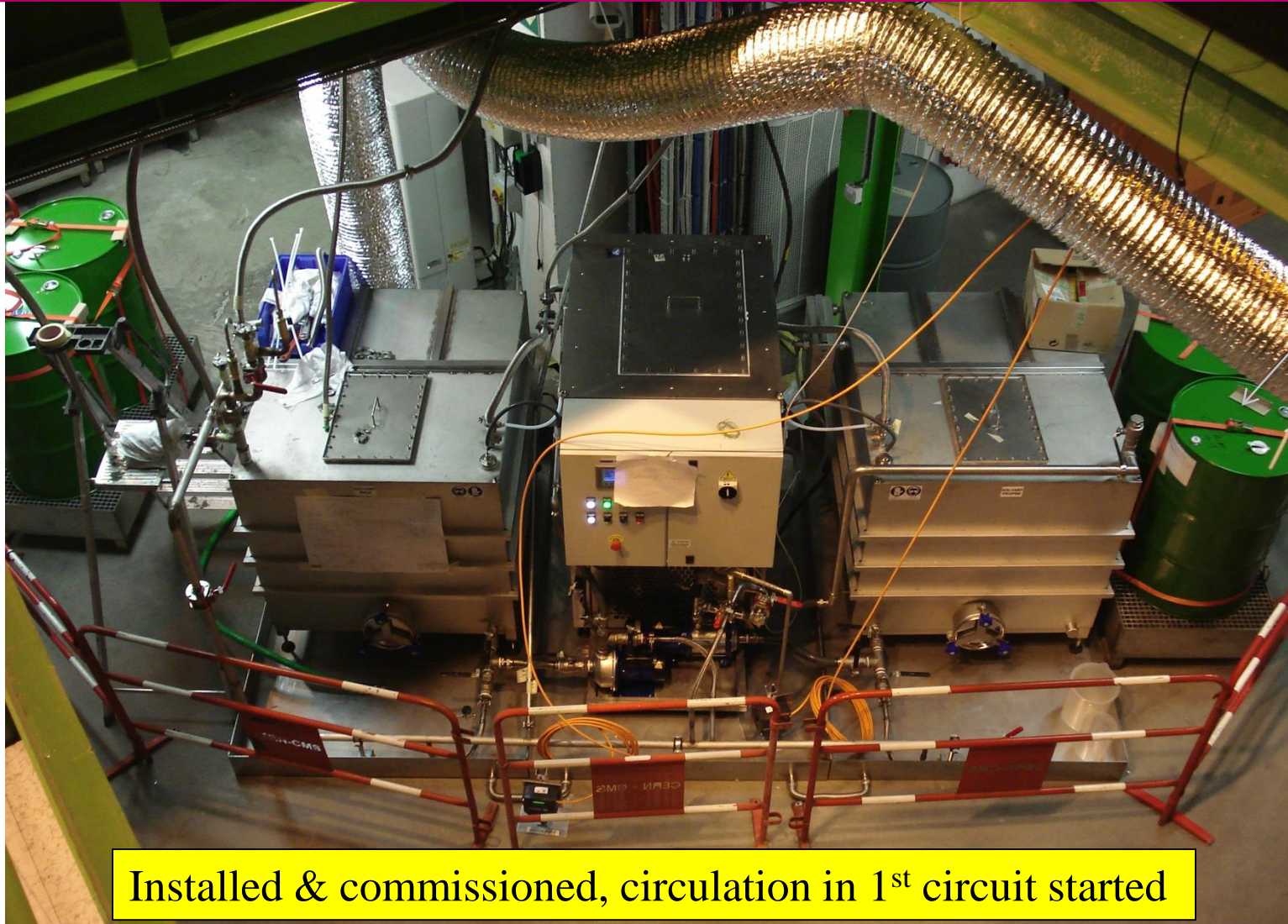




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## Cleaning machine & fluid: USC -3



