

1st R2E Mitigation Project Meeting

2nd December 2010

M. Brugger (MB), M. Calviani (MC), C. Jach (CJ), L. Lari (LL),
J. Andrew Osborne (JO), A.-L. Perrot (ALP), S. Roesler (SR)

Agenda:

1. R2E Project News and priorities ([slides](#))
2. Round Table and Work-Package Report
 - Integration/Implementation
 - Power-converters R&D
 - Monitoring and Calculations ([slides](#))
 - Radiation Tests
 - Civil Engineering
 - Safety
 - Project Support
 - News from BE/OP
3. Chamonix 2011
4. Documentation & Planning
5. A.O.B.
 - Next R2E meeting : proposed date and agenda

R2E Project News and Priorities (MB) ([slides](#)):

- I. The R2E Project meeting will be scheduled on a monthly basis with direct follow-ups in between meetings, in order to follow specific subjects. The objective on the monthly meeting is to ensure that all the information is correctly exchanged and to provide follow-ups on safety, progress in work-packages and to review the implementation status. Eventually – if required – meetings on restricted subjects will be organized in between . The slot of Thursday at 11h00 is always kept in case of need.
- II. Markus presented the table with the Project Team Members and the proposed Structure: there are core activities, managed by the Project and linked activities – not under the supervision of the R2E Project, however strongly linked to the long-term solution for R2E mitigation actions.
 - a. Project Leader: M. Brugger
 - b. Integration & Implementation: A-L. Perrot
 - c. Power Converters: Y. Thurel
 - d. Monitoring & Calculations: M. Calviani
 - e. General Safety: C. Jach
 - f. Radiation Protection: S. Roesler
 - g. Civil Engineering: J. Osborne

- h. Operation: M. Pojer
 - i. Radiation Working Group: G. Spiezia
 - j. Project Support: K. Foraz, S. Weisz, L. Lari
 - k. Linked activities
 - i. Collimation: R. Assmann
 - ii. Super-Conducting Links: A. Ballarino
 - iii. New Irradiation Facility: M. Moll
- III. It is underlined that documentation and available information is a key point, and must be easily accessible by all members of the Project. A project space ([\\cerndfs01\dfs\Projects\R2E](#)) has been setup at DFS and all project related information should be stored there.
- IV. Work Packages functions and objectives are defined, with the RadWG and MCWG being working groups under the control of the R2E committee, however with clear deliverables for the R2E Mitigation Project. WP3 (Civil Engineering) is responsible for providing a long-term support from the implementation side as well as short-term help for implementation. General and Radiation Safety are part of the project support which is integrated in the last work-package (Long-Term Solution) to be renamed to (Project Support and Long-Term Solution).
- V. Budget codes are defined and are *cost-to-completion*. By default they have a limit to 10kCHF, above which limit the signature will be authorized by the Project Leader or respective DPO. An update to the budget from the various working groups is requested before Chamonix, especially for what concerns 2012 or 2013 shutdown activities [**follow-up ALP for Integration & Implementation, MB for the rest**].
- VI. The project plan and respective budget issues were discussed and agreed on with the DPOs of EN, TE and GS.
- VII. Fellows have been assigned to TE/EPC and EN/STI. A fellow could start from GS/SEM middle next year. For urgent civil engineering issues coming up beforehand (*e.g.*, thickness of UX/UL wall) JO confirmed his support also beforehand. Marie-Curie fellowships might be obtained under the theme of research “Functional Safety”; it seems that R2E-related proposals have had a good response. They might be available towards the end of 2012. M. Brugger is trying to get a proposal into the next call. The impact for R2E might involve several projects: radiation tolerant developments, facility design and related collaborations.
- VIII. Some general news about the project:
- a. For what concerns the Safe Rooms, a safety study will be performed by DG/SEE. It seems not feasible before June 2011, unless an external company is called by to perform the work. ALP was hoping to get some inputs by end of February but this seems unrealistic. It was agreed that MB together with CJ will contact R. Trant in order to verify if the required calculations can be speed up [**follow-up MB**].
 - b. A collaboration for radiation tests and radiation tolerant developments (for the Marie-Curie program but also the R2E project as such) with the University of Montpellier seems feasible with a visit scheduled in December and the respective preparations on the way [**follow-up MB, GS**].
 - c. As reported during the 8h30 meeting (see [slides](#)) and during the Wednesday’s LMC discussions, ion operation revealed weak point in the DS/ARC of P7 and of P3, as well as in some peculiar regions of other IPs.

- d. A preliminary analysis of the radiation fields is coherent with FLUKA predictions. This topic is strongly linked with the capability of data monitoring and will be treated in the MCWG. The analysis of equipment failures is so far (fortunately!) limited by the lack of statistics (few events); this is a good point for operation but less from the analysis point of view → outcome of the equipment analysis will be followed-up in the RadWG.
 - e. For the P5 relocation, the baseline for relocation has been presented to the R2E Project Committee and the approach has been agreed upon:
 - i. full relocation into the bypass/UL + additional installations in the USC
 - ii. cabling through ducts to be drilled and the UP
 - iii. no gallery required for R2E reasons
 - f. In Chamonix, two presentations related to R2E are foreseen: the first one in the “planning” session (with title “R2E relocation and shielding activities”) to be presented by ALP and the second one in the “High Intensity” session (with title “R2E Reality of Fata Morgana [title imposed by organisers) to be presented by MB. **[follow-up ALP, MB]**
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Work-Packages report

