

Minutes of the RADWG meeting held on 3 December 2009

Present: Daniel Kramer EN/STI, Alfredo Ferrari EN/STI, Markus Brugger EN/STI, Julian Palluel BE/CO, Yves Thurel TE/EPC, Erik Van Der Bij EN/HDO, Pierre Dahlen TE/MPE, Ewald Effinger BE/BI, Antonio Marin BE/ABP, Gonzalo Penacoba TE/CRG, Evangelia Gousiou TE/CRG, Betty Magnin, Sylvie Dubettier TE/EPC.

Matters arising – (Daniel Kramer):

- The dose calibrations of several CNGS test locations were re-estimated using the 2008 data. This concerns only the ones in the line of sight of the ducts TSG45 and 46. The values used in the past were too conservative and increase in average by factor 2. The exact values will be communicated to the concerned users and later on updated in the Java GUI.
- The second Cu-Cu WorldFIP repeater tested in CNGS showed no errors during the tests. There was only one spike of 10mA recorded. The TID at the end of the tests was 250Gy.
- The access to remove the equipment from the CNGS test area is foreseen for the 10 December 2009 at 14:00. Details concerning the handling and transport will be clarified directly on place with Christophe Tromel. The equipment from the CNGS control room should be removed as well.
- The requests for the CNGS tests in 2010 are the following:
 - CRYO
 - TSG45
 - 1MHz SUBD + 2xNE48
 - Two crates like in 2009
 - New cards ready for the April/May run
 - TE/EPC
 - TSG45
 - NE48 only (no FGC)
 - The same installation size as in 2009
 - PS etc ready 2nd half of May or June
 - QPS
 - TSG46
 - 1MHz miniSUBD
 - Later in the year (prototype boards for IP1,5)

Survey results of CNGS tests in 2009 – (Antonio Marin):

- Similar setup as in UJ56 installed to TSG46 on 17/9/09 and on 7/10/09 moved to TSG45 to get higher dose rate
- System stopped working on 9/11/09 when it failed to restart or power cycle
 - TID = 98Gy(Si)
 - $\Phi_{H>20\text{MeV}} = 6.07 \times 10^{11} \text{cm}^{-2}$
- The system required a restart 5 times during the whole test period
 - Not really sure if caused by the uFip / FieldDrive (could be the ADUC card, but unlikely as it was well tested by QPS)
 - Restarted via WorldFip bus by the “magic word”.

- The currents of power supplies and other components were constantly monitored and only very small drifts were observed (decrease of the consumption)
- The tested system is not installed in the UPS galleries neither in US/US85, where only the signal conditioners are present (tested up to $\sim 350\text{Gy}$? with ^{60}Co). 6 crates are placed in the UJ56 1st floor.

Communication from R2E – Status and missing information (Markus Brugger):

- R2E is preparing a full relocation of US85 including a priority list and additional shielding of the safe room in US 85 and of the displaced cryo racks in the bottom floor of US85.
 - Full integration study performed by Anne Laure Perrot, which is now on Maternity leave. The replacing coordinator will be chosen by EN/MEF.
- The work will be reported in Chamonix where decisions are required in order to allocate the budget
- The issue of UJ56 relocation is the most difficult as the shielding will not really help for the 1st floor and relocation to the PM shaft seems very unlikely.
 - A part of the UP/USC bypass could be condemned – first studies performed for the upgrade.
 - One could think to relocate some devices to the bottom floor (i.e. PConv.), but it is a very difficult and not a definitive solution
- Early radiation monitoring should give first indications of the fields we can expect later on.
 - Large number of TLDs installed in the critical areas
 - First dedicated tests performed using the RadMon readout and provoking dedicated losses on different collimators
- Weaker shielding at the edge of UJ84 was discovered close to the power converters for the triplets
 - Up to $1\text{e}7\text{cm}^{-2}/\text{y}$ $h > 20\text{MeV}$ is expected in nominal conditions at the electronics position
 - Shielding can be possibly installed to reduce the radiation levels

PO results from the last CNGS campaign (Yves Thurel):

- 8 DC-DC from 2 purchases were tested in CNGS (no batch control during production)
 - Present in 1300 PSU of FGCs in the alcoves of LHC and in 70 - 75% of power modules
 - NO SEEs observed
 - Only slow derivations detected
 - Died after TID of $40\text{-}50\text{Gy}(\text{Si})$ [with safety factor of 2]
- 60A tunnel FGC COD together with power MOSFETs were tested in 2009 in CNGS
 - Voltage source tested separately from the FGC
 - Diagnostic module DIM failed during the tests
 - It sends the data via WorldFip
 - It could bring down the power converter
 - Most likely due to a SEL in the CPLD
 - No MOSFET failures observed
 - No problem with the zero crossing (Stable V_{GS})
 - 4 Unexplained crashes occurred at the beginning of irradiation
 - Most likely a SEL in the CPLD (power cycle required)
 - If happens in FGC generic -> beam dump
 - SEU in one of the main registers remains a possibility
 - Sensitive internal RAM used as radiation monitor

- Measured fluence using the Louvain data $3.1e11\text{cm}^{-2}$
 - Fluence provided by the RadMon system $3.08e11\text{cm}^{-2}$
 - System “dead” after 50Gy (with factor 2 safety)
 - Power cycling automatically every 20s
- The high precision analog card prototype SD360 was tested in CNGS
 - Possible replacement of SD350 which was very sensitive to SEE induced corruptions of the signal filter
 - The SPARTAN FPGA was replaced
 - No errors observed up to $\sim 100\text{Gy}$ and 10^{12}cm^{-2} hadrons $> 20\text{MeV}$
 - More tests needed to qualify the card
- More precise dose estimation is required for the tunnel units under dipoles
 - Updated simulations by M.Brugger give less then **$\sim 1\text{Gy/y}$ ($4e9\text{cm}^{-2}$ $H > 20\text{MeV}$)**
 - The contribution from the LSS losses has to be included for MBB12 (few Gy/y)
 - Beam gas pressure assumed as $1e-15$ molec/m³
 - Assumed to be conservative in the beginning but optimistic after scrubbing

Status update and discussion about the planned Radioactive Workshop (Betty Magnin):

- The work planning for the preparation of the radioactive workshop in 867 should be done in 2 weeks
 - Construction to be done in 2 phases
 - The WShop is expected to be operational by the end of 2010
 - 100m^2 allocated as common space for reparations
 - $2 \times 80\text{m}^2$ for PCB (text to be added)
 - 25m^2 analysis boxes for individual groups
 - In total about 350m^2 allocated
 - The temporary storage space will not be very big due to safety reasons
 - Derogation most likely to be attributed to the TE/EPC as their installation is too big for the WShop (no official letter, but preapproved)
- Question: what is the responsibility and job description of the RPE?
 - RPE course was being held during week 9 in French language
- Temporary solution needed already for 2010 i.e. for PConverters
 - With 750 devices, the MTBF for electrical failures is 3 weeks