Introduction to discussion: Cryostat cleaning

Contribution to the integration & construction session

Tuesday, June 10, 16:30 - 17:30

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fact collection

- Prior to copper mounting: 12 mBq
- After copper mounting: 120 mBq (factor ~10 above our specifications!)
- Known components added:
  - Copper
  - Stainless steel screws (silver covered) & bolds
  - Eccentric copper discs with black surface
  - Traces of marker writing on copper
  - Dust, but how much???

Cleaning and mounting procedures

- Cleaning procedure of copper at CSN: sulphoric acid etching and DI water rinse
- Vacuum packing in PE (however partly no vacuum upon arrival at LNGS)
- Alcohol wiping of inner steel surface by Bernhard prior to copper mounting
- Alcohol wiping of copper sheets ??
- Hepa-filtered air flow into cryostat, however only simple tent to protect, non-hermetic
- Size of copper pieces & available time did not allow a rigorous ‘clean mounting’ procedure

Impurities of candidate culprits

- Copper excenter: total contribution 1.6 mB1/ 35 cm => <~10 mBq (not dominant)
- Silver coated steel screws: ?
- Acid from CSN: ?
- Marker: excluded
- Residual air: unlikely, to be tested
- Copper with identical surface and acid/DI treatment ?
- Dust from hall A: candidate
  - 30 mBq/g (gamma spectrometry)
  - 1/10 x 20 mBq/g (radon emanation of non-fractioned dust)

  $\Rightarrow$ ~40 g dust would account for 120 mBq (not a small amount!)

Possible next steps

- 4^{th} radon measurement (prior to open)
- Access tank:
  - Visual inspection and wipe all accessible surfaces with alcohol; measure (all) wipe's with gamma spectroscopy on Gempi & blank measurement
  - Exchange of copper eccentric discs
  - Close
- 5^{th} radon measurement
  - If not ok $\Rightarrow$ cleaning operation August/September

Possible cleaning options

Wet-clean (alcohol):

Caveats:

- no access to hidden surfaces;
- no water because difficult to remove from surfaces between copper sheets ⇒ ethanol

1. Mount clean room tent with Hepa-filters on top of platform
2. Prepare flange with special piping
3. Spray-ball wash with alcohol in circulation mode (pump at bottom of tank?)
4. QA: particulate counting of removed liquid; radon emanation of tank

Time required: medium
(wo)man power: medium

Dryclean:

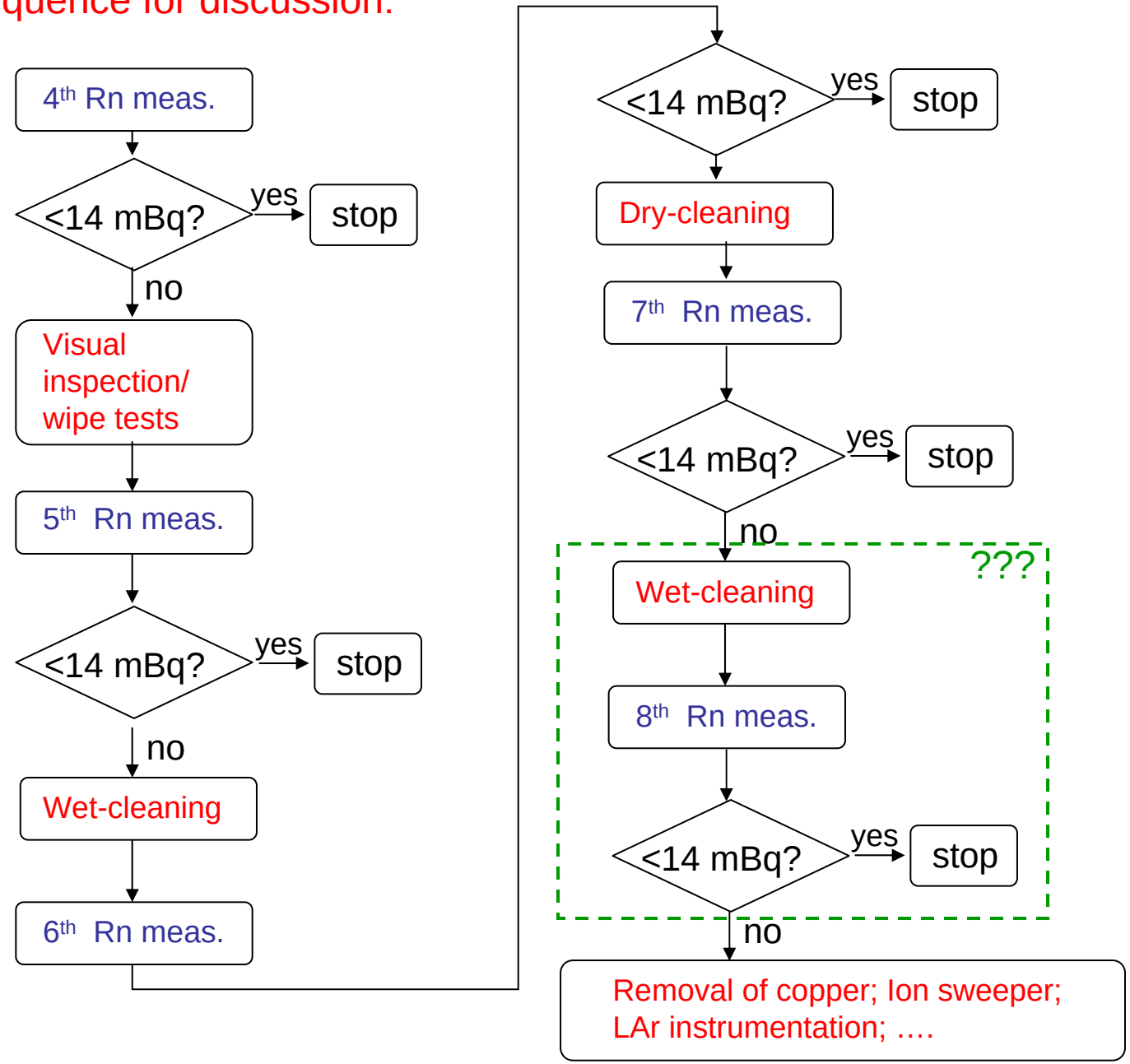
Caveats:

- Mounting and dismounting of mounting device with hall A craned ⇒ open to hall A atmosphere ⇒ cleanliness?
- Cleanliness of mounting device?

1. Mount clean room tent with Hepa-filters on top of platform
2. Copper mounting device inside cyrostat (cleaned prior to installation) through clean room tent?
3. Remove single slab from wall (but not from tank; store one slab in tank?)
4. Separate slabs in two pieces
5. Wipe with alcohol: cupper slabs & steel wall
6. QA: gamma/alpha counting of wipe samples; radon emanation of tank

Time required: high
(wo)man power: high

Proposed sequence for discussion:



Schedule

- start as early as possible
- **Start** 4th radon measurement if time slot available between water tank and GERDA building
- **Continue** after completion of GERDA building: end of July
- **End:** latest end of September (prior to start of cleanroom construction)

Action items

- Agree on / modify sequence
- Identify required personnel and hardware
- QA: make particulate counting Borexino from Borexino available for GERDA
- Identify safety issues (alcohol, access in tank, …)
- Write procedures
- ……