Vertrel XF  
solvent  
drums

Installed & commissioned, circulation in 1<sup>st</sup> circuit started





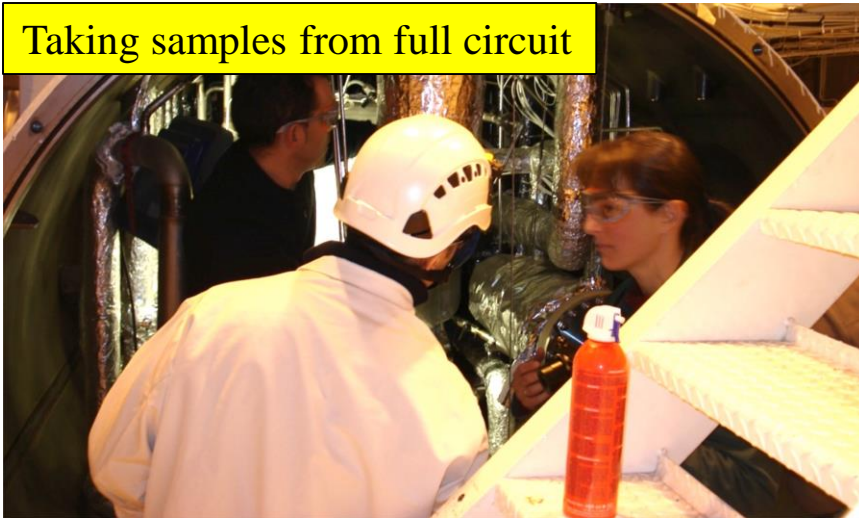
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# Moment of truth: is there Breox in the solvent?

This morning: 10am

Taking samples from full circuit



Preparing IR analysis



Awaiting result.....

