SPL dump FLUKA simulations

present: R. Garoby, F. Gerigk, F. Haug, E. Lebbos, T. Otto

Discussion items:

- E. Lebbos showed simulations on energy deoposition and ambient residual dose rate, using the dump geometry studied at GSI,
- The dump consists of a graphite core surrounded by water cooled Aluminum, further surrounded by a Tungsten cylinder, an iron block and then concrete,
- Alternatively a sliced core (graphite and tungsten) was used, which may make heat evacuation easier. It was shown that the energy deposition in the sliced core is higher but it still needs to be studies if the heat can be extracted easier. It became also clear that the sliced core yields a higher "backward" dose rate.
- Presently two scenarios are considered:

Commissioning period: continous use of the dump during 5 months for approximately 50% of the time.

1.5E14 protons/pulse
1 pulse every 10 s
6.5E17 protons/day (on average)
1E20 protons in the first year
12 kW beam power, when beam is on

Operation period: dump will be used for setting-up, debugging and MD. We assume 2 weeks of setting up and 1 MD of 8 hours per week of operation (36 weeks in total).

456 hours at 5.4E16 protons/hour or 2.5E19 protons/year
12 kW beam power, when beam is on

- it is assumed that water cooling is needed for any beam power above 1 kW,
- we can assume that the radiation decreases in the upstream direction of the beam pipe with $1/r^2$,
- Rule of thumb: radiation values should be in the range of ~100 uSv/hour after 1 hour of cool-down in the tunnel below the dump. This would allow safe passage and after further cool-down it should also allow safe intervention in the area below the dump.

Action plan

- Using the simulation results, T. Otto and E. Lebbos will estimate how much concrete we need between dump and ceiling,
- They will also estimate the immediate (prompt) dose rate ~20 metres above the target, which will be a public area. There the dose should be no larger than 0.1 uSv/h.
- O. Aberle will use the calculated heat loads to make cooling simulations on the proposed dump geometry.

next meeting should take place 1-2 months from now.

-- FrankGerigk - 08-Apr-2010

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