Integration/Implementation (ALP)

- Feasibility study of P5 relocation: foreseen full relocation of the UJ56 equipment in the bypass. The planned activities will span over 15 months (according to the current planning and prior final optimisations), with a foreseen budget of ~3.5 MCHF, excluding the civil engineering. SR asks if the additional space required by a possible future triplet upgrade is being considered. ALP replies that at present this has not been taken under consideration. However there is still some space available in the bypass. MB comments that for the upgrades of the power converters the idea is that they should move on the surface (SCL development). An additional comment concerns the support frame in the UJ56: the CATIA models are not in agreement with a recent scan performed in the cavern; this will have to be corrected and will also have an impact on the activities at P1. At P5 a problem with the support structure (acceptable load) has to be clarified with GS **[follow-up ALP]**. SR asks the status of the ECRs: ALP comments that the ECR for Fire/ODH has been already prepared while those for the long shutdown will require significantly more time than expected. SR pointed out that the availability of ECRs must be assured sufficiently well in advance in order to allow for comments being possibly integrated in design studies. MB agreed with that, however pointed out that it's also important that all aspects are already carefully considered beforehand in order to avoid surprises at the ECR level. Presence in the ICL meetings and ALP's planning meetings when required from the agenda are thus very important.
- P1: according to the FLUKA studies presented at the ICL (MC), the power converter location in the UL14 and UL16 is possibly not safe for the long-term (exceeding the $10^7 \text{cm}^{-2} \text{y}^{-1}$ threshold). Further studies are required to see where these could be moved. MB asks to JO if there is a way to measure in the tunnel the actual distance between the UX and the UL, to

have a counter check of the drawings. JO confirmed that this can be scheduled for this xMasBreak. MC will provide JO with the exact location. [follow-up JO, MC]

- ALP comments that she prefers not to write the ECR until all questionable points have been cleared, in order to avoid coming back to the same points twice (P5 ECR ok, P1 and P5 ECR on hold). MB suggested that parts of the ECRs can already be prepared in parallel and iterated with him in order to save time.
- In Chamonix ALP will show the new updated baseline solutions together with open questions still on hold.
- The call for tender of all shielding (cast-iron) blocks has been launched successfully.

Power Converters (MB on behalf of YT)

- The R&D Project has been launched as well as the conceptual design. The most important phase now will be devoted to component testing selection, mainly under responsibility of EN/STI and TE/EPC. A respective test plan is to be developed with high-priority for the early radiation tests in 2011 [follow-up GS, YT, MB]
- A large number of components is to be tested in 2011. A testing scheme has been set up between TE/EPC and EN/STI.
- For what concerns manpower, YT got 2 additional fellows, one expert in radiation tolerant equipment and the other expert in power converter design.

Measurement and Calculation WG (MC) (slides)

- The activities of the WG are focused on monitoring of LHC critical areas of concern for R2E, on the comparison and benchmarking with expected radiation levels, on the improvement of the Monitoring Tools, on the improving of the RadMon coverage of critical areas as well as in extrapolation of the data towards nominal LHC operations.
- The main findings and actions performed up to now are summarized:
 - New release of the LHC Monitoring Tool ([link](#)) together with a tool to report bugs and request for new features ([link](#))
 - New FLUKA calculation for P1 and for P8. In this latter case a global evaluation of the dose and HEH fluence for 2010/2011 and nominal operation has been performed, together with a first application benchmark between RadMons and RAMSES detectors. An EDMS note is being published ([link](#))
 - Improving of RadMon monitor locations in critical areas, to be performed during the next xMas break ([link](#)). An updated/operative version is being discussed with EN/STI/ECE.
 - The preliminary analysis of the BLMs and RadMon data should allow to estimate a BLM/RadMon count ratio (accurate at least within a factor 2-3), to be used in locations where the RadMon coverage is not sufficient (e.g. the ARC).
 - The update of the Layout Drawings is well underway, and shall be concluded before Chamonix, including not only RadMons but also RAMSES and beam intercepting devices ([link](#)).
 - A first version of the Weekly Radiation Report is available for comments: presently it is a pdf map with critical loss locations around the machine as well as an Excel file where detailed information of the losses in the various IR is presented ([link](#)). This will

be the basis for a weekly report next year to be distributed to the equipment owners once “digested” by the R2E team.

Beam Operation (MP)

- Update of ion operation: a recently performed wire scan (located in 5R/L4) induced a dump in Q9 (10L4!). This confirms “strange” loss locations, not observed during the proton run, mainly due to the different loss locations of the ions once they get off-momentum and off-orbit. The present cumulated luminosity during ion operation is $\sim 7 \text{ ub}^{-1}$.
 - Next year operation with protons will most probably with 75 ns bunch spacing. In order to run with the 50 ns one, the machine will need to undergo too intense scrubbing, not acceptable by OP and also having an impact on R2E, due to the increase beam-gas interaction that might play a role for the losses. The final decision will be taken during Evian and Chamonix. MB asks if there are already fixed objectives in terms of energy and luminosity for 2011 and eventually for 2012. MP replies that at present there is a big unknown for the beam energy next year, since there is an increasing pressure to move to 4 TeV operations.
 - MP also suggests that a formal request for specific loss maps in specific locations could be put forwards during Chamonix if required for R2E [**follow-up MC, MB**].
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Next meeting

Next meeting will be announced in due time.

The next R2E Committee Meeting is scheduled the 13th January 2011.