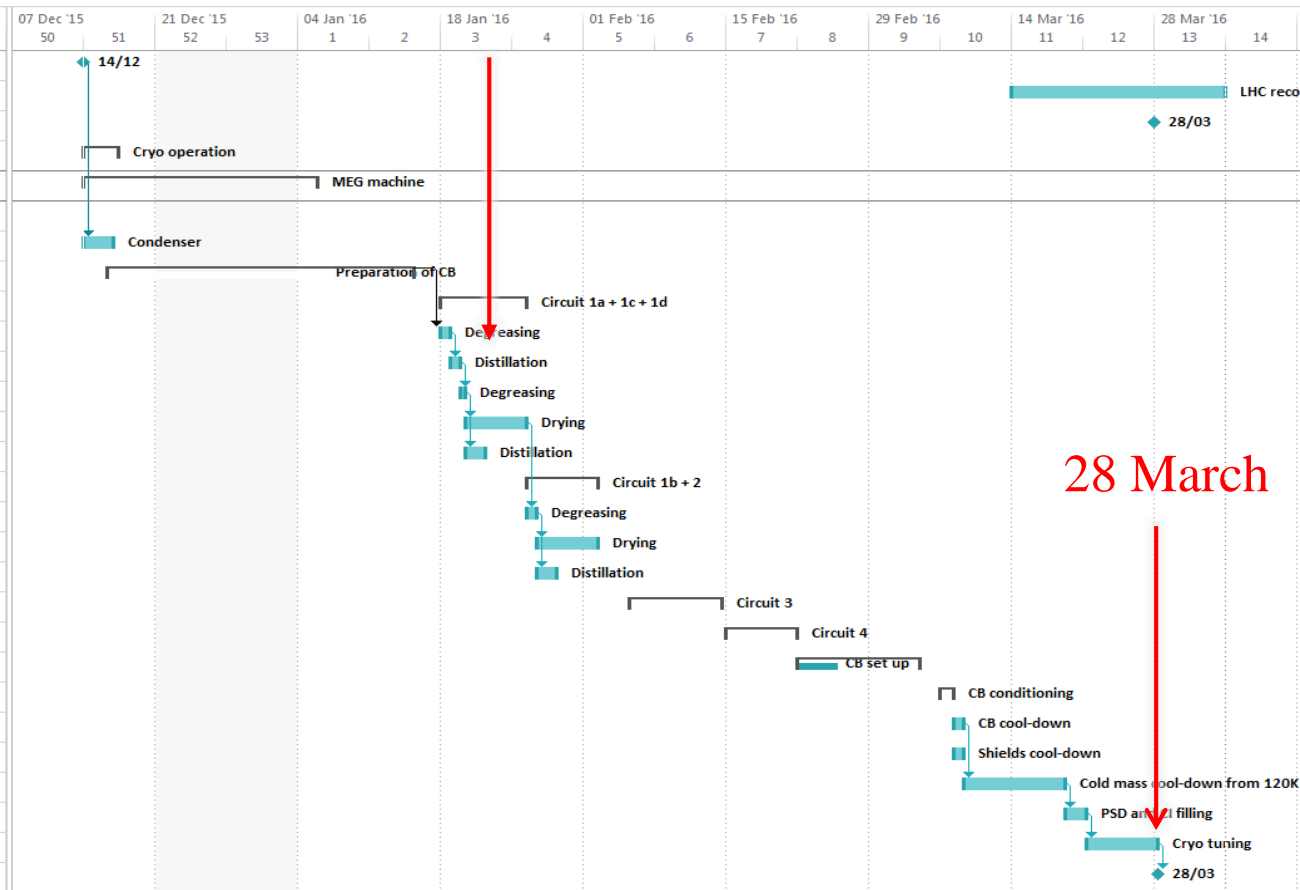


Bingo! strong Breox signature....

Looks like we are on the right track

# Planning for all CB intervention driven by the “cleaning / drying” procedure

Task Name	Duration	Start	Finish
Field OFF	0 days	Mon 14/12/15	Mon 14/12/15
LHC recommissioning with beam	16 days	Mon 14/03/16	Sun 03/04/16
Field ON	0 days	Mon 28/03/16	Mon 28/03/16
▸ <b>Cryo operation</b>	<b>3.25 days</b>	<b>Mon 14/12/15</b>	<b>Thu 17/12/15</b>
▸ <b>MEG machine</b>	<b>7 days</b>	<b>Mon 14/12/15</b>	<b>Tue 05/01/16</b>
Safety equipment installed			
Condenser	3 days	Mon 14/12/15	Wed 16/12/15
▸ <b>Preparation of CB</b>	<b>12 days</b>	<b>Wed 16/12/15</b>	<b>Fri 15/01/16</b>
▸ <b>Circuit 1a + 1c + 1d</b>	<b>6.5 days</b>	<b>Mon 18/01/16</b>	<b>Tue 26/01/16</b>
Degreasing	1 day	Mon 18/01/16	Mon 18/01/16
Distillation	1 eday	Mon 18/01/16	Tue 19/01/16
Degreasing	0.5 days	Wed 20/01/16	Wed 20/01/16
Drying	6 edays	Wed 20/01/16	Tue 26/01/16
Distillation	2 edays	Wed 20/01/16	Fri 22/01/16
▸ <b>Circuit 1b + 2</b>	<b>5 days</b>	<b>Tue 26/01/16</b>	<b>Tue 02/02/16</b>
Degreasing	1 day	Tue 26/01/16	Wed 27/01/16
Drying	6 edays	Wed 27/01/16	Tue 02/02/16
Distillation	2 edays	Wed 27/01/16	Fri 29/01/16
▸ <b>Circuit 3</b>	<b>5.25 days</b>	<b>Fri 05/02/16</b>	<b>Sun 14/02/16</b>
▸ <b>Circuit 4</b>	<b>5 days</b>	<b>Mon 15/02/16</b>	<b>Sun 21/02/16</b>
▸ <b>CB set up</b>	<b>2 wks</b>	<b>Mon 22/02/16</b>	<b>Fri 04/03/16</b>
▸ <b>CB conditioning</b>	<b>1.1 days</b>	<b>Mon 07/03/16</b>	<b>Tue 08/03/16</b>
CB cool-down	1 day	Tue 08/03/16	Wed 09/03/16
Shields cool-down	1 day	Tue 08/03/16	Wed 09/03/16
Cold mass cool-down from 120K	10 edays	Wed 09/03/16	Sat 19/03/16
PSD and CI filling	2 edays	Sat 19/03/16	Mon 21/03/16
Cryo tuning	1 wk	Mon 21/03/16	Mon 28/03/16
Cryoready ON	0 days	Mon 28/03/16	Mon 28/03/16



