

HiRadMat meeting on 26th January 2009

By Adriana Rossi

Present: Steve Myers, Vincent Vuillemin, Frederick Bordry, Paul Collier, Rudiger Schmidt, Malika Meddahi, Christoph Hessler, Ralph Assmann (chairman), Adriana Rossi (scientific secretary), Heinz (on behalf of Helmut) Vincke, Ilias Efthymiopoulos

Beam test stand for materials, collimators and absorbers. –Presentation to the management of the accelerator sector on Monday, January 26th, 17h00.

Scope of the meeting is to see if management agrees with the project before going on with detailed work.

1. Ralph

- a. Explained that the 'Test Facility for High Power LHC Beam Type' is required to test accelerator materials and components for robustness against beam shock impact, prior installation – given that LHC beam is several orders of magnitudes above the damage thresholds of most robust materials.
 - b. Showed that there is room for 2 collimators or for a magnet
 - c. Stated that TT40 is no longer a good solution, mainly to avoid interference with LHC operations.
 - d. Gave summer 2010 as time framework for HiRadMat Facility to be operational in order to give enough time to change collimator design if necessary.
- Discussion took place on the necessity of testing cryo-magnets. RA said that it has been proposed to test quench and damage limits of magnet modules off-line, relying on a reduced cooling system. SM worried about the overhead deriving from cryogenics operations. It was agreed that the first priority of the facility is to test collimators for phase II, and to postpone such discussion to a later stage.
- PC commented that the fact that a dedicated facility is built should not imply that tests are made without trying to minimise the amount of material irradiated. RA replied that each test should follow the standard approval lines and more in general the facility should meet ALARA recommendations.
- VV asked if the disposal of radioactive material is included in the budget. RA/IE answered that the dismantling is included but not the cost for disposal. *To be checked.*

2. Christoph

- a. Showed 3 possible locations (T1, TT61 and WANF/T9) where to place the line after branching off from the TI 2 transfer line. (~200m of existing line, ~200m of new line). Optics simulations were performed for all 3 solutions and the example for the preferred solution (WANF/T9) was shown.
- b. Described the design requirements; to remark the wide range of beam size, and no need of additional new magnets.

- c. Presented a somewhat detailed budget estimate for each of the options (all more or less equivalent and around 2MCHF).
- SM asked which is the total proton dose envisaged, IE replied few 10^{16} p/y, as described in the specification for a [Test Facility with High Power LHC Type Beam](#).
 - Management enquired the origin of the magnets, showing concern that a sufficient number of spares should be reserved for SPS/CNGS operations. MM replied that all magnets are taken from storage, including MBS. CH said that there should remain 1 MBS magnet as spare. **A complete list of remaining spares for each magnet type will be compiled** in collaboration with magnet colleagues.
 - SM asked how long the facility lifetime foreseen. CH replied 20y.
 - FB asked if the electricity distribution is included in the budget. MM replied that EN/EL (Sebastien Pelletier) reckons that there should be no need of additional distribution boxes. **To be checked.**
 - PC asked which parts of the injection line are on the critical paths. MM said that refurbishing (or changing type) of magnets, and ordering power convertors and beam instrumentation is urgent if one wants to start installation during the next shut-down.
 - FB stated that the CERN personnel working time should be included in the estimates, especially given the present over-busy period. **To be added.**
 - VV said that the 15kCHF estimate for draftsmen seem too little. **To be checked.**
 - IE commented that if the project does not go ahead there would be no need in going into detailing manpower budget.
3. Ilias then showed preferred solution WANF/T9:
- a. Illustrated the HiRadMat Exp. Area-WG. The pictures show some equipment with rust.
 - b. Reminded that the foreseen 10^{16} p/y < 1000 times what used in CNGS or SPS North Area
 - c. Explained that the T9 is planned to be used as dump, and therefore would need some additional material. He proposed that some of the concrete blocks at present in T1/TTC6 could be moved to T9 (and the remaining stored for future needs).
 - d. He showed that the experimental area would be installed upstream the T9. In this way the radiation dose to personnel will be reduced.
 - e. Pointed out the necessity of cleaning up 160m of tunnel for any unnecessary material. This material would be 'conditioned', stored in the WANF tunnel and be ready for disposal.
 - f. He stressed the fact that HiRadMat is meant to be a facility and that each new test may have additional/different requirements and equipment. One should try to and anticipate as much as possible to reduce need of installation once the zone is more radioactive.
- VV asked if the energy density deposited on the test material is varied by varying the beam size. RA said that this will be done with a tuneable line and the beam line design presented has this possibility.
 - PC asked which would be the implications on the HiRadMat project if LHC runs throughout the winter shut-down. RA said that LHC operations will have the absolute priority.

