EUROPEAN SPALLATION SOURCE

Safety Work Update

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13th Technical Board Mtg - ESS Accelerator System Project (ACCSYS)
May 21, 2015

Outline

- Resources
- Annual review, WP annual audits, PDRs and CDRs
- Requirements from SSM (Swedish radiation safety authority)
- Radiological zoning – new approach
- Status of accelerator models for MC studies
- Completed/ongoing radiation safety tasks
- Completed/ongoing general safety tasks
- Safety manual
- Summary

Resources

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- ✓ Lali Tchelidze, safety work package leader
- ✓ Duy Phan, general safety engineer
- ✓ Luigi Esposito – 50% support (FLUKA) from CERN for 12 months – leaves on June 1st, 2015
- ✓ Riccardo Bevilacqua (Target Division) - 40% support for MCNPX calculations for the accelerator – no longer since March 2015
- ✓ Luisella Lari (AD and project planning) – part-time (~30%) support for FLUKA calculations for the accelerator

- ✓ A senior consultant for safety – a temporary position – possible candidates are being contacted
- ✓ MC (MARS) expert(s) – temporary position – possible candidates are being contacted

Annual review, WP annual audits, PDRs and CDRs

- ESS annual review, April 21-24, 2015, ESS, Lund
  - "Add a high-level ESH person to AD…":
    - Discussions are on-going to temporarily hire a senior safety advisor to support the accelerator safety advisor currently employed
  - "The hot cooling water should be seriously evaluated. It seems that this idea has many caveats, including risk for personnel accidents…".
    - We believe that the local infrastructure allows us to effectively and safely recycle hot water in the area
- WP annual audits:
  - WP 10 (Test Stands), April 28, 2015, ESS, Lund
    - Develop a plan for analyzing and designing the radiation shield in TS2 in order to meet the schedule and permitting needs.
  - WP 16 (Cooling Supports), April 29, 2015, ESS, Lund
    - Finalize with CF the tunnel penetrations for the water piping and cable trays in the front end. Design the radiation shielding according the access needs.
    - ACCYS and ICS needs to address the issue of radiation sensitivity on sensors and electronics in the tunnel in a comprehensive manner.
- Preliminary Design Reviews:
  - PDR for Cryogenic Distribution System for Elliptical Linac on May 20, 2015, ESS, Lund
  - Outcome – to be shared later
- Critical Design Reviews:
  - DTL CDR – June 22-23, 2015, INFN, Legnaro

Requirements from SSM (Swedish radiation safety authority)

- Licensing step #1 – completed in summer 2014
  - Permit for construction was issued with a list of conditions to fulfill
  - The conditions were broken down into requirements (ES&H)
  - Further break-down to accelerator systems – is ongoing

- Licensing step #2 – application to be filed at the end of 2015
  - The SSM conditions/requirements should be implemented

Radiological zoning – new approach

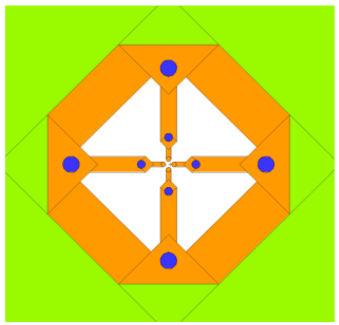
- ESS-0003520 (by T. Hansson) based on need of access
- Currently re-defining zoning for all areas, including both H1 and H2 into consideration (required by SSM)

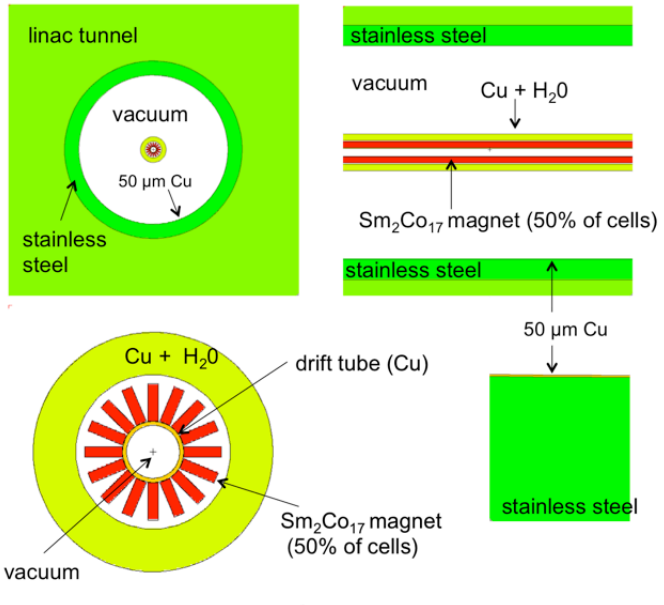
- "ESS Procedure for determining the radiological zoning of an area" ESS-0033188 (by G. Muhrer) is in place
- Procedure and examples were presented to SSM, in an informal meeting, in Stockholm, on May 11

	Frequency (1/y)	Name
H1	>1	Normal operation
H2	10^{-2} - 1	Anticipated events
H3	10^{-4} - 10^{-2}	Unanticipated events
H4	10^{-6} - 10^{-4}	Design basis accident (DBA)
H5	< 10^{-6}	Beyond DBA

Status for accelerator models for MC studies

- MARS & FLUKA
  - A detailed model of superconducting linac (quadrupole magnets, cryomodules, etc.)
  - Bulk shielding around the linac
  - Penetrations in the bulk shielding
- MCNPX
  - Simplified model of the warm
  - linac (RFQ, MEBT and DTL)





Completed/ongoing radiation safety tasks

- Cryo-vent line – ESS-0025763 (by L. Tchelidze), February, 2015
- A2T/GSA cable penetration chicane design – ESS-0030412 (by L. Tchelidze), May, 2015
- Radiation shielding concept for stubs – is ongoing

- Note: “ESS procedure for designing shielding for safety” ESS-0019931 (by G. Muhrer) is followed for every internal shielding work since March 18, 2015

- A paper for IPAC “FLUKA Modeling of the ESS Accelerator” (by L. Esposito, L. Lari, et. al), May, 2015

Completed/ongoing general safety tasks

- Fire safety
  - Fire load estimation carried out for the tunnel and for the klystron gallery. Submitted for review to the fire expert from ES&H.
  - "Guideline for the selection of electrical cables, with respect to fire safety and radiation resistance" (by D. Phan and E. Vaena) – to be reviewed and finalized.
- Cryogenic safety
  - "Oxygen Deficiency Hazard ODH safety process and implementation" (by N. Elias, D. Phan, J. Weisend) – to be reviewed and finalized
  - "Oxygen Deficiency Hazard assessment, accelerator tunnels and other areas housing cryogenic fluids" (by D. Phan) – being prepared
    - Preliminary calculations in the tunnel to compare both ventilation systems (normal vs. smoke extractors) in case of helium discharge
    - ODH working group session #1, Topic: safety process and case studies, May 18, 2015
    - ODH working group session #2, planned in June, 2015
- Ventilation
  - Collaboration with CERN's HVAC experts – ongoing – waiting for their feedback

Safety Manual

- Work is starting in ES&H to have a safety manual in place in September, 2015
- AD will provide input/help as needed

Summary

- Short in resources – working to temporarily hire a senior safety advisor and short-term MC calculation experts
- Safety manual (by ES&H) – expected to be ready in September, 2015
- Focus on:
  - supporting licensing activities
  - supporting integration work with CF
  - addressing time-critical safety issues
  - complete reviews (safety aspects)

Thank you!