28 March

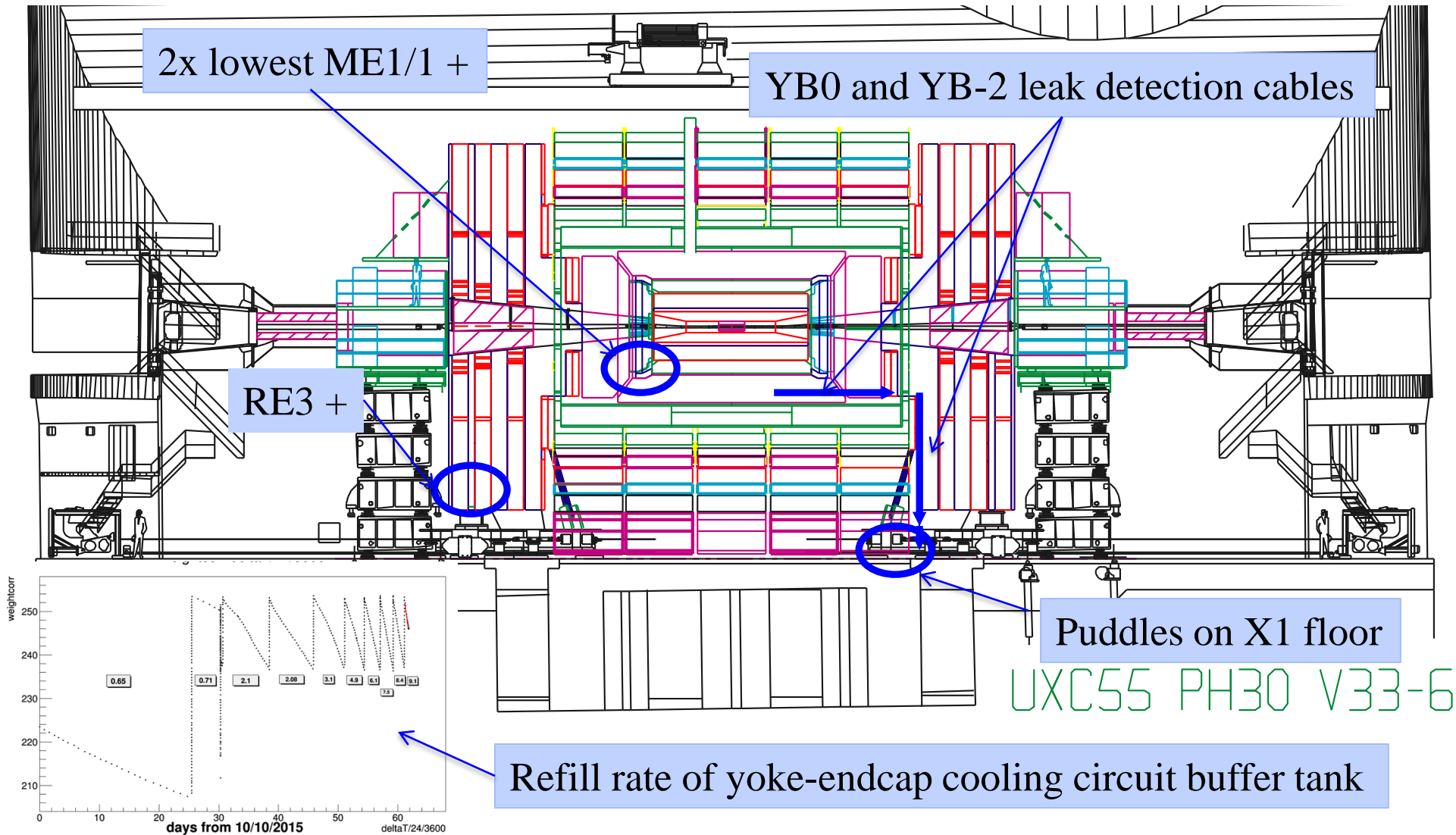
Consistent with planning within errors. Drying procedure is biggest uncertainty





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# Water leaks (i)



