

## Minutes of RADWG meeting held on 20 August 2009

Presence: Daniel Kramer EN/STI, Julian Palluel BE/CO, Yves Thurel TE/EPC, Rodrigo Sierra IT/CS, Gonzalo Penacoba TE/CRG, Benjamin Todd TE/MPE, Ivan Romera Ramirez TE/MPE, Markus Brugger EN/STI, Alfredo Ferrari EN/STI, Ewald Effinger BE/BI, Eva Calvo BE/BI.

### *Matters Arising (D.Kramer):*

The CNGS electronics test area data interface was described and users were asked to use the provided data (mostly the hadron fluences) as preliminary due to ongoing discussions with the Fluka team and some remaining calibrations to be done. The interface is available in the following [link](#) and will be placed also on the CNGS test WEB. The former interface is still available [here](#). The individual test areas were calibrated using the RadMon detectors and the corresponding scaling factors are applied upon the click on the area button. Only the integrated beam intensity is retrieved from the DB.

M.Brugger reminded that measurement data and mainly the CNGS Fluka simulations should be considered with a safety factor of 2 to 3.

The status of the Radioactive Workshop planning was presented. The information gathering phase was finished and several members were surprised as the form proposed by Luca Bruno was largely contested and people believed that a better solution was going to be found using the layout DB. Response of L.Bruno is pending.

The cabling situation was presented together with the requirements of the coming users.

### *Report from R2E – ongoing and planned activities (M.Brugger):*

The first slides in the presentation were included mainly as a reminder of the past actions and were not discussed in detail. Summary can be found in the Chamonix 2008 report.

The present activities include the TZ76 works and cabling preparation for the power converter removals during the next shutdown; US85 removals and shielding construction; TLD early measurement campaign; RadMon relocations and position integration to the DB; Point review iterations and the acceptance of memorandum by the LMC.

The works in preparation include the shielding studies for the most critical areas {UJ14/16; UJ23/87; UJ56 (limited to lower floor); RR13/17/53/57}. The full relocations and heavy civil engineering are being studied as well. The cost of the works is foreseen in the LHC consolidation budget.

### *CNGS Irradiation Program Status (Y.Thurel):*

Summary of the main test goals:

- A FGC Type COD (LHC60A-08V). Almost no –good- data on this item since stopped early during CNGS 2008 tests.
- See if we encounter again a CPLD Crash. (The 2 types being tested will give us info). Another test campaign is foreseen in a radiation facility outside CERN.

- Get more data on ADC card based on highly radiation sensitive FPGA to re-write FGC software code to limit consequences of converters now exposed to radiation with the GENERIC FGC. (Same test than in 2008).
- Test the powerMOS devices for possible burnout up to 40Gy without cycling than 12 devices with cycling
- Test the DC-DC converters sensitivity
- During the next access, a possible ADC replacement card (for Generic only) should be installed.

Y.Thurel also mentioned the noise measurements performed on the NE48 cables with the maximum 50Hz coupling amplitude observed of 0.8V. He also found one of the shielding contacts removed (necessary for WFip).

#### ***Xilinx 9500/9500XL CPLD Testing CNGS 2009 – test setup and first results (B.Todd):***

Two types of XILINX CPLDs are tested in parallel. 32 chips of the 95144 type powered at 5V and 32 chips of the 95288XL type powered at 3.5V. Each chip has a replication of the actual code which runs in LHC and can be individually restarted remotely (soft or power cycle). The test boards are described in EDMS #995295 and #995292. The boards are connected to a driver and power supply placed few meters from the TSG45 tunnel edge (<~2Gy/week). The setup was working for 2 weeks in the lab.

Changes on the outputs are constantly monitored and logged every 300 s.

The 5V CPLDs are not safety critical as used for monitoring and testing in the CIBU and PIC. There are 300 units in the LHC.

The 3.5V is directly in the signal path of the CIBM manager board (VME) with 34 devices in the LHC.

Thanks to the redundant design, the CPLD failures reduce the availability of the machine but not really the safety.

From the first observations, it is clear that the XL version of the CPLD is several orders times more sensitive than the 5V version. Detailed results will be presented in the next RADWG.

#### ***BPM measurement status in CNGS (E.Calvo):***

The test setup is composed of 2 WBTN position cards, 1 beam intensity card, 1 power supply and one controller card with the MicroFip chip. The analog signals from the WBTN cards are brought directly to the lab via optical fibers. The status of the cards is acquired through the WorldFip interface of the controller card.

After the access for the second slot, the software monitoring program was incorrectly started and it took 6 days to recover (holidays). During this period, after about  $2 \times 10^{10} \text{cm}^{-2}$  hadrons and 3.7Gy, the intensity card was moved to a high flux region and suffered a SEE causing it to work incorrectly. A similar behavior was observed in TCC2 in the past. The card has to be inspected in the lab.

LHC contains 600 intensity cards, which are not essential for the operation as they are redundant to the BCTs and eventually BLMs.

Second monitoring problem occurred on 17 July when the WFip blocked and stopped sending data. 10 days later a reset was successful and the card remains operational (so far on 20 August the dose is 90 Gy, i.e. 4.5 years in the worst location 8R3). More Fip errors were observed and have to be inspected in more detail.

***WFip repeater – first look at results and outlook (J.Palluel):***

During the slot 1 and 2, the repeater was placed on the fence in TSG45 area. During the slot 3 it remained behind the BLM crate with the dose rate of about double than in the previous location.

The device started sending a succession of errors and then stopped communicating after 69 Gy and  $1.7 \times 10^{12} \text{ cm}^{-2}$  1 MeV n eq. During the access the restart didn't help and the repeater was exchanged with a new one and placed again on the fence. One of the possible suspects is the FieldDrive, as the return channel was not working.

The next part of the test will be done with the new DeriveFIP device containing the Actel Antifuse FPGA which should arrive after mid-September.