Production Readiness Review

for the Muon MWPC,
LNF Production Site.

The report from the referees.

The referees were
Hans Jurgen Hilke, Rosario Nania, Antonio Pellegrino and Olav Ullaland.

Ex-officio:
Pierluigi Campana, Giovanni Carboni, Burkhard Schmidt and Werner Witzeling.

The PRR was held at Laboratori Nazionali di Frascati, LNF, the 4 December 2003. It was followed by a visit to the chamber production sites. The agenda and the transparencies that were presented can be found at http://agenda.cern.ch/fullAgenda.php?ida=a036499#2003-12-04

This review followed the EDR with reference EDMS No 381 979.

The following items were covered
− Construction procedures, Travellers and Quality Control
− Source and cosmic ray tests
− Test beam results on M3R3 chambers
− Access to chamber construction information
− Interface and integration issues
− Material procurement, logistics, manpower and production plan
− Guard wire studies

General comments.

The review was very well prepared and the material presented fully covered all aspects which needed discussion. We would like to congratulate the team for the very good presentations and for the excellent state of the production sites. These sites are, in the view of the reviewers, very well thought through and optimised for handling and speed of production as well as a continuous and rigorous quality control. It is also clear that the team is highly motivated and professional in all aspects of the chamber production.

The production schedule is tight and the definition of the M1 chamber characteristics looks to be urgent as the production of these chambers is scheduled to start in October 2004. We would therefore urge the Muon Project to allocate more effort to the finalisation of the design of this detector wall. Detector integration issues have progressed rapidly since the PRR at CERN. This work should, in our view, have a very high priority and we clearly support the effort to build a mock-up.
Even though all detail drawings related to the first chambers to be produced are ready, they are not yet available in EDMS. It is expected that the documentation will be brought up to date shortly.

**Matters arising from the EDR.**

The reviewers were satisfied with the actions taken on the points listed in the recommendation in the EDR report.

**Recommendations for the production.**

1. The final acceptance test of a chamber should be decided. It should, in the view of the reviewers, consist of the source scan and a long term test, in the range of 10 to 15 days, at nominal HV and gas flow. A large sample of the chambers produced at LNF, if possible all, should also be tested in the cosmic ray set-up with final electronics. It would be preferable if this or comparable procedures could be made common to all production sites. We understand that the scan with a strong $^{137}\text{Cs}$ $\gamma$ source could be difficult to implement at some production sites. Equivalent methods should be found for these sites.

2. HV connections and HV leads currently proposed should be discussed and approved by the GLIMOS of LHCb together with the CERN TIS commission.

3. The reviewers were impressed by the effort that had gone into the creation of a database for the measurements done during the construction of a chamber. We would encourage the Muon Project to adopt this or similar systems, for all production sites and furthermore develop a uniform interface between this database and the Detector Description DataBase (DDDB) as well as the Conditions DB for LHCb.

4. The question concerning the diameter and the material of the guard wires should be settled. If further tests have to be made, it should have the highest priority.

5. Some safety aspects at the production sites should be revisited. The use of isopropyl alcohol, the radioactive sources and the laser at the soldering station should be referred to the Prevention and Protection Unit at LNF.

6. The chamber which was used for irradiation and ageing studies should be tested and opened for inspection.

**Conclusion.**

The conclusion of this PRR is that the LNF Site is ready for production, subject to the points mentioned above have been properly addressed in due time.