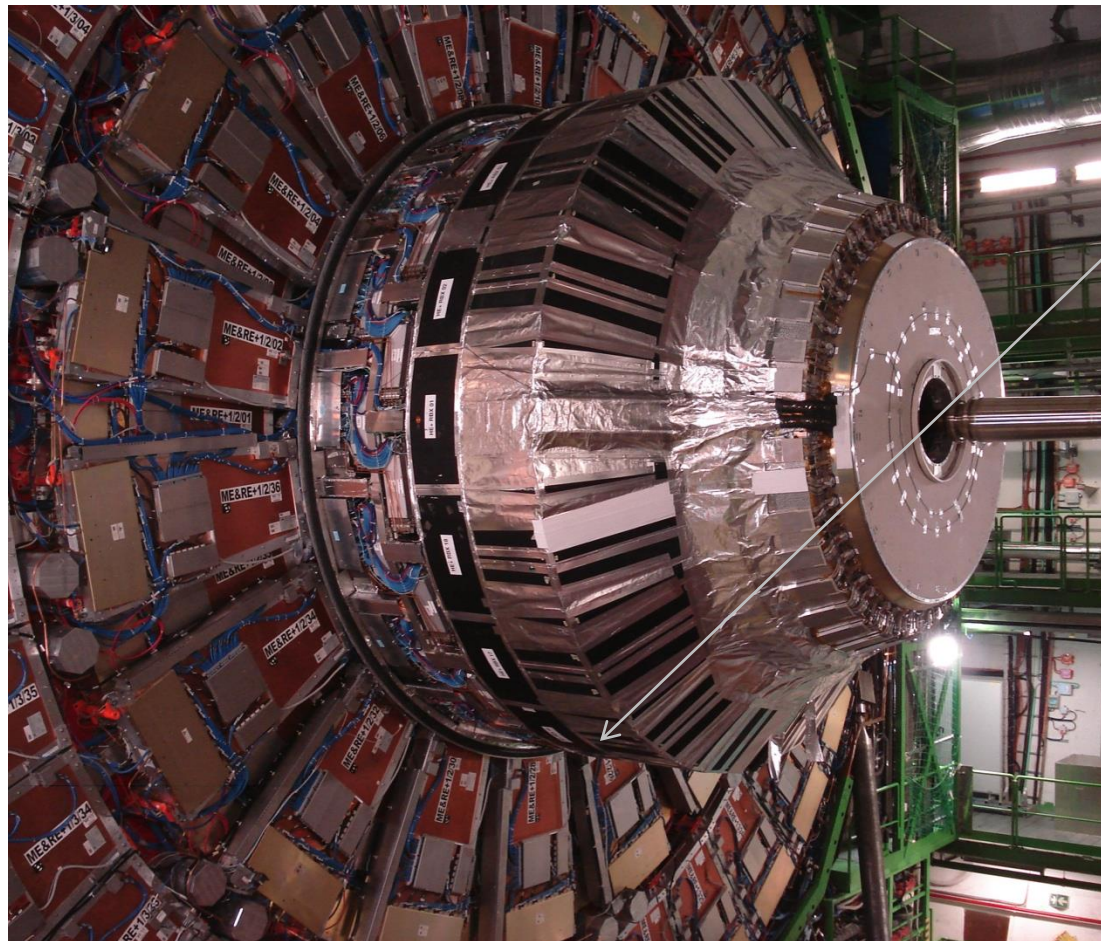


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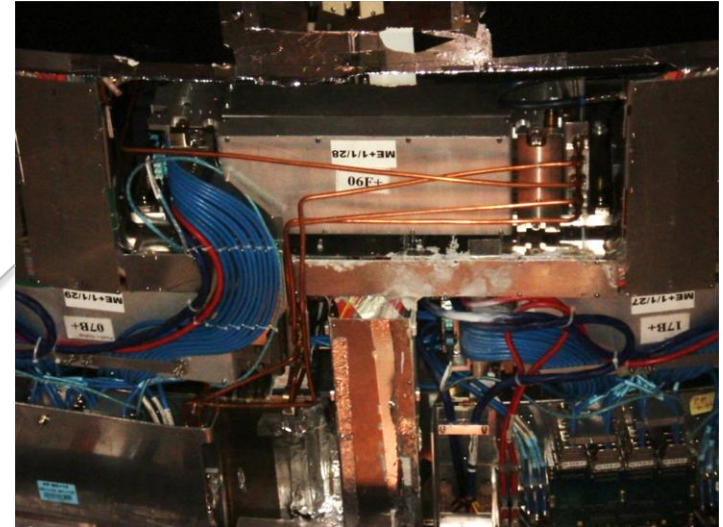
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# Search for the leak on YE+1

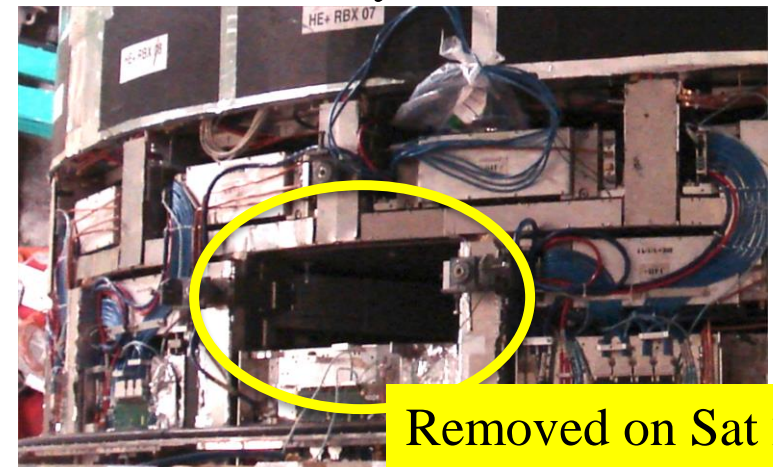
YE1 disk (1500t) withdrawn from barrel  
(beampipe in place)