- Management asked if access system (only one in place), radiation monitoring, radiation remote handling had been included in the budget. IE replied that there should be no need for a different access system. PC replied that past experience showed differently. *To be checked.*
 - PC stated that the 550 kCHF foreseen for dismantling (which does not include waste disposal), seem too little. IE maintained this estimate based on past offers. *To be checked.*
 - PC also said that T9 was designed to be completely removed exactly to reduce radiation dose to personnel when passing. MM pointed out that for this very reason they have foreseen a drift tunnel for personnel, running besides T9.
 - VV asked about the present ventilation system. IE said that presently there is only natural ventilation from the BA7 units. For HIRADMAT the system will have to be refurbished, first with a simple flow, while in the future they would like to installed active ventilation with filters (included in the proposal).
4. Heinz (on behalf of Helmut Vincke) presented the radiation levels in the WANF/T9 tunnel.
- a. With the present installation, the measured data show a peak ~ 900 uSv/h at the beam entrance window of the T9 target station, reduced to 300uSv/h by the marble shielding.
 - b. Gamma measurements show that the concrete tunnel walls are activated. Helmut ran FLUKA simulation to try estimating the actual values after dismantling. Similar values (200-300uSv/h maximum) are expected to be found around the same location after dismantling (empty tunnel). He confirmed that the dose will be minimised if the experimental area is placed upstream T9.
 - c. The dose rate due to HiRadMat operation (about 200 uSv/h after 1 month cooling time) will come mainly from equipment and will be higher if material with higher Z than copper is used.
 - d. The collective dose received during the dismantling in 1992 was of 200 mSv, while the activation was twice as much. Basing on these data and comparison with the current layout, at maximum a similar collective dose is to be expected for the dismantling to be carried out. It should be noted that this value is very conservative because it does not take into account that the T9 target station could be left in place and better shielded.
- PC said that the 200mSv collective dose seems very high compared to the SPS+CNGS shut down dose of 39mSv. He added that careful planning should reduce it considerably. *To be checked.*
5. Ralph wrapped up the preliminary proposal and summarised the costs (total of 4.4 MCHF, if the WANF cleanup cost is included). The cost is about twice as initially approved within the budget for phase II of LHC collimation, which includes this test area. No cheaper solution could be identified. Ralph asked for strategic input from the sector management before more work is invested and detailed work packages are defined with group leaders.
- Discussion on whether the facility is strictly required and consequences if not built was initiated. RA reminded the essential lessons from the TT40 tests of the TCSG collimator and said that such tests

are crucial not only for equipment to be installed in the future, but also for understanding a problem should a malfunctioning of the machine occur. SM said that this latter argument is stronger than the first. RA and RS strongly insisted on the need to test future near-beam devices before installation into the high-power LHC beam. Damage in the LHC and costs for repairs could otherwise be severe.

- SM said that the costs of 0.6MCH for the cleaning of the WANF tunnel should be part of the project.*
- PC pointed out that a new-moved TeD (or similar) should be put in place to avoid misfiring to TI2 while HIRADMAT will operate. MM replied that this is discussed in TE/ABT but not yet added to the budget.*
- RS affirmed that the 2010 target may be too optimistic and that one should follow LHC planning.*
- FB said that resources are tight for several ongoing activities and projects. SM commented that priority will be discussed at the sector meeting.*
- SM commented that the facility could charge laboratories or industries external to the EU/CERN council, which will reduce operational costs. **To be evaluated.***
- SM concluded that the **HiRadMat WG should make more complete cost estimates** and include CERN man power, waste disposal, instrumentation for radiation dose measurements and access requirements, once a go ahead comes from the sector. The preliminary proposal will be evaluated at the upcoming sector meeting. SM will inform RA in about 3 weeks' time on the strategic direction to be taken.*

END OF THE MEETING