...obvious where the water came out



--source eventually traced to chamber 13



Removed on Sat 25 Jan



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# Corrosion, sediment



Plate sent to Chem  
group for analysis  
Deposit has high  
Pb & B content

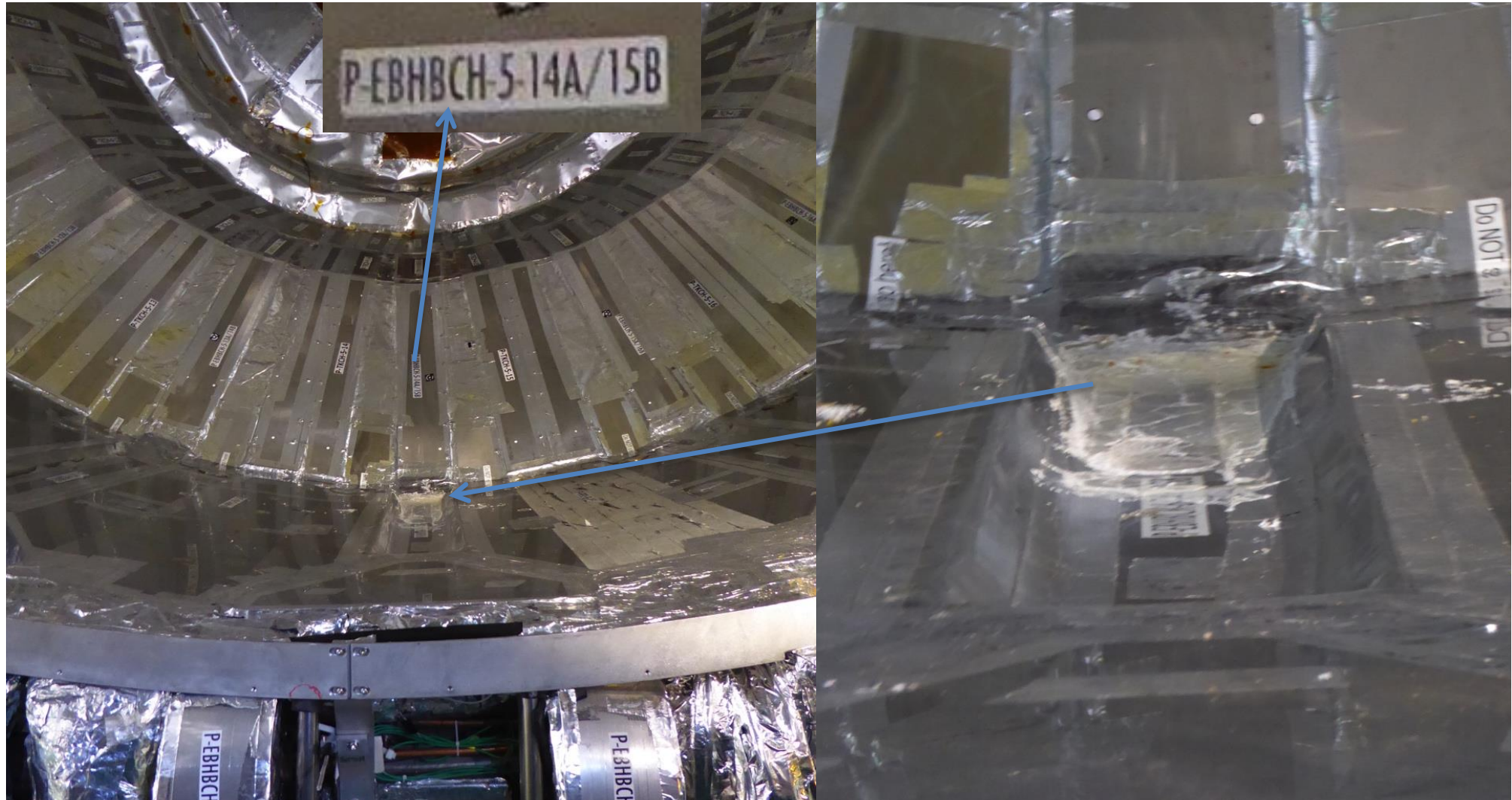




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# Exit from nose to vac tank





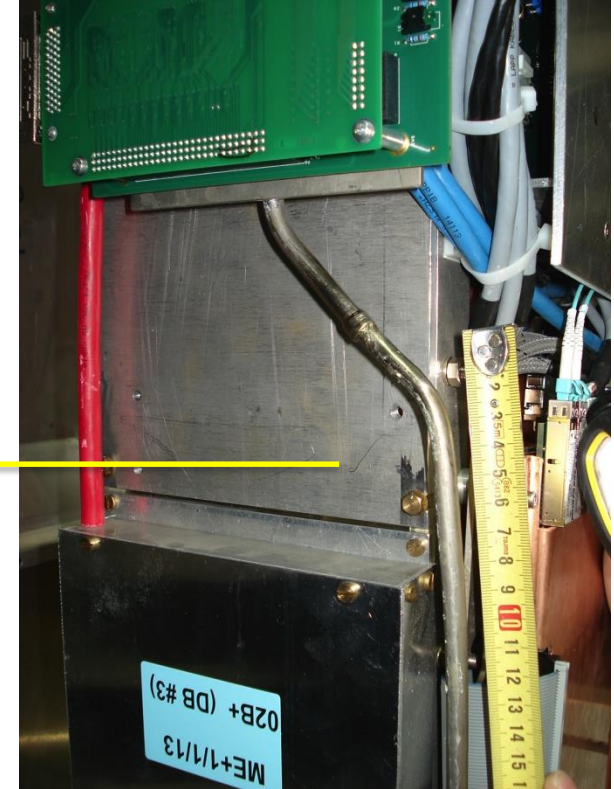
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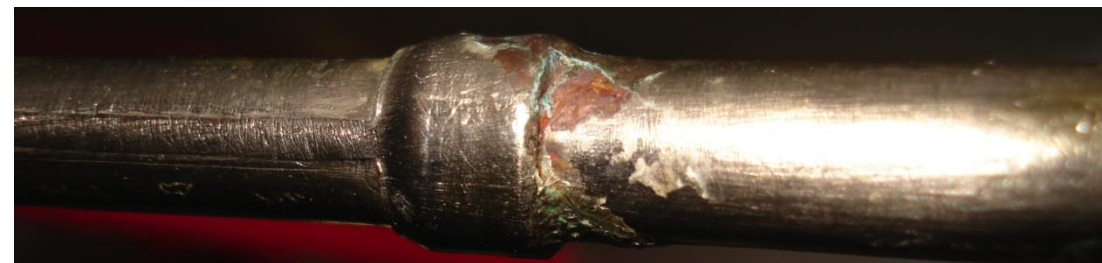
# Chamber 13

Removed Sat am – thanks to transport, CMS & HSE crews

Leak from internal joint



Is this a on-off (eg mech damage) or 1<sup>st</sup> symptom of a generic corrosion problem?





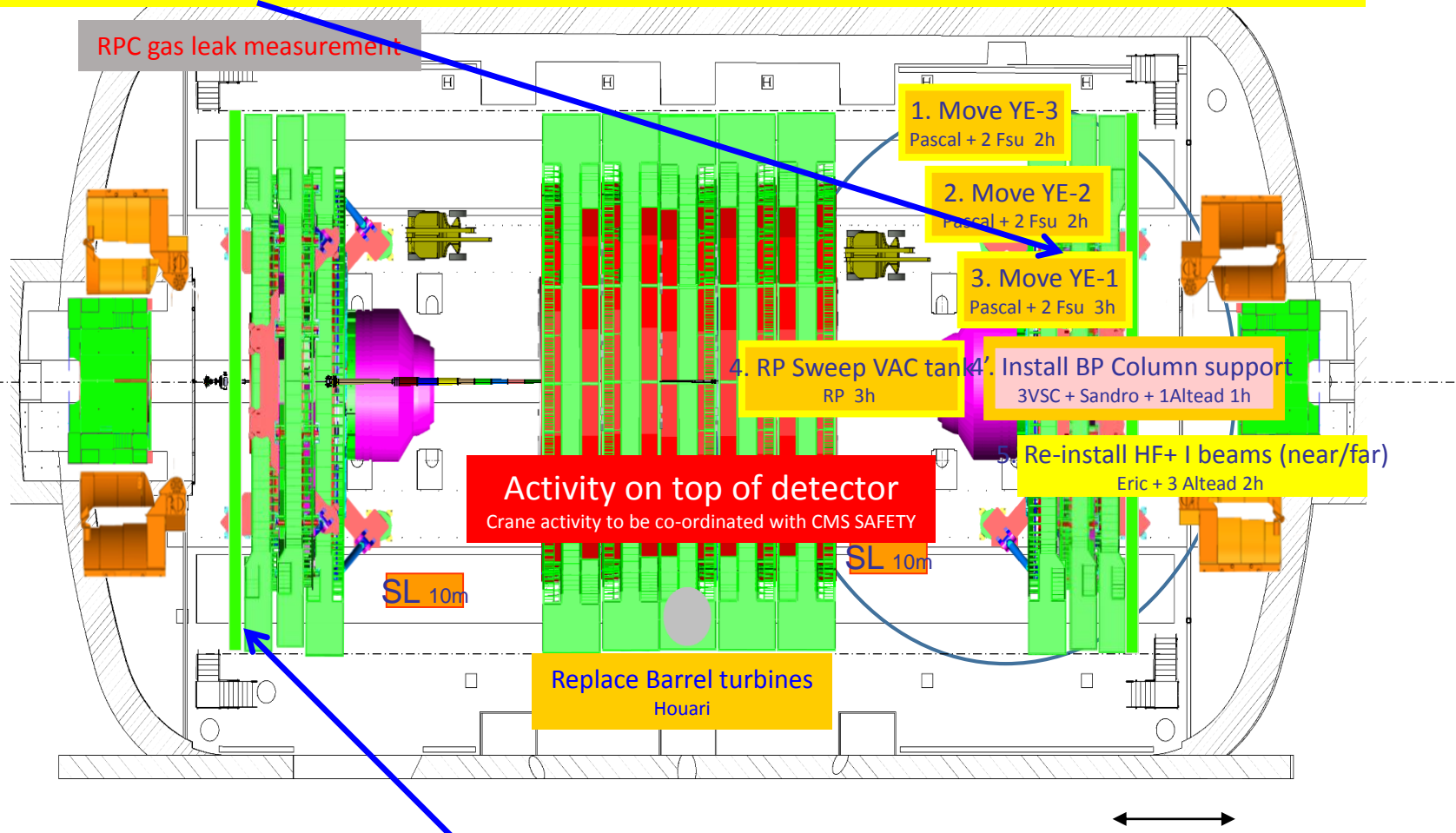
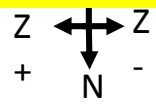
Cryo.	EL power	Water cool.	Database		
IT	Magnet	C6F14	Gas		
ECAL	ZEC	DT+ RB	Survey	TE-VSC	GS Dept
CMX	CSC RE	TK PIX	HCAL	EN Dept	RP

PX56  
Plug  
OPEN  
TX54 Plug  
CLOSED

Wednesday  
27. January 2016

Cra

Next : open other endcap to attack collateral damage from water exit thru vac tank



Then : separate +z endcap disks (3 & 4) to check small RPC leak – correlated with main one?



# Can CMS stick to the nominal YETS schedule?

Chamonix mtg

Latest date to start closing to be ready 21 Mar

	Jan			Feb				Mar					21 Mar
Wk	1	2	3	4	5	6	7	8	9	10	11	12	13
Mo	4	11	18	25	1	8	15	22	29	7	14	21	28 Easter Mon
Tu													
We										Powering tests			Recommissioning with beam
Th				Year end technical stop									
Fr												G. Friday	
Sa													
Su											Machine checkout		

18Apr 25 Apr

	Apr			
Wk	14	15	16	17
Mo	4	11	18	25
Tu				
We				
Th				
Fr				
Sa				
Su				1st May

Scrubbing

**Cryo system/cleaning/replacement:** looking good....  
 finish valve repair in UXC: : mid Feb  
 finish cold box cleaning + new oil removal: end Mar

**Water leak repair:**  
 replace ME1/1 chamber 13 : end Jan  
 collateral damage clean-up : mid Feb  
 secondary leak (RE4) diagnosis & repair : mid Feb

**Water leak precautionary measures** (if generic fault)  
 no estimate yet –stay